S-58

ENC Validation Checks

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1 INTRODUCTION

This document was previously Appendix B.1, Annex C of S-57 Edition 3.1. It specifies the minimum checks that producers of ENC validation tools should include in their validation software. This software must be used by hydrographic offices to help ensure that their ENC data are compliant with the S-57, Appendix B.1 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. The document provides checks for individual ENC cells however additional checks applicable to ENC Exchange Sets are included in part 3.3.

1.1 Document Layout

The validation checks are laid out as follows;

3.4 Checks relating to Use of the Object Catalogue for ENC					
No.	**Check description**	**Check message**	**Check solution**	**Conformity to:**	**Cat**
1500a	For each CBLARE feature object which is WITHIN OR OVERLAPS a LNDARE feature object of geometric primitive area.	CBLARE object overlaps a LNDARE object.	Amend objects to remove overlap.	Logical consistency	W
1500b	For each SBDARE feature object which is WITHIN OR CROSSES a LNDARE feature object of geometric primitive area.	SBDARE object is within or crosses a LNDARE object.	Amend objects to remove overlap.	Logical consistency	W
~~1501~~	*Check removed.*				

Columns are as follows

1. Check number
2. Check description written in a defined syntax (wherever feasible) as defined in this document (see 1.4).
3. Check message to provide the user with meaningful information.
4. Check solution, suggested action to rectify a warning or error.
5. Conformity to, reference to the location within the relevant section of S-57.
6. Check classification - Critical Error (C), Error (E), Warning (W) (see 1.2).

1.2 Check Classification

The check classification is intended to ensure that published ENC data is free of errors which would affect the use of an ENC in ECDIS. In some cases it has been necessary to diverge from the strength of wording used in the S-57 ENC Product Specification or the Use of the Object Catalogue for ENC. In such cases the impact on the user has been the overriding factor for consideration. The classifications have the following meanings:

C	Critical Error	An error which would make an ENC unusable in ECDIS through not loading; or causing an ECDIS to crash; or presenting data which is unsafe for navigation.
E	Error	An error which may degrade the quality of the ENC through appearance or usability but which will not pose a significant danger when used to support navigation.
W	Warning	An error which may be duplication or an inconsistency which will not noticeably degrade the usability of an ENC in ECDIS.

At a minimum validation software must group validation reports using these categories. They may also support sub-grouping of related checks such as those relating to geometric validity or attribute consistency. Software may allow checks of type Error or Warning to be deselected completely or by such categories.

1.3 Minimum Check Standard

The critical checks included in S-58 constitute the minimum check standard for ENCs. All published ENCs must conform to the checks classified as Critical within this document.

1.4 Guidelines on the Check Syntax

In order to ensure that checks can be interpreted clearly and consistently a defined syntax has been used for the reworded checks wherever possible. Each check is a statement which generates a Critical Error, Error or Warning if the expression returns ‘true’.

In the below example the check would return true and give an error for each BERTHS feature object which carries the attribute VERDAT;

No	Check description	Check Message	Check solution	Conformity to:	Cat
1571	For each BERTHS feature object where VERDAT is Present.	Prohibited attribute VERDAT populated for a BERTHS object.	Remove value of VERDAT from BERTHS object.	4.6.2	E

The elements of the syntax are defined as follows:

1.4.1 Comparison and Logical Operators

The following comparison and logical operators are used:

Equal
Not equal
Less than
Less than or equal to
Greater than
Greater than or equal to
AND
OR (inclusive OR)

1.4.2 Spatial Operators

Within this document the spatial operators (EQUALS, DISJOINT, TOUCHES, WITHIN, OVERLAPS, CROSSES, INTERSECTS, CONTAINS, and COINCIDENT), based on those laid out in the ISO standard 19125-1, are used to describe spatial relationships tested within the checks. They are described in Section 2 of this document.

For all spatial operators a default tolerance of 1/COMF should be applied in validation software.

1.4.3 Values

The following terms are used for types of values:

- Present – The attribute is present and may or may not be populated with a value.
- Known – The attribute is Present and has been populated with a value.
- Unknown – The attribute is Present, but has not been populated with a value.
- Optional – The encoding of the attribute is optional. It may be Present or not Present.

The following terms are used in relation to ISO 8211 unsigned 8-bit integer sub-fields:

- Null – The sub-field has a value of null (255).
- notNull – The sub-field value is not Null.

1.4.4 Statements

The checks must be structured using the following statements:

- If – A conditional statement which determines whether a further statement should be executed.
- For – Repeat a statement until a statement is met (evaluates to “true”). For the purposes of the checks the statement being met generates the error or warning specified.

2 GEOMETRY AND SPATIAL OPERATORS: TERMS AND DEFINITIONS

2.1 ISO 19125-1:2004 Geometry

This Section defines ISO 19125-1:2004 geometric terms used in this document.

2.1.1 Definitions for ISO 19125-1:2004 Geometry

Note that these definitions are for the primitives defined by ISO 19125-1:2004 which are single Point, single Line and single Area geometry objects.

- *Polygon* – A Polygon has a geometric dimension of 2. It consists of a boundary and its interior, not just a boundary on its own. It is a simple planar surface defined by 1 exterior boundary and 0 or more interior boundaries. The geometry used by an S-57 ENC Area feature is equivalent to a Polygon.
- *Polygon boundary* – A Polygon boundary has a geometric dimension of 1 and is equivalent to the outer and inner rings used by an S-57 ENC Area feature.
- *LineString* – A LineString is a Curve with linear interpolation between Points. A LineString has a geometric dimension of 1. It is composed of one or more segments – each segment is defined by a pair of points. The geometry used by an S-57 ENC Line feature is equivalent to a LineString.
- *Line* - An ISO 19125-1:2004 line is a LineString with exactly 2 points. Note that the geometry used by an S-57 ENC Line feature is equivalent to a LineString, not a line in ISO 19125-1:2004 terms. In this document the term Line refers to an S-57 ENC Line feature or a LineString which can have more than two points.
- *Point* – Points have a geometric dimension of 0. The geometry used by an S-57 ENC Point feature is equivalent to an ISO 19125-1:2004 point.
- *Reciprocal* – inversely related or opposite.

The following table matches 19125-1:2004 geometric terms to S-57 ENC terms:

ISO 19125-1:2004	S-57 ENC
Polygon	Area feature geometry OR Face
Polygon boundary	Exterior and interior boundaries
LineString	Line feature geometry OR Line OR series of edges
Point	Point feature geometry OR Node OR vertex

2.1.2 Definition of Symbols Used in ISO 19125-1:2004

I = interior of a geometric object
E = exterior of a geometric object
B = boundary of a geometric object
∩ = the set theoretic intersection
U = the set theoretic union
∧ = AND
Ú = OR
≠ = not equal
∅ = the empty or null set
a = first geometry, interior and boundary (the topological definition)
b = second geometry, interior and boundary (the topological definition)
dim = geometric dimension – 2 for Polygons, 1 for LineStrings and 0 for Points

Dim(x) returns the maximum dimension (-1, 0, 1, or 2) of the geometric objects in x, with a numeric value of -1 corresponding to dim (∅).

Note:
- Neither interior nor exterior include the boundary (that is I, E and B are mutually exclusive).
- The boundary of a Polygon includes its set of outer and inner rings.
- The boundary of a LineString is its end points except for a closed LineString, which has no boundary; the rest of the LineString is its interior.
- A Point does not have a boundary.

2.2 ISO 19125-1:2004 Geometric Operator Relationships

In ISO 19125-1:2004 (see Reference [1]), the dimensionally extended nine-intersection model (DE-9IM) defines 5 mutually exclusive geometric relationships between two objects (Polygons, LineStrings and/or Points). One and only one relationship will be true for any two given objects (see Reference [2]):

1. WITHIN
2. CROSSES
3. TOUCHES
4. DISJOINT
5. OVERLAPS

There are others that help further define the relationship:

1. CONTAINS
- the reciprocal of WITHIN
- within is the primary operator; however, if **a** is not within **b** then **a** may contain **b** so CONTAINS may be the unique relationship between the objects
2. EQUALS
- a special case of WITHIN / CONTAINS
3. INTERSECTS
- reciprocal of DISJOINT
- have at least one point in common
4. COVERS and is COVERED_BY
- reciprocal operators
- extends CONTAINS and WITHIN respectively
5. COINCIDENT

Note that COVERS, COVERED_BY and COINCIDENT relational operators are not described in the ISO 19125-1:2004 document.

The formulas given in this Section (for example a.Disjoint(b) $\Leftrightarrow a \cap b = \varnothing$) are the generalized ones given for ISO 19125-1:2004, not the more specific DE-9IM formulas (that is, DE-9IM predicates). The generalized formulas use topologically closed notation (that is, geometry includes the interior and boundary unless otherwise stated), whereas the DE-91M formulas refer to the interior and boundary of geometry separately. Note that different versions of documents describing ISO 19125-1 give different generalized formulas – this Section is using the formulas that are the most consistent with the DE-9IM predicates. If a generalized formula appears to contradict a DE-9IM predicate as defined in ISO 19125-1:2004, the DE-9IM predicate takes precedence. Software is expected to be consistent with DE-9IM predicates.

2.3 How the Relationships Apply to S-57 ENC Features

Geometric relationships will be tested on an entire S-57 ENC feature object as a single geometric entity. Note that S-57 ENC Point, Line and Area feature geometry is equivalent in ISO 19125-1:2004 terms to Point, LineString and Polygon geometry respectively.

A Line feature in S-57 ENC may be made up of several individual edges. The geometric relationship operators used with a Line feature will consider the sequence of edges as a single geometry (LineString).

A test on an Area feature will operate on the entire Polygon.

In an S-57 ENC file a Line or Area feature may be split into pieces as a result of a cutting operation from a data source. In that case each feature record in the dataset is treated as a separate LineString or Polygon when testing geometric relationships.

If a test intends to operate only on a feature's specific components (Polygon boundary (all rings), Polygon outer ring, Polygon inner rings, edges, vertexes or nodes) then it must make this explicit in the description of the test. When a specific linear portion is specified in a test (Polygon boundary, edge) then it is treated as a LineString while individual vertexes or points will be treated as points.

For example a test to look for cases where object class A OVERLAPS object class B would operate on the entire geometry. While a test to see if boundary of Area object class A OVERLAPS an edge of Line class B will be comparing Area boundaries to edges using Line to Line comparisons.

2.4 Geometric Operator Definitions

The ISO 19125-1:2004 definitions referenced in this section, refer to section 6.1.14.3 entitled "Named spatial relationship predicates based on the DE-9IM" in the ISO 19125-1:2004 document.

(In the diagrams within this Section LineString corresponds to the S-57 ENC Line geometric primitive.)

EQUALS – Geometric object **a** is spatially equal to geometric object **b**.

The two geometric objects are the same. This is a special case of WITHIN.

Examples of the EQUALS relationship

Note: ISO 19107:2003 describes equality more formally as:

> Two different GM_Objects are equal if they return the same Boolean value for the operation GM_Object::contains for every tested DirectPosition within the valid range of the coordinate reference system associated to the object.
>
> NOTE: Since an infinite set of direct positions cannot be tested, the internal implementation of equal must test for equivalence between two, possibly quite different, representations. This test may be limited to the resolution of the coordinate system or the accuracy of the data. Application schemas may define a tolerance that returns true if the two GM_Objects have the same dimension and each direct position in this GM_Object is within a tolerance distance of a direct position in the passed GM_Object and vice versa.

For the purposes of S-58, a GM_Object is any spatial object as described in A.1.1 (Polygons, LineStrings, and Points). A spatial object is always equal to itself; that is, **a** EQUALS **a** is always true.

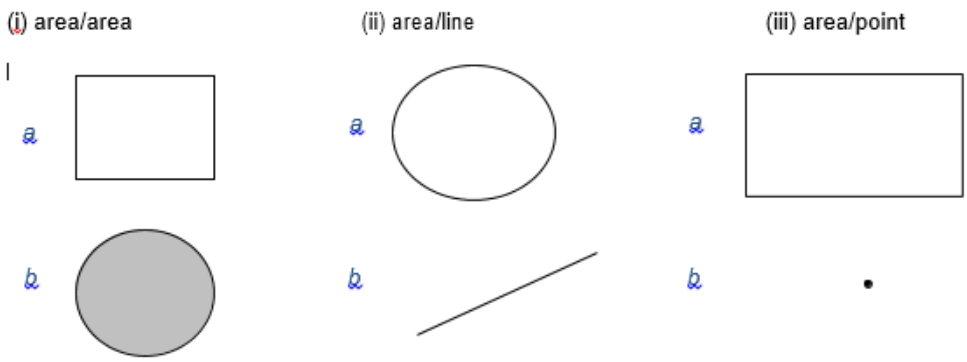
DISJOINT – Geometric object **a** and geometric object **b** do not intersect.

The two geometric objects have no common points.

The ISO 19125-1:2004 definition of DISJOINT is:

$$\boldsymbol{a}.Disjoint(\boldsymbol{b}) \Leftrightarrow \boldsymbol{a} \cap \boldsymbol{b} = \varnothing$$

This translates to: **a** is disjoint from **b** if the intersection of **a** and **b** is the empty set.



Examples of the DISJOINT relationship

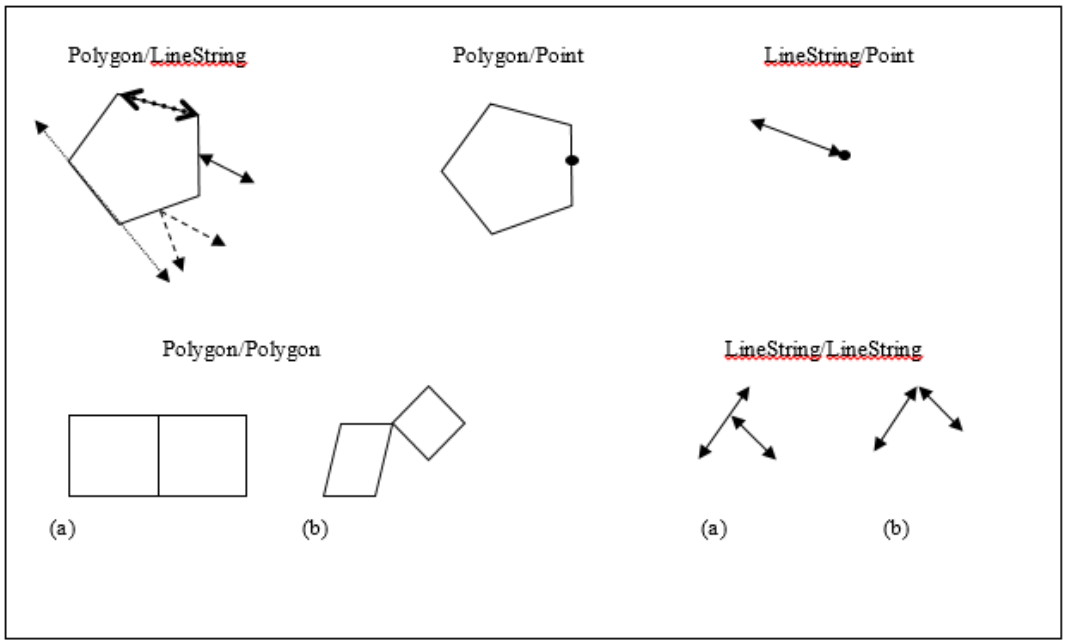
TOUCHES – Geometric object **a** intersects with geometric object **b** but they do not share interior points.
Only the boundary of one geometry intersects with the boundary of another geometry.
The only thing the geometric objects have in common is contained in the union of their boundaries.

The ISO 19125-1:2004 definition of TOUCHES is:

$$\boldsymbol{a}.Touch(\boldsymbol{b}) \Leftrightarrow (I(\boldsymbol{a}) \cap I(\boldsymbol{b}) = \varnothing) \wedge (\boldsymbol{a} \cap \boldsymbol{b}) \neq \varnothing$$

This translates to: **a** touches **b** if the intersection of the interior of **a** and the interior of **b** is the empty set AND the intersection of **a** and **b** is not the empty set.

Note: This operator applies to the Area/Area, Line/Line, Line/Area, Point/Area and Point/Line relationships. It does not apply to a Point/Point relationship since points do not have a boundary.



Examples of the TOUCHES relationship

Note the Polygon touches Polygon example (a) is also a case where the Polygon boundaries are COINCIDENT. In the Polygon/LineString example two of the LineStrings that share a linear portion of the Polygon boundary are also COINCIDENT with the Polygon boundary.

WITHIN – Geometric object **a** is completely contained in geometric object **b**.

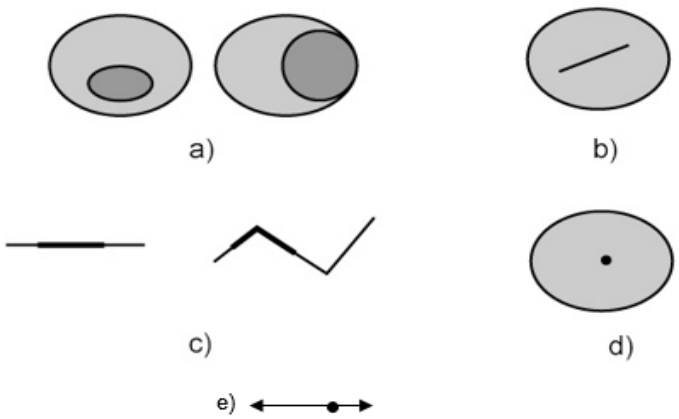
WITHIN includes EQUALS.

The definition of WITHIN is:

$$\mathbf{a}.\ \mathrm{Within}(\mathbf{b}) \Leftrightarrow (\mathbf{a} \cap \mathbf{b} = \mathbf{a}) \wedge (\mathrm{I}(\mathbf{a}) \cap \mathrm{I}(\mathbf{b}) \neq \varnothing)$$

This translates to: **a** is within **b** if the intersection of **a** and **b** equals **a** AND the intersection of the interior of **a** and the interior of **b** is not the empty set.

Note that this formula matches the one given in **the OpenGIS Simple Features Specification for SQL, Revision 1.1 (OpenGIS Project Document 99-049, Release Date: May 5, 1999**) which is the precursor to ISO 19125-1:2004.



Examples of the WITHIN relationship — Polygon/Polygon (a), Polygon/LineString (b), LineString/LineString (c), Polygon/Point (d), and LineString/Point (e)

Note that a Line that completely falls on a Polygon boundary is not WITHIN the Polygon, it TOUCHES it. In that case it would also be COINCIDENT with the Polygon boundary and COVERED_BY the Polygon.

OVERLAPS - The intersection of two geometric objects with the same dimension results in an object of the same dimension but is different from both of them.

For two Polygons or two LineStrings, part of each geometry, but not all, is shared with the other.

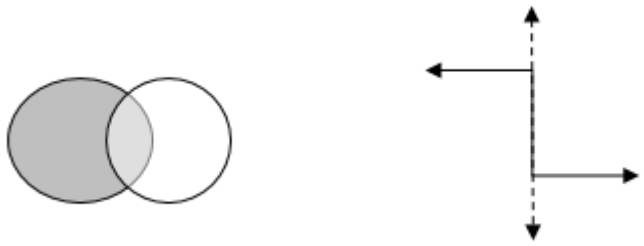
The OVERLAPS relationship is defined for Area/Area and Line/Line relationships. Points are either equal or disjoint.

Note that this does not include lines that cross.

The ISO 19125-1:2004 definition of OVERLAPS is:

$$\mathbf{a}.Overlaps(\mathbf{b}) \Leftrightarrow (dim(I(\mathbf{a})) = dim(I(\mathbf{b})) = dim(I(\mathbf{a}) \cap I(\mathbf{b}))) \wedge (\mathbf{a} \cap \mathbf{b} \neq \mathbf{a}) \wedge (\mathbf{a} \cap \mathbf{b} \neq \mathbf{b})$$

This translates to: **a** overlaps **b** if the geometric dimension of:
(1) the interior of **a**
(2) the interior of **b**
(3) the intersection of the interiors of **a** and **b**
are all equal AND the intersection of **a** and **b** does not equal either **a** or **b**.



Examples of the OVERLAPS relationship

Note Lines that OVERLAP are also COINCIDENT.

CROSSES – The intersection of geometric object **a** and geometric object **b** returns geometry with a dimension less than the largest dimension between **a** and **b** but is not the same as geometric object **a** or **b**.

Two LineStrings cross each other if they meet on an interior point. A LineString crosses a Polygon if the LineString is partly inside the Polygon and partly outside.

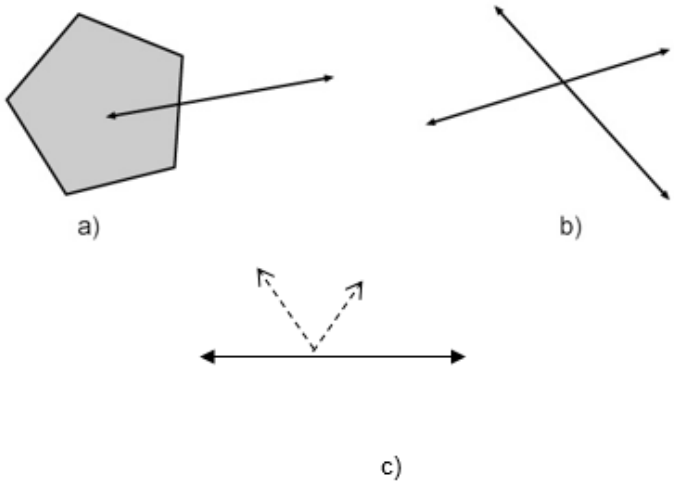
The definition of CROSSES is:

$$\mathbf{a}.Cross(\mathbf{b}) \Leftrightarrow (I(\mathbf{a}) \cap I(\mathbf{b}) \neq \emptyset) \wedge (dim(I(\mathbf{a}) \cap I(\mathbf{b})) < max(dim(I(\mathbf{a})), dim(I(\mathbf{b})))) \wedge (\mathbf{a} \cap \mathbf{b} \neq \mathbf{a}) \wedge (\mathbf{a} \cap \mathbf{b} \neq \mathbf{b})$$

This translates to: **a** crosses **b** if the intersection of the interiors of **a** and **b** is not the empty set AND the dimension of the result of the intersection of the interiors of **a** and **b** is less than the largest dimension between the interiors of **a** and **b** AND the intersection of **a** and **b** does not equal either **a** or **b**.

Note that "$(I(\mathbf{a}) \cap I(\mathbf{b}) \neq \emptyset) \wedge$" was added to the beginning of the ISO 19125-1:2004 formula so that it would not be true for disjoint geometry.

The CROSSES operator only applies Line/Line and Line/Area relationships.



Examples of the CROSSES relationship

Note that example c) shows one solid line and one dashed line – their interiors intersect. If any Line were split into two separate Line features at the intersection point then the relationship would be TOUCHES because a boundary would be involved.

INTERSECTS is the reciprocal of DISJOINT.

The two geometric objects cross, overlap or touch, or one is within (or is contained by) the other. They have at least one common point.

CONTAINS is the reciprocal of WITHIN.

*Given two geometric objects, **a** and **b**, if **a** is within **b** then **b** must contain **a**.*

COVERED_BY (not a standard ISO 19125-1:2004 operator)

No point of geometry **a** is outside geometry **b**.

The definition of COVERED_BY is:

a. Covered_by (**b**) ⇔ (**a** ∩ **b** = **a**)

This translates to: **a** is covered_by **b** if the intersection of **a** and **b** equals **a**.

The following expressions are equivalent to **a** is COVERED_BY **b**:

1. Polygon (**a**) is COVERED_BY Polygon (**b**): Polygon **a** is WITHIN a polygon **b** (WITHIN includes EQUALS)
2. Point (**a**) is COVERED_BY Polygon (**b**): Point **a** is WITHIN or TOUCHES polygon **b**
3. Line (**a**) is COVERED_BY Polygon (**b**): Line **a** is WITHIN polygon **b** or WITHIN the boundary of Polygon **b**
4. Line (**a**) is COVERED_BY Line (**b**): Line **a** is WITHIN Line **b** (WITHIN includes EQUALS)
5. Point (**a**) is COVERED_BY Line (**b**): Point **a** is WITHIN or TOUCHES Line **b**
6. Point (**a**) is COVERED_BY Point (**b**): Point **a** EQUALS Point **b**

Note that the figure below on the left is an example of Lines that are COVERED_BY a polygon.

The figure on the right is <u>not</u> an example of a Line that is covered by a Polygon – it is an example of a Line that TOUCHES a Polygon. In both cases the Lines are COINCIDENT with the Polygon boundary.

COVERS (not a standard ISO 19125-1:2004 operator)

COVERS is the reciprocal of COVERED_BY.

*Given two geometric objects, **a** and **b**, if **a** is* COVERED_BY ***b** then **b** must cover **a**.*

COINCIDENT (not an ISO 19125-1:2004 operator)

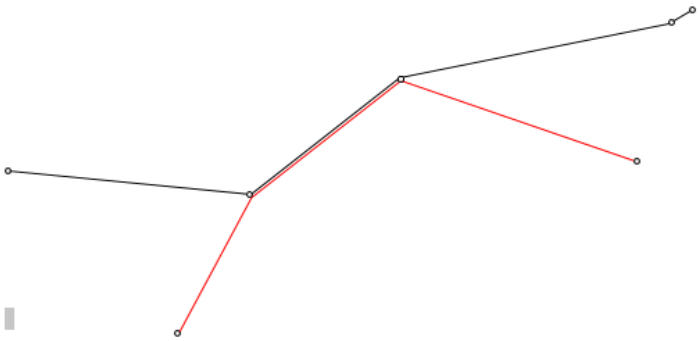
Two geometric Lines OVERLAP or one geometric Line is WITHIN the other. Note that EQUAL Lines are also COINCIDENT by this definition.

The intersection of two geometric Lines results in one or more Lines.

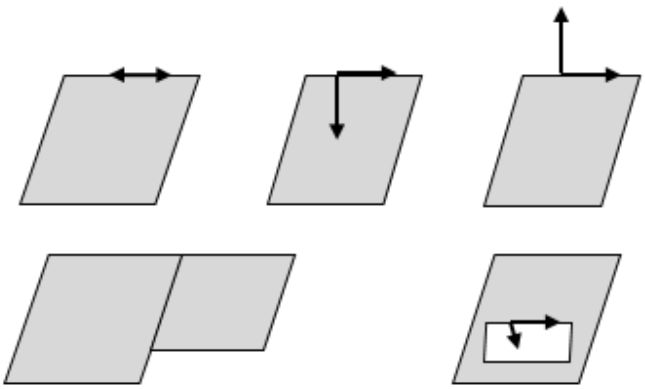
This operator is only to be used to compare a Line with another Line. Note that normally the boundary of a Polygon is not the same as a Line but for this operation the boundary of a Polygon, exterior and interior rings, is treated as Lines for the COINCIDENT test.

The following expressions are equivalent to **a** is COINCIDENT with **b**:

1. Polygon (**a**) is COINCIDENT with Polygon (**b**): The boundary of Polygon **a** OVERLAPS or is WITHIN the boundary of Polygon **b**.
2. Line (**a**) is COINCIDENT WITH Polygon (**b**): Line **a** OVERLAPS or is WITHIN the boundary of Polygon **b**.
3. Line (**a**) is COINCIDENT WITH Line (**b**): Line **a** OVERLAPS or is WITHIN Line **b**.



Example of the COINCIDENT relationship



Above are other examples of objects COINCIDENT with the boundary of a Polygon. LineStrings following a portion of a Polygon boundary or Polygons sharing a boundary portion.

Note that by definition a Line can be COINCIDENT with an interior boundary of a Polygon.

Note that other relationships may also be true such as COVERED_BY or TOUCHES since COINCIDENT is not mutually exclusive.

References

[1] ISO 19125-1:2004, *Geographic Information – Simple feature access – Part 1 Common architecture*

[2] CLEMENTINI, E., DI FELICE, P., VAN OOSTROM, P. *A Small Set of Formal Topological Relationships Suitable for End-User Interaction, in D. Abel and B. C. Ooi (Ed.), Advances in Spatial Databases* — Third International Symposium. SSD 1993. LNCS **692**, pp. 277-295. Springer Verlag. Singapore (1993)

[3] ISO 19107:2003, *Geographic information│ Spatial schema*

[4] OpenGIS Simple Features Specification for SQL, Revision 1.1 *(OpenGIS Project Document 99-049, Release Date: May 5, 1999)*

3 VALIDATION CHECKS

3.1 Checks Relating to S-57 Data Structure

No	Check description	Check message	Check solution	Conformity to:	Cat
1	For each edge which is COINCIDENT with another full or a segment of an edge of the same or another line.	Partially duplicated edges or their segments.	Remove duplication, add nodes and edit edges as required.	Part 2 (2.2.1.2)	E
2	For each edge which does not have a beginning or end node.	VE edge missing beginning or end node.	Add nodes as required.	Part 2 (2.2.1.2)	C
3	For each record where RUIN is Equal to 1 (insert) AND the record identifier NAME (concatenation of the RCNM & RCID subfields) is not unique within the dataset (Base dataset (EN) file and all subsequent Update (ER) files) applicable to a single Edition of an ENC..	Record identifier NAME is not unique.	Amend Record identifier NAME to be unique.	Part 3 (2.2)	C
4	For each RCNM where the value is not in table 2.2 of S-57 Part 3.	Invalid value of RCNM.	Amend RCNM value	Part 3 (2.2.1)	C
5	For each RCID which is Less than 1 OR Greater than 2^{32} -2 (4294967294).	RCID is out of range.	Amend RCID value.	Part 3 (2.2.2)	C
~~6~~	*Check removed.*				
7	For each feature object with invalid AGEN, FIDN or FIDS values.	Invalid values of AGEN, FIDN or FIDS.	Amend AGEN, FIDN or FIDS value.	Part 3 (4.3.1) and (4.3.2)	C
8	For each feature object where an attribute code is repeated.	Duplicate attribute code on an object.	Remove or amend duplicate attribute code.	Part 3 (4.4), (4.5) and (5.1.2)	C
9a	For each feature object of geometric primitive line where ORNT is Not equal to 1 (forward) OR 2 (reverse).	Invalid value of ORNT.	Set value of ORNT to 1 (forward) or 2 (reverse).	Part 3 (4.7.2)	C
9b	For each feature object of geometric primitive line where USAG is Not equal to Null.	Invalid value of USAG.	Set value of USAG to 255 (Null).	Part 3 (4.7.2) and Appendix B.1 (3.8)	C
9c	For each feature object of geometric primitive line where MASK is notNull AND is Not equal to 1 (mask) AND is Not equal to 2 (show).	Invalid value of MASK.	Set MASK to 1 (mask), 2 (show) or Null.	Part 3 (4.7.2) and Appendix B.1 (3.8)	C
10a	For each feature object of geometric primitive point where ORNT is Not equal to 255 (direction is not relevant).	Invalid value of ORNT.	Set ORNT to 255 (direction is not relevant).	Part 3 (4.7.1)	E

10b	For each feature object of geometric primitive point where USAG is Not equal to 255 (Null).	Invalid value of USAG.	Set USAG to 255 (Null).	Part 3 (4.7.1)	E
10c	For each feature object of geometric primitive point where MASK is Not equal to 255 (masking is not relevant).	Invalid value of MASK.	Set MASK to 255 (masking is not relevant).	Part 3 (4.7.1)	C
11	For each edge reference where USAG is Equal to 3 (exterior boundary truncated by the data limit) not also referenced by a M_COVR meta object.	Edge reference with USAG = 3 (exterior boundary truncated by the data limit) is not referenced by a M_COVR object.	Set USAG to 1(exterior) or 2(interior).	Part 3 (4.7.3.3)	E
12	For each feature object (excluding C_AGGR and C_ASSO collection objects) which does not reference a spatial record.	Feature object without geometry.	Remove the feature object or reference the feature object to a spatial record of allowable geometric primitive.	Part 3 (4.7)	C
13a	For each feature object of geometric primitive line which references multiple edges where the vector records are not referenced sequentially.	Edges are not referenced sequentially.	Amend records to reference edges sequentially.	Part 3 (4.7.2)	C
13b	For each feature object of geometric primitive line which references multiple edges where the end node of a vector record is not identical to the beginning node of the following vector record.	Sequential edges do not have the same end and beginning nodes.	Ensure end and beginning nodes of sequential edges match.	Part 3 (5.1.3.2)	C
13c	For each feature object of geometric primitive area where a polygon ring references multiple edges where the vector records are not referenced sequentially.	Edges are not referenced sequentially.	Amend records to reference edges sequentially.	Part 3 (4.7.2) and (4.7.3)	C
13d	For each feature object of geometric primitive area where a polygon ring references multiple edges where the end node of a vector record is not identical to the beginning node of the following vector record.	Sequential edges do not have the same end and beginning nodes.	Ensure end and beginning nodes of sequential edges match.	Part 3 (4.7.2) and (4.7.3)	C
14	For each feature object of geometric primitive area where the exterior boundary shares more than one node with an interior boundary.	Exterior and interior boundaries share more than one node.	Amend boundary to share at most one node.	Part 3 (4.7.3)	C

15	For each feature object of geometric primitive area where the exterior boundary or an interior boundary is not closed.	First and last edge of an area boundary do not meet at a common connected node.	Amend edges bounding the area to meet at a common connected node.	Part 3 (4.7.3.1)	C
16	For each feature object of geometric primitive area where the exterior boundary is not encoded clockwise.	Area exterior boundary not encoded clockwise.	Ensure area exterior boundary is encoded clockwise.	Part 3 (4.7.3.2)	C
17	For each feature object of geometric primitive area where an interior boundary is not encoded counter-clockwise.	Area interior boundary not encoded counter-clockwise.	Ensure area interior boundary is encoded counter-clockwise.	Part 3 (4.7.3.2)	C
18a	For each feature object of geometric primitive area where the number of exterior boundaries is Not equal to 1.	Area object without an exterior boundary or with several exterior boundaries.	Amend geometry so that area object has one exterior boundary.	Part 3 (4.7.3.2) and (4.7.3.3)	C
18b	For each feature object of geometric primitive area where the exterior boundary is not referenced first.	Area object with exterior boundary which is not referenced first.	Amend geometry so that the exterior boundary is referenced first.	Part 3 (4.7.3.1), (4.7.3.2) and (4.7.3.3)	C
18c	For each feature object of geometric primitive area with one or more interior boundaries where any interior boundary does not have USAG set to 2 (interior boundary).	Interior boundary has invalid USAG value.	Amend edge to USAG = 2 (interior boundary).	Part 3 (4.7.3.2) and (4.7.3.3)	C
19	For each edge which is COINCIDENT with the data limit borders (that is limits of M_COVR with CATCOV is Equal to 1 (coverage available)) where USAG is Not equal to 3 (exterior boundary truncated by the data limit).	Edge coincides with the data limit and USAG does not equal 3 (exterior boundary truncated by the data limit).	Amend edge to USAG = 3 (exterior boundary truncated by the data limit) if the real world feature extends beyond the data limit of the cell.	Part 3 (4.7.3.3)	W
20a	For each feature object where a geometric primitive is not one of those permitted.	Geometric primitive of this type is not permitted for this object class.	Use alternative geometric primitive or alternative object class as required.	Part 3 (4.2.1), Appendix B.1 (3.3) and Supplement No.3 Ch.3 (3.3)	C
20b	For each spatial record which is not referenced by a feature object.	Orphaned geometry.	Remove orphaned geometry.	Logical consistency and Part 2 (1)	C
21	For each VRPT field which is not pointed to by an edge vector record.	VRPT field not referenced by an edge vector record.	Ensure VRPT field is referenced by an edge vector record or remove.	Part 3 (5.1.3)	C
22	For each edge where the End node is referenced before the beginning node.	Beginning and end nodes are not in the correct sequence.	Amend edge to reference beginning node before end node.	Part 3 (5.1.3.2)	C
23	For each coordinate which is not a SG2D or SG3D field.	Coordinate is not a SG2D or SG3D field.	Amend coordinate to valid field.	Part 3 (5.1.4)	C

24	For each SOUNDG feature object which does not reference a SG3D field with X, Y and Z values.	SOUNDG does not reference a SG3D field.	Amend coordinate type or values for SOUNDG.	Part 3 (5.1.4.1)	C
25a	For each edge where the beginning and end are not encoded as connected nodes.	Beginning or end nodes of an edge are not encoded as connected nodes.	Amend beginning or end nodes to be connected nodes.	Part 3 (5.1.4.4)	C
~~25b~~	*Check removed.*				
25c	For each edge where the beginning or end node is not referenced using the vector record pointer.	Beginning or end nodes not referenced by the vector record pointer.	Amend edge to ensure beginning and end nodes are referenced.	Part 3 (5.1.4.4)	C
26a	For each subfield where the value is not within the range defined in the S-57 format description.	Subfield value does not conform to S-57 format specification.	Amend subfield value.	Part 3 (7.2.2.1) and (7.3)	C
26b	For each subfield value which is not within the legal range for attribute values (for attribute values of type "float", the resolution given in the format statement by the integer part (for example **XX**.X) must not be checked).	Subfield value outside of the permitted range for an attribute value.	Amend subfield value to permitted attribute value.	Appendix A, Chapter 2	E
27	For each subfield which is not formatted in accordance with S-57.	Subfield not formatted in accordance with S-57.	Amend formatting of subfield value.	Part 3 (7.2.2.2)	C
28	If the count of records in the DSSI field is Not equal to the total number of records.	DSSI field record count incorrect.	Amend the DSSI field record count.	Part 3 (7.3.1.2)	E
29	For each of the following: FFPC-NFPT, FSPC-NSPT, SGCC-CCNC, and VRPC-NVPT subfields where the value is Not equal to the number of records/pointers.	Invalid number of records/pointers in the following FFPC-NFPT, FSPC-NSPT, SGCC-CCNC or VRPC-NVPT.	Amend subfield to equal the number of records/pointers.	Part 3 (7.6.5) (7.6.7), (7.7.1.5) and (7.7.1.3)	C
30	For each of the following: FFPC-FFIX, FSPC-FSIX, SGCC-CCIX, and VRPC-VPIX subfields where the index position for updating is invalid.	Invalid index position for updating in the following subfields FFPC-FFIX, FSPC-FSIX, SGCC-CCIX or VRPC-VPIX.	Amend to valid index position for updating.	Part 3 (7.7.1.5), (7.6.5), (7.6.7) and (7.7.1.3)	C
31	For each edge where SG2D coordinates are identical to the beginning or end node coordinates.	Edge where beginning or end node coordinates are the same as the SG2D coordinates.	Amend SG2D coordinates to differ from beginning and end node coordinates.	Part 3 (7.7.1.6)	C
32	For each record update which does not refer to a valid record NAME.	Record update does not refer to a valid record NAME.	Amend record update to refer to a valid record NAME.	Part 3 (8.3.2)	C
33	For each attribute update which does not refer to a valid record NAME and attribute label/code.	Attribute update does not refer to valid record NAME and attribute label/code.	Amend attribute update to refer to valid values.	Part 3 (8.3.3)	C

34	For each of the following fields FFPT, FSPT or VRPT where the update pointer index does not refer to a valid record NAME and index.	Update pointer index does not refer to a valid record NAME and index for FFPT, FSPT or VRPT.	Ensure update pointer index refers to a valid record NAME and index.	Part 3 (8.3.4)	C
35	For each feature object where RVER is out of sequence.	RVER is out of sequence.	Ensure RVER is sequential.	Part 3 (8.4.2.1) and (8.4.3.1)	C
36a	For each feature or vector update record which is DELETE AND contains further fields.	DELETE update contains additional fields.	Remove additional fields from update record.	Part 3 (8.4.2.2) and (8.4.3.2)	C
36b	For each feature or vector update record which is MODIFY OR INSERT and contains no further fields.	MODIFY or INSERT update does not contain additional fields.	Add additional fields to update record.	Part 3 (8.4.2.2) and (8.4.3.2)	C
~~37~~	*Check renumbered 1006.*				
38	For each update record which contains more than one of the following fields: FFPC, VRPC, FSPC or SGCC.	Update record contains more than one of the following fields: FFPC, VRPC, FSPC or SGCC.	Remove additional fields from update record.	Part 3 (8.4.2.3), (8.4.3.2b), (8.4.2.4) and (8.4.3.3)	C
~~39~~	*Check removed.*				~~C~~
40	For any pair of feature objects of geometric primitive line where class and attribute values are identical AND which have one or two common connected nodes which is (are) a beginning node or an end node of each linear feature AND each common connected node is not shared by more than two objects which are not chained together.	Linear objects with the same class and attribute values which are connected and are not chained together.	Chain linear objects together.	Logical consistency	W
~~41~~	*Check removed.*				
42	For each edge which is referenced by Group 1 objects AND is not referenced by a M_COVR meta object with CATCOV is Equal to 1 (coverage available) which does not appear twice with different ORNT (forward and reverse) values.	Group 1 coverage is not correct, a hole or an overlap exists.	Amend Group 1 coverage, to remove hole or overlap.	Appendix B.1 (3.10.1) and Logical consistency	C
43	For each DEPCNT edge which is not COINCIDENT with the boundaries of two Group 1 feature objects AND is not WITHIN an UNSARE or DRGARE.	DEPCNT does not coincide with two Group 1 objects.	Amend DEPCNT or Group 1 objects as required.	Appendix B.1 (3.10.1) and Logical consistency	W

44a	For each DEPARE feature object which is not an isolated shallow area[1] AND where DRVAL1 is not Equal to a value of VALDCO on DEPCNT feature objects found in the ENC AND is not shallower than the shallowest value of VALDCO contained within the ENC.	The value of DRVAL1 is different from one of the values of VALDCO found in the ENC.	Amend value of DRVAL1 so that it equals a value of VALDCO.	Appendix B.1, Annex A (5.4.3)	W
44b	For each DEPARE feature object which is not an isolated deep area[2] AND where DRVAL2 is not Equal to a value of VALDCO on DEPCNT feature objects found in the ENC AND is not the deepest DRVAL2 contained within the ENC.	The value of DRVAL2 is different from one of the values of VALDCO found in the ENC.	Amend value of DRVAL2 so that it equals a value of VALDCO.	Appendix B.1, Annex A (5.4.3)	W
44c	For each DEPARE feature object which is an isolated shallow area AND where DRVAL1 is not Equal to a value of VALDCO on DEPCNT feature objects found in the ENC AND is not shallower than the shallowest value of VALDCO contained within the ENC AND is not Equal to the shallowest sounding within the DEPARE.	The value of DRVAL1 is different from one of the values of VALDCO found in the ENC or is not equal to the shallowest sounding contained within the DEPARE.	Amend value of DRVAL1 so that it equals a value of VALDCO or the shallowest sounding within the DEPARE.	Appendix B.1, Annex A (5.4.3)	W
44d	For each DEPARE feature object which is an isolated deep area AND where DRVAL2 is not Equal to a value of VALDCO on DEPCNT feature objects found in the ENC AND is not the deepest DRVAL2 contained within the ENC AND is not Equal to the deepest sounding within the DEPARE.	The value of DRVAL2 is different from one of the values of VALDCO found in the ENC or is not equal to the deepest sounding contained within the DEPARE.	Amend value of DRVAL2 so that it equals a value of VALDCO or the deepest sounding within the DEPARE.	Appendix B.1, Annex A (5.4.3)	W

[1] An “isolated shallow area” is a DEPARE feature object that is bound entirely by a single DEPCNT feature object and having DRVAL1 for the DEPARE less than or equal to the VALDCO of the bounding DEPCNT.
[2] An “isolated deep area” is a DEPARE feature object that is bound entirely by a single DEPCNT feature object and having DRVAL2 for the DEPARE greater than the VALDCO of the bounding DEPCNT.

45a	For each feature object (excluding BERTHS, CBLOHD, CBLSUB, CONVYR, DWRTCL, FERYRT, MARCUL, MORFAC, NAVLNE, PIPSOL, RCRTCL and RECTRC) of geometric primitive line which is COINCIDENT with another feature object of the same class and geometric primitive.	Coincident linear objects of the same class.	Remove coincident object.	Logical consistency	W
45b	For each BERTHS, CBLOHD, CBLSUB, CONVYR, DWRTCL, FERYRT, MARCUL, MORFAC, NAVLNE, PIPSOL, RCRTCL, or RECTRC feature object of geometric primitive line which is COINCIDENT with another feature object of the same class and geometric primitive and the same attribute values.	Coincident line objects of the same class and attribute values.	Remove coincident object.	Logical consistency	W
46	For each feature object where DATEND and DATSTA are Known AND DATEND is Less than or equal to DATSTA.	DATEND is less than or equal to DATSTA.	Amend values of DATEND or DATSTA accordingly.	Logical consistency	E
47a	For each LIGHTS or RTPBCN feature object where SECTR1 is Known AND SECTR2 is Unknown OR is Equal to SECTR1. (0 and 360 must be treated as the same value.)	SECTR2 not populated with a valid value, must not be the same as SECTR1.	Populate SECTR2 with a valid value.	Logical consistency	E
47b	For each LIGHTS or RTPBCN feature object where SECTR2 is Known AND SECTR1 is Unknown OR is Equal to SECTR2. (0 and 360 must be treated as the same value.)	SECTR1 not populated with a valid value, must not be the same as SECTR2.	Populate SECTR1 with a valid value.	Logical consistency	E
48	For each M_SREL meta object where SCVAL1 and SCVAL2 are Known AND SCVAL2 is Less than SCVAL1.	SCVAL2 is less than SCVAL1.	Amend values of SCVAL1 or SCVAL2 accordingly. The value of SCVAL2 must be greater than SCVAL1.	Logical consistency	E
49	For each feature object where DRVAL1 and DRVAL2 are Known AND DRVAL2 is Less than DRVAL1.	DRVAL2 is less than DRVAL1, DRVAL2 must be greater than or equal to DRVAL1.	Amend the values of DRVAL1 or DRVAL2 as required.	Logical consistency	E

50	For each RECTRC feature object of geometric primitive line where CATTRK is Equal to 1 (based on a system of fixed marks) OR NAVLNE feature object where its nodes/vertices do not lie on a straight (rhumb) line OR orthodromic line.	RECTRC where CATTRK = 1 (based on a system of fixed marks) or NAVLNE is not a straight line.	Amend geometry to a straight line.	Logical consistency	E
51a	For each COALNE feature object which is COINCIDENT with a SLCONS feature object of geometric primitive line.	COALNE and SLCONS objects share an edge.	Amend objects so that they do not share an edge.	Logical consistency	W
51b	For each COALNE feature object which is COINCIDENT with a SLCONS feature object of geometric primitive area where WATLEV is Equal to 1 (partly submerged at high water) OR 2 (always dry) OR is not Present that is WITHIN a LNDARE feature object of geometric primitive area.	COALNE and SLCONS with illogical values of WATLEV overlap.	Amend objects so that they do not overlap or amend WATLEV values.	Logical consistency	W
52a	For each LNDELV feature object of geometric primitive line which is not COVERED_BY a LNDARE feature object of geometric primitive area.	Linear LNDELV object not covered by area LNDARE.	Ensure linear LNDELV object is covered by a LNDARE.	Appendix B.1, Annex A (4.7.2, 4.7.4, 6.1.1 and 6.2.1)	E
52b	For each LNDELV feature object of geometric primitive point which is DISJOINT from a LNDARE feature object of any geometric primitive AND is DISJOINT from a WRECKS feature object of geometric primitive area where WATLEV is Equal to 1 (partly submerged at high water) OR 2 (always dry).	LNDELV object not covered by a LNDARE or by a drying or partially submerged WRECKS object.	Ensure LNDELV object is covered by a LNDARE or by a drying or partially submerged WRECKS object.	Appendix B.1, Annex A (4.7.2, 4.7.4, 6.1.1 and 6.2.1)	E
53a	For each SLOGRD feature object which is not COVERED_BY a LNDARE feature object of geometric primitive area.	SLOGRD not covered by LNDARE.	Amend LNDARE or SLOGRD accordingly.	Appendix B.1, Annex A (4.7.4, 4.7.5 and 4.8.4)	E
53b	For each SLOTOP feature object which is not WITHIN a LNDARE feature object of geometric primitive area.	SLOTOP not within LNDARE.	Amend LNDARE or SLOTOP accordingly.	Appendix B.1, Annex A (4.7.4, 4.7.5 and 4.8.4)	E

54a	For each FORSTC, LNDMRK or SILTNK feature which is not COVERED_BY a BRIDGE, COALNE, DAMCON, FLODOC, HULKES, LNDARE, OFSPLF, PILPNT, PONTON, PYLONS, SLCONS or UWTROC feature object OR a MORFAC feature object where CATMOR is Equal to 1 (dolphin) OR 2 (deviation dolphin) OR 5 (post or pile).	FORSTC, LNDMRK or SILTNK not covered by a suitable supporting object.	Amend object to ensure it is situated on a suitable object.	Logical consistency	C
54b	For each DAYMAR feature object which is not a slave in a master/slave relationship AND is not COVERED_BY a BRIDGE, COALNE, DAMCON, FLODOC, HULKES, LNDARE, OFSPLF, PILPNT, PONTON, PYLONS, SLCONS or UWTROC feature object OR a MORFAC feature object where CATMOR is Equal to 1 (dolphin) OR 2 (deviation dolphin) OR 5 (post or pile).	DAYMAR not covered by a suitable supporting object.	Amend object to ensure it is situated on a suitable object.	Logical consistency	W
54c	For each BUISGL or CRANES feature object which is not COVERED_BY a BRIDGE, COALNE, DAMCON, FLODOC, HRBFAC, LNDARE, OFSPLF, PILPNT, PONTON, PYLONS or SLCONS feature object OR a MORFAC feature object where CATMOR is Equal to 1 (dolphin) OR 2 (deviation dolphin) OR 5 (post or pile).	BUISGL or CRANES not covered by a suitable supporting object.	Amend object to ensure it is situated on a suitable object.	Logical consistency	W
55	For each LNDARE feature object of geometric primitive point or line which is COVERED_BY a LNDARE feature object AND is not COVERED_BY a CANALS, DOCARE, LAKARE, LOKBSN or RIVERS feature object.	Point or line LNDARE lies on LNDARE.	Ensure LNDARE is not covered by a LNDARE.	Logical consistency	W
56	For each BUAARE feature object which is not COVERED_BY a LNDARE feature object.	BUAARE not located on LNDARE.	Amend BUAARE so that it is covered by a LNDARE.	Logical consistency	E

57a	For each COALNE feature object where CATCOA is Not equal to 7 (mangrove) which is not COINCIDENT with a LNDARE feature object AND is not WITHIN a LNDARE feature object of geometric primitive area.	COALNE object not bounding LNDARE.	Ensure that COALNE coincides with LNDARE boundary.	Logical consistency and Appendix B.1, Annex A (4.5)	E
57b	For each COALNE feature object which is WITHIN a LNDARE feature object of geometric primitive area OR is COINCIDENT with LNDARE feature objects on both sides AND is COINCIDENT with a SLCONS or DRYDOC feature object where CONDTN is Not equal to 1 (under construction) OR 3 (under reclamation) OR 5 (planned construction).	COALNE is within a LNDARE or is coincident with a permanent SLCONS or DRYDOC object.	Remove COALNE or amend CONDTN values.	Logical consistency and Appendix B.1, Annex A (4.6.10)	E
57c	For each COALNE feature object which is COINCIDENT with LNDARE feature objects on both sides where not one of them has CONDTN is Equal to 1 (under construction) OR 3 (under reclamation) OR 5 (planned construction).	COALNE is coincident with LNDARE objects on both sides.	Remove COALNE or amend CONDTN values.	Logical consistency and Appendix B.1, Annex A (4.6.10)	E
57d	For each COALNE feature object where CATCOA is Equal to 7 (mangrove) which is not COINCIDENT with a LNDARE feature object OR is not coincident with a VEGATN feature object of geometric primitive area where CATVEG contains the value 7 (mangroves) AND is not WITHIN a LNDARE feature object of geometric primitive area.	Mangrove COALNE object not bounding LNDARE or mangrove VEGATN area.	Ensure that mangrove COALNE coincides with LNDARE or mangrove VEGATN boundary.	Logical consistency and Appendix B.1, Annex A (4.7.11)	E
58	For each SBDARE feature object of geometric primitive line which is COINCIDENT with a SBDARE feature object of geometric primitive area.	Line SBDARE bounds an area SBDARE.	Remove linear SBDARE.	Logical consistency	W
59	For each OBSTRN feature object of geometric primitive line which is COINCIDENT with an OBSTRN feature object of geometric primitive area.	Line OBSTRN bounds an area OBSTRN.	Amend or remove linear OBSTRN.	Logical consistency	W

60	For each CBLSUB feature object which is WITHIN OR CROSSES a LNDARE feature object of geometric primitive area.	CBLSUB covered by LNDARE.	Ensure CBLSUB is not covered by a LNDARE.	Logical consistency	W
61a	For each feature object of geometric primitive line where WATLEV is Equal to 3 (always underwater/submerged) which is WITHIN OR CROSSES a LNDARE feature object of geometric primitive area OR is WITHIN OR CROSSES an inter-tidal area (DEPARE feature object where DRVAL2 is Less than or equal to 0).	Linear object where WATLEV = 3 (always underwater/ submerged) is within or crosses a LNDARE or inter-tidal area (DEPARE with DRVAL2 ≤ 0).	Amend value of WATLEV.	Logical consistency	E
61b	For each feature object of geometric primitive point where WATLEV is Equal to 3 (always underwater/submerged) which is not COVERED_BY a DEPARE feature object where DRVAL2 is Greater than 0 AND is not COVERED_BY a DRGARE feature object AND is not COVERED_BY an UNSARE feature object OR is COVERED_BY a LNDARE feature object of geometric primitive point or line.	Point object where WATLEV = 3 (always underwater/submerg ed) is not covered by a suitable bathymetry object.	Amend value of WATLEV.	Logical consistency	E
61c	For each feature object of geometric primitive area where WATLEV is Equal to 3 (always underwater/submerged) which is WITHIN OR OVERLAPS a LNDARE feature object of geometric primitive area OR is WITHIN OR OVERLAPS an inter-tidal area (DEPARE feature object where DRVAL2 is Less than or equal to 0).	Area object where WATLEV = 3 (always underwater/submerg ed) is within or overlaps a LNDARE or inter-tidal area (DEPARE with DRVAL2 ≤ 0).	Amend value of WATLEV.	Logical consistency	E
62	For each PONTON, HULKES or FLODOC feature object of geometric primitive area where any edge shares the geometry of a COALNE or SLCONS feature object of geometric primitive line AND the edge is not COINCIDENT with a LNDARE feature object of geometric primitive area.	PONTON, HULKES or FLODOC which shares an edge with a SLCONS or COALNE which is not on the edge of a LNDARE.	Ensure all SLCONS or COALNE objects are backed by LNDARE objects.	Logical consistency	W

63	For each RECTRC feature object which INTERSECTS LNDARE, PONTON, HULKES or FLODOC feature objects of geometric primitive line or area OR any feature object where WATLEV is Equal to 1 (partly submerged at high water) OR 2 (always dry).	RECTRC intersects non-navigational objects.	Amend RECTRC or other objects to ensure RECTRC is within navigable objects.	Logical consistency	E
64	For each ACHARE feature object where CATACH does not contain the value 8 (small craft mooring area) which is COVERED_BY OR OVERLAPS another feature object where RESTRN contains the value 1 (anchoring prohibited).	ACHARE object within an area with RESTRN = 1 (anchoring prohibited).	Amend ACHARE object or object carrying RESTRN = 1 (anchoring prohibited).	Logical consistency	W
65	For each LIGHTS feature object which EQUALS another LIGHTS feature object AND STATUS does Not contain the value 4 (not in use) AND does not contain the value 6 (reserved) AND does not contain the value 11 (extinguished) where sectors overlap AND none of the values of the following attributes are different CATLIT, EXCLIT, LITCHR, SIGPER or SIGGRP.	Coincident lights with overlapping sectors and the same characteristics.	Amend light sectors so that they do not overlap, or remove duplicated sectors.	Logical consistency	W
~~66~~	*Check removed.*				
67a	For each feature object where the object class, attribution and geometry is identical to another feature object.	Duplicate object exists.	Remove duplicate object.	Data structure	E
67b	For each collection object which references exactly the same set of feature objects as another collection object.	Duplicate collection object exists.	Remove duplicate collection object.	Data structure	E
~~68~~	*Check renumbered 1007.*				
~~69~~	*Check removed.*				
~~70a~~	*Check removed.*				
~~70b~~	*Check removed.*				
71a	For each feature object of geometric primitive area that is not COINCIDENT with the M_COVR boundary where all edges are masked (that is USAG is Equal to 3 (exterior boundary truncated by the data limit) OR MASK is Equal to 1 (mask)).	Area object has all of its edges masked and is not the edge of the data coverage.	Remove masking.	Logical consistency	W

71b	For each feature object of geometric primitive line which has any edges masked (that is MASK is Equal to 1 (mask)).	Line object with masked edges.	Remove masking from line object.	Logical consistency	E
72a	For each set of hierarchical relationships which form a loop (for example master object is slave of its own slave).	Relationships form a loop.	Amend relationships to remove loop.	Logical consistency	E
72b	For each feature object which is both a slave and master object.	Object which is slave and master object at the same time.	Review the relationship so that there is only one master and one or more slaves.	Appendix B.1 (12.1.2)	E
73a	For each attribute value which contains a leading or trailing space.	Attribute value contains leading or trailing spaces.	Remove leading or trailing spaces.	Logical consistency	W
73b	For each attribute value of type list which contains spaces.	List attribute value contains spaces.	Remove spaces.	Logical consistency	W
74	For each DEPCNT edge which is not COINCIDENT with the boundary of a Group 1 feature object AND OVERLAPS or is COVERED_BY a DEPARE feature object of geometric primitive area where DRVAL1 and DRVAL2 are Known AND VALDCO is Less than DRVAL1 OR Greater than DRVAL2.	Floating DEPCNT within a DEPARE with VALDCO less than DRVAL1 or greater than DRVAL2.	Amend floating contour VALDCO between DRVAL1 and DRVAL2 of the underlying DEPARE.	Logical consistency	C
75	For each DEPCNT edge which is not COINCIDENT with the boundary of a Group 1 feature object AND OVERLAPS or is COVERED_BY a DRGARE feature object of geometric primitive area where DRVAL1 is Known AND VALDCO is Less than DRVAL1.	Floating DEPCNT within a DRGARE with VALDCO less than DRVAL1 of the DRGARE.	Amend floating contour VALDCO to be greater than the DRVAL1 of the underlying DRGARE or amend DRVAL1 of the DRGARE.	Logical consistency	C
76	For each DEPCNT feature object that CROSSES OR is WITHIN a FLODOC, HULKES, LNDARE or PONTON feature object of geometric primitive area.	DEPCNT crosses or is within prohibited objects.	Amend DEPCNT to be within appropriate objects.	Logical consistency	E
77	For each DEPCNT feature object which CROSSES another DEPCNT feature object. *Instances where the point of intersection is an intermediate vertex or node, and where one DEPCNT does not cross to the other side of the other DEPCNT, are excluded.*	DEPCNT objects cross.	Amend DEPCNT objects so they do not cross.	Logical consistency	C

78	For each feature object of geometric primitive area where its boundary crosses itself.	Boundary of an area object crosses itself.	Amend boundary to remove part which crosses itself.	Logical consistency	C
79	For each feature object of geometric primitive line where a component edge CROSSES another component edge without a connected node at the crossing point.	Component edges of a line object cross without a connected node at the crossing point.	Insert connected node at crossing point.	Topology	E
80a	For each feature object of geometric primitive area where an interior boundary is WITHIN an interior boundary.	Interior boundary within an interior boundary.	Amend boundaries so that interior boundary is not within another interior boundary.	Topology	C
80b	For each feature object of geometric primitive area where an interior boundary is not WITHIN an exterior boundary.	Interior boundary outside of an exterior boundary.	Amend boundaries so that interior boundary is within exterior boundary.	Topology	C
80c	For each feature object of geometric primitive area where an exterior boundary is WITHIN an interior boundary.	Exterior boundary within an interior boundary.	Amend boundaries so that exterior boundary is not within the interior boundary.	Topology	C
81	For each spot sounding (point of sounding array) which position EQUALS another spot sounding. (EQUALS applies to the horizontal component only).	Spot Soundings position is equal.	Remove coincident sounding.	Topology	E
82	For each feature object of geometric primitive line or area which references the same edge more than once.	Object references the same edge more than once.	Remove duplicate reference to the edge.	Topology	C
83	For each node which EQUALS another node (connected or isolated).	Nodes are coincident.	Remove or amend coincident node.	Topology	W
84a	For each node which is physically isolated AND is marked as connected.	Isolated node marked as connected.	Amend to isolated node.	Part 3 (5.1.1)	C
84b	For each node which is not physically isolated AND is marked as isolated.	Connected node marked as isolated.	Amend to connected node.	Part 3 (5.1.1)	C
~~85~~	*Check renumbered 1008.*				
86	For each feature object of geometric primitive point which references more than one vector record.	Point feature references more than one vector record.	Remove references to additional vector records.	Part 3 (4.7.1)	C
87	For each edge with EQUAL consecutive vertices.	Consecutive vertices are coincident.	Remove coincident vertices from edge.	Part 3 (4.7.2)	E
88a	For each feature object of geometric primitive area where ORNT is Not equal to 1 (forward) AND is Not equal to 2 (reverse).	Invalid value of ORNT.	Set value of ORNT to 1 (forward) or 2 (reverse).	Part 3 (4.7.3)	C

88b	For each feature object of geometric primitive area where USAG is Not equal to 1 (exterior) AND is Not equal to 2 (interior) AND is Not equal to 3 (exterior boundary truncated by the data limit).	Invalid value of USAG.	Set USAG to 1(exterior), 2(interior) or 3 (exterior boundary, truncated by the data limit).	Part 3 (4.7.3)	C
88c	For each feature object of geometric primitive area where MASK is Not equal to 1 (mask) AND is Not equal to 2 (show) AND is Not equal to 255 (masking is not relevant).	Invalid value of MASK.	Set MASK to 1 (mask), 2 (show) or 255 (masking is not relevant).	Part 3 (4.7.3)	C
89a	For each master object which references the same slave more than once.	Master object references the same slave more than once.	Remove duplicate reference to slave object.	Part 3 (6.3); Appendix B.1 (3.9) and Appendix B.1, Annex A (12.1.2)	C
89b	For each slave object which is referenced by more than one master object.	Slave object has more than one master.	Remove incorrect master from slave object.	Part 3 (6.3); Appendix B.1 (3.9) and Appendix B.1, Annex A (12.1.2)	C
~~90a~~	*Check renumbered 1009*				
90b	For an EN file where the DDR does not contain only the description of the base cell file structure.	Invalid DDR in EN file.	Amend DDR.	Part 3 (7) and Part 3 (A.2)	W
90c	For an ER file where the DDR does not contain only the description of the update cell file structure.	Invalid DDR in ER file.	Amend DDR.	Part 3 (7) and Part 3 (A.2)	W
~~91~~	*Check removed.*				
~~92~~	*Check renumbered 1010.*				
93a	For each feature object of geometric primitive area where WATLEV is Equal to 4 (covers and uncovers) OR 5 (awash) AND OVERLAPS OR is WITHIN a LNDARE feature object of geometric primitive area.	Object with WATLEV = 4 or 5 is within a LNDARE object.	Amend LNDARE object to ensure object is within an inter-tidal area.	Logical consistency	E
93b	For each feature object of geometric primitive point where WATLEV is Equal to 4 (covers and uncovers) OR 5 (awash) AND is COVERED_BY a LNDARE feature object.	Object with WATLEV = 4 or 5 on a LNDARE object.	Amend LNDARE object to ensure object is within an inter-tidal area.	Logical consistency	E
93c	For each feature object of geometric primitive line where WATLEV is Equal to 4 (covers and uncovers) OR 5 (awash) AND CROSSES OR is WITHIN a LNDARE feature object of geometric primitive area.	Object with WATLEV = 4 or 5 is within a LNDARE object.	Amend LNDARE object to ensure object is within an inter-tidal area.	Logical consistency	E

94	For each combination of FSPC and FSPT fields within an ER file that does not modify a feature.	ER file contains a redundant combination of FSPC and FSPT fields.	Remove irrelevant FSPC field from ER file.	Logical consistency	E
95	If the COMT subfield of the DSID and DSPM fields contains text which is not lexical level (0).	COMT subfield contains text which is not lexical level (0).	Amend text to conform to lexical level (0).	Part 3 (2.4)	E
96	For each relationship which does not reference a C_ASSO or C_AGGR collection object AND the RIND subfield of the FFPT field is set to 3 (peer).	Invalid value of RIND.	Amend the relationship indicator to 2 (slave) or remove as appropriate.	Part 3 (6.2) and Appendix B.1 (3.9)	E
97	For each feature object where SUREND and SURSTA are Known AND SUREND is Less than SURSTA.	SUREND less than SURSTA.	Ensure SURSTA is earlier than SUREND.	Logical consistency	E
98	For each feature object which has a relationship AND references an object which does not exist.	Object references an object that does not exist	Remove reference to non-existent object	Logical consistency.	E
~~99~~	~~For SG3D that contains > 8250 3D coordinates~~	~~Sounding bundle contains more than 8250 individual depths~~	~~Split sounding bundle~~	~~Part 3 (2.7)~~	~~C~~
~~100~~	~~For SG2D that contains > 12375 2D coordinates~~	~~Edge contains more than 12375 coordinates~~	~~Split or optimise geometry~~	~~Part 3 (2.7)~~	~~C~~
~~101~~	~~For FSPT that references > 12375 VRID records~~	~~FSPT record contains references to more than 12375 spatial records~~	~~Optimise geometry, merging referenced edges where possible~~	~~Part 3 (2.7)~~	~~C~~
102	For each ISO 8211 record where the Record Length specified by the DR Leader is equal to "00000".	The DR leader record length is set to "00000", indicating a very large record greater than 99999 bytes. Some software applications will not be able to import this dataset. This is usually caused by having large sounding bundles, edges with a large number of vertices, or features that reference a large number of edges.	Split the large record up into multiple smaller records. This may involve splitting up large sounding bundles, splitting up large edge records, or merging multiple small edges that are referenced by an FSPT record.	Part 3 (2.7)	C
103	For each spot sounding (point of a sounding array) that is not WITHIN a DEPARE, DRGARE or UNSARE feature object.	Spot sounding that is not within a bathymetric area.	Remove the spot sounding or amend skin of the earth features as appropriate.	Logical consistency	C

3.2 Checks Relating to the ENC Product Specification

No	Check description	Check message	Check solution	Conformity to:	Cat
500	For each feature object where its geometry is not COVERED_BY a M_COVR meta object with CATCOV Equal to 1 (coverage available).	Objects fall outside the coverage object.	Ensure objects are not outside of the limits of the coverage area for the cell.	2.2	C
501	If the combined coverage of all M_COVR meta objects limits are not rectangular.	Cell is not rectangular.	Ensure cell limits are rectangular.	2.2	E
502a	If the EN file size is greater than 5 Megabytes.	The EN file is larger than 5Mb in size.	Ensure that the cell is not larger than 5Mb.	2.2	E
502b	If the ER file size is greater than 50 Kilobytes.	The ER file is larger than 50Kb in size.	Ensure that the cell is not larger than 50Kb.	Appendix B.1, Annex A (2.6)	E
503	For each feature object where the FOID is not unique WITHIN the dataset.	Duplicate FOIDs exist within the dataset.	Ensure that no duplicate FOIDs exist.	3.1	W
504	For each CANBNK, LAKSHR, RIVBNK SQUARE, M_HDAT, M_PROD, M_UNIT, C_STAC, $AREAS, $LINES, $CSYMB, $COMPS, or $TEXTS feature object.	Prohibited objects exist within the dataset.	Remove prohibited objects.	3.2	C
505	If either M_COVR or M_NSYS meta objects do not exist within the data set.	Mandatory feature objects are missing.	Include mandatory feature objects M_COVR and M_NSYS.	3.4 and MD8 8.Co.6	C
~~506~~	*Check removed.*				
507	If any mandatory OR conditional mandatory attributes are not Present (a conditional mandatory attribute is only required if the condition for that attribute to be mandatory is met).	Mandatory attributes are not encoded.	Populate mandatory attributes (If unknown encode attribute with empty value).	3.5.2 and Supplement No.3 Ch.4 (3.5.2.1)	C
508a	For each feature object (excluding LIGHTS) where more than one value of COLOUR is encoded AND COLPAT is not Present.	COLOUR has multiple values without a value for COLPAT.	Ensure COLPAT has a value where multiple COLOUR values are encoded.	3.5.2 and Logical consistency	E
508b	For each feature object where COLPAT is Known AND COLOUR is Unknown OR only has one value.	COLPAT is populated without multiple COLOUR values.	Ensure multiple COLOUR values are populated or remove COLPAT value.	3.5.2 and Logical consistency	E

509	For each feature object listed below where the attribute stated is Unknown: ARCSLN: NATION; ASLXIS: NATION; CONZNE: NATION; COSARE: NATION; CTNARE: INFORM or TXTDSC; CUSZNE: NATION; DEPARE: DRVAL1 and DRVAL2; DEPCNT: VALDCO; DRGARE: DRVAL1; DWRTPT: ORIENT; DWRTCL straight (rhumb) line: ORIENT; EXEZNE: NATION; FSHZNE: NATION; LNDELV: ELEVAT; LIGHTS: CATLIT[3] M_COVR: CATCOV; M_CSCL: CSCALE; M_NSYS: MARSYS or ORIENT; M_QUAL: CATZOC; M_SDAT: VERDAT; M_VDAT: VERDAT; MAGVAR: VALMAG; NEWOBJ: CLSDEF and CLSNAM; RCTLPT : ORIENT; RESARE: CATREA only present; RESARE: RESTRN only present; RESARE: CATREA and RESTRN present; STSLNE: NATION; SWPARE: DRVAL1; TESARE: NATION; TS_PAD: TS_TSP.	Mandatory attribute has not been populated with a value.	Populate mandatory attributes; in these cases the object is meaningless without this value.	3.5.2 and Supplement No.3 Ch.4 (3.5.2.1)	E
~~510~~	*Check removed.*				
511	For each feature object where any of the attributes DUNITS, HUNITS, RECDAT, RECIND, SCAMAX, PUNITS or CATQUA is Present.	Prohibited attributes have been encoded.	Remove prohibited attributes.	3.5.3	C
512	For each feature object with an attribute of type Float or Integer where the value contains zeroes before the first numerical digit or after the last numerical digit.	Values have been padded with non-significant zeroes. Example: For a signal period of 2.5 sec, the value of SIGPER must be 2.5 and not 02.500.	Remove non-significant zeroes.	3.5.4	E

[3] For air obstruction lights and fog detector lights CATLIT must be set to 6 or 7 respectively.

513	For each feature object with an attribute value identical to a corresponding attribute of a meta object it is COVERED_BY.	An attribute value of a meta object is duplicated on a geo object.	Remove duplicate value from geo object.	3.5.6	E
~~514~~	*Check removed.*				
515	For each edge where the subfield USAG (Usage indicator) is Equal to 3 (exterior boundary, truncated by the data limit) AND the MASK subfield is Not equal to 255 (masking is not relevant).	Edge with USAG = 3 (exterior boundary truncated by the data limit) does not have MASK = 255 (masking is not relevant).	Set MASK to 255 (masking is not relevant) for edges with USAG = 3.	3.8	W
516a	For each master feature object of geometric primitive point which does not share the geometry of the related slave objects.	Master and slave point objects do not share the same node.	Ensure master and slave point objects share the same node.	3.9 and Appendix B.1, Annex A (12.1.1 and 12.1.2)	E
516b	For each master feature object of geometric primitive line where the slave object does not INTERSECT the master object.	Slave object is not located on the master line object.	Ensure the master and slave objects overlap.	3.9 and Appendix B.1, Annex A (12.1.1 and 12.1.2)	E
516c	For each master feature object of geometric primitive area where the slave object is not COVERED_BY the master object.	Slave object is not covered by the master area object.	Ensure the slave object covered by the master object.	3.9 and Appendix B.1, Annex A (12.1.1 and 12.1.2)	E
517a	For each collection feature object which does not reference at least two feature objects.	Collection feature object does not reference at least two feature objects.	Remove collection feature object or ensure that it references at least two feature objects.	3.9 and Appendix B.1, Annex A (15), and Part 3 (6.2)	E
517b	For each collection feature object which references itself.	Collection feature object references itself.	Remove circular reference.	3.9 and Appendix B.1, Annex A (15), and Part 3 (6.2)	E
517c	For each collection feature object where the subfield PRIM is Not equal to Null {255} (no geometry).	Invalid value of geometric primitive subfield.	Set PRIM subfield to Null {255} (no geometry).	3.9 and Appendix B.1, Annex A (15), and Part 3 (6.2)	E
~~517d~~	*Check removed.*				
517e	For each collection feature object where the RIND subfield is not 3 (peer) OR which references feature objects where the subfield RIND is Not equal to 3 (peer).	Collection feature object which is peer, references non-peer feature objects.	Amend feature objects to peer.	3.9 and Appendix B.1, Annex A (15), and Part 3 (6.2)	E
517f	For each collection feature object that references the same feature more than once.	Collection feature object contains multiple references to the same feature object.	Remove duplicate reference.	3.9 and Appendix B.1, Annex A (15), and Part 3 (6.2)	E

518a	For each FLODOC, DRGARE, LNDARE, HULKES, PONTON, DEPARE or UNSARE feature object of geometric primitive area where the GRUP subfield of the FRID is Not equal to 1 (Group 1).	Skin of the earth objects are not encoded as Group 1.	Ensure that the FRID subfield GRUP is set to 1 (Group 1) for all skin of the earth feature objects.	3.10.1	C
518 b	For each feature object (excluding FLODOC, DRGARE, LNDARE, HULKES, PONTON, DEPARE and UNSARE of geometric primitive area) where the GRUP subfield of the FRID is Not equal to 2 (Group 2).	Group 2 objects are not encoded as Group 2.	Ensure that the FRID subfield GRUP is set to 2 (Group 2) for all non-skin of the earth feature objects.	3.10.2	C
519a	If the combined coverage of all DEPARE, DRGARE, FLODOC, HULKES, LNDARE, PONTON and UNSARE feature objects is Not equal to the combined coverage of all M_COVR meta objects where CATCOV is Equal to 1 (coverage available).	Skin of the earth (Group1) objects do not equal the data coverage (M_COVR = 1).	Amend to ensure Group1 coverage and M_COVR with CATCOV = 1 are equal.	3.10.1	C
519b	For each DEPARE, DRGARE, FLODOC, HULKES, LNDARE PONTON or UNSARE feature object of geometric primitive area that OVERLAPS or is WITHIN another DEPARE, DRGARE, FLODOC, HULKES, LNDARE, PONTON or UNSARE of geometric primitive area.	Skin of the earth (Group1) objects overlap.	Ensure Group1 objects do not overlap.	3.10.1	C
520a	If the AALL subfield of the DSSI is Not equal to 0 AND is Not equal to 1.	Invalid value of AALL.	Set value of AALL to 0 or 1.	3.11, 3.5.5, 6.3.2.2 and 6.4.2.2	E
520b	If the NALL subfield of the DSSI is Not equal to 0 AND is Not equal to 1 AND is Not equal to 2.	Invalid value of NALL.	Set value of NALL to 0, 1 or 2.	3.11, 3.5.5, 6.3.2.2 and 6.4.2.2	E
~~520c~~	*Check removed.*				
520d	If lexical level 2 has been used anywhere other than the NATF field.	Lexical level 2 used outside of the NATF field. (Return character sets used and the sequence found.)	Amend text to remove lexical level 2 characters.	3.11 and 3.5.5	E
520e	If any ATTF or NATF field contains characters of a lexical level greater than that in the DSSI - AALL/NALL subfields correspondingly.	Lexical level of characters in the attribute or encoding of DSSI-AALL/NALL is inconsistent.	Amend characters or the subfield encoding as required.	3.11 and 3.5.5	E
520f	If the UT or FT is not encoded at the lexical level specified for that field.	The UT or FT is not of the correct lexical level.	Amend UT and FT to the correct lexical level.	Part 3, Annex B (B.2)	E

~~520g~~	*Check removed.*				
~~520h~~	*Check removed.*				
521a	For each feature object where OBJNAM and NOBJNM are Known AND are Equal.	Values for OBJNAM and NOBJNM are identical.	Ensure that national language attributes are populated with the correct values.	3.11.1	W
521b	For each feature object where INFORM and NINFOM are Known AND are Equal.	Values for INFORM and NINFOM are identical.	Ensure that national language attributes are populated with the correct values.	3.11.1	W
521c	For each feature object where PILDST and NPLDST are Known AND are Equal.	Values for PILDST and NPLDST are identical.	Ensure that national language attributes are populated with the correct values.	3.11.1	W
521d	For each feature object where TXTDSC and NTXTDS are Known I AND are Equal.	Values for TXTDSC and NTXTDS are identical.	Ensure that national language attributes are populated with the correct values.	3.11.1	W
522	For each feature object where NOBJNM is Known AND OBJNAM is Unknown OR not Present.	NOBJNM is populated without OBJNAM.	Populate OBJNAM.	3.11.1	E
523	If the HDAT subfield of the DSPM field is Not equal to 2 (WGS 84).	HDAT does not equal 2 (WGS 84).	Set the HDAT subfield to 2 (WGS 84).	4.1	C
524	If the DUNI subfield of the DSPM field is Not equal to 1 (metres).	DUNI does not equal 1 (metres).	Set the DUNI subfield to 1 (metres).	4.4	C
525	If the PUNI subfield of the DSPM is Not equal to 1 (metres).	PUNI does not equal 1 (metres).	Set the PUNI subfield to 1 (metres).	4.4	C
526	If the COUN subfield of the DSPM field is Not equal to 1 (latitude/longitude).	COUN does not equal 1 (latitude/longitude).	Set the COUN subfield to 1 (latitude/longitude).	4.4	C
~~527~~	*Check renumbered 1011.*				
~~528~~	*Check renumbered 1012.*				
~~529~~	*Check renumbered 1013.*				
~~530~~	*Check renumbered 1014.*				
531	If the Dataset file name is not in accordance with the ENC Product Specification.	Dataset file name is not in accordance with the ENC Product Specification.	Amend file names.	5.6.3 and MD8 1. CL.37 and 1.Co.32	C
~~532~~	*Check renumbered 1015.*				
533	If the UADT subfield of the DSID field is used in an ER file.	DSID-UADT subfield populated in an ER file.	Remove value of DSID-UADT subfield.	5.7	C
534	If a delete cell message contains anything other than the DSID field AND EDTN is Equal to 0.	Incorrect delete cell message.	Remove additional information from delete cell message.	5.7	C
~~535~~	*Check renumbered 1016.*				
536	If a field without a repetition factor repeats.	Field without a repetition factor repeats.	Remove repeating value.	6.1.3	C
~~537~~	*Check renumbered 1017.*				
~~538~~	*Check renumbered 1018.*				
539	If DSID-PROF is Not equal to 1 (EN) AND is Not Equal to 2 (ER).	Invalid value of DSID-PROF.	Set DSID-PROF to either 1 (EN) or 2 (ER).	6.3 and 6.4 and Part 3 (7.3.1.1)	C

540a	If mandatory records, fields and subfields are not Present OR are Null where the “Null” value is not allowed.	Mandatory records, fields or subfields are not used.	Add mandatory records/values.	6.1.4, 6.3 and 6.4	C
540b	If data set file contains prohibited records, fields or subfields.	Prohibited records, fields or subfields used.	Remove prohibited records/values.	6.3 and 6.4	C
~~541a~~	*Check removed.*				
541b	For each LIGHTS feature object where LITCHR is Not Equal to 1 (Fixed) where SIGGRP does not start and finish with a bracket.	SIGGRP is incorrectly formatted.	Ensure SIGGRP is correctly formatted with appropriate brackets.	Appendix A Ch.2 (code 141)	E
542	For each FOGSIG and RTPBCN feature object where SIGGRP is Present AND does not start and finish with a bracket.	SIGGRP is not formatted correctly.	Amend the formatting of SIGGRP.	Appendix A Ch.2 (code 141)	E
~~543~~	*Check removed.*				
543a	For each TS_TSP attribute that does not contain 28 commas.	Attribute TS_TSP does not conform to expected coded string.	Modify TS_TSP to comply with the coded string format.	Appendix A, Ch. 2 (code 159)	E
543b	For each TS_TSP attribute where the first value is Present AND is Not alphanumerical.	The reference station identifier is not encoded or contains non-alphanumerical characters.	Modify the reference station identifier to an alphanumeric value.	Appendix A, Ch. 2 (code 159) and Logical consistency	W
543c	For each TS_TSP attribute where the second value is Not Present OR is Not alphabetic.	The name of the reference station is not encoded or contains non alphabetic characters.	Encode or Modify the name of the reference station.	Appendix A, Ch. 2 (code 159) and Logical consistency	E
543d	For each TS_TSP attribute where the third value is Not equal to HW AND is Not equal to LW.	Invalid reference water level.	Modify the reference water level.	Appendix A, Ch2 (code 159)	E
543e	For each TS_TSP attribute where at least one tide stream orientation value is Not an integer between 000 and 360.	Invalid value of tide stream orientation.	Modify the tide stream orientation value (must be between 0 and 360).	Appendix A, Ch. 2 (code 159) and Logical consistency	W
543f	For each TS_TSP attribute where at least one tide stream rate value is Not a floating value between 0.0 and 20.0.	Invalid value of tide stream rate.	Modify the tide stream rate value (should be between 0.0 and 20.0).	Appendix A, Ch. 2 (code 159) and Logical consistency	W
544	For each feature object that OVERLAPS, CROSSES OR is WITHIN an area of M_COVR where CATCOV is Equal to 2 (no coverage available).	Object within an area of no coverage.	Remove object or amend coverage.	2.2	C
545	For each feature object which does not have a valid feature object class label/code as defined by the Object Catalogue and S-57 Supplement No.3.	Object has invalid object class code.	Amend object class code.	3.2 and Supplement No.3 Ch.2	C

546	For each attribute which does not have a valid attribute label/code as defined by the Object Catalogue and S-57 Supplements No.3.	Attribute has invalid attribute label/code.	Amend attribute label/code.	3.2 and Supplement No.3 Ch.3	C
547	For each feature object which contains attributes outside the list of permissible attributes for the feature object as defined in the Object Catalogue and S-57 Supplement No.3.	Attribute not permitted on feature object class.	Remove attribute.	3.2 and Supplement No.3 Ch.2	C
548a	If the combined coverage of M_COVR meta objects is Not equal to the cell extents.	Cell not entirely covered by M_COVR objects.	Edit M_COVR coverage to match cell extents.	3.4	C
548b	For each M_COVR meta object that OVERLAPS or is COVERED_BY another M_COVR object.	Cell contains overlapping M_COVR objects.	Amend M_COVR objects to remove overlap.	3.4	C
548c	For Each M_COVR feature object where the boundary geometry is coincident with the boundary of another M_COVR feature object with identical attribution.	M_COVR object unnecessarily split	Merge adjacent M_COVR features with identical attribution.	2.2	W
549	For each DEPARE or DRGARE feature object which is not COVERED_BY the combined coverage of M_QUAL meta objects.	DEPARE or DRGARE objects not covered by an M_QUAL object.	Ensure full coverage of M_QUAL objects over DEPARE or DRGARE objects.	3.4 and Appendix B.1 Annex A (2.2.3)	E
550	For each UNSARE feature object which COVERS OR CROSSES OR OVERLAPS the following objects DEPCNT, OBSTRN, SOUNDG, UWTROC or WRECKS AND is not COVERED_BY the combined coverage of M_QUAL meta objects.	UNSARE containing bathymetric features not completely covered by M_QUAL.	Ensure M_QUAL objects completely cover UNSARE objects containing bathymetric features.	3.4 and Appendix B.1 Annex A (2.2.3)	E
551a	If text attribute values use (C0) characters (C0 as defined in S-57 Part 3, Annex B).	C0 characters used in text attribute values.	Correct text attribute values.	3.5.5 and Part 3 Annex B	C
551b	If the delete character is used outside of the update mechanism, (that is in records where RUIN is Equal to 3 (modify)).	Delete character used outside of the update mechanism.	Only use delete within the update mechanism.	3.5.5	E
551c	If text attribute values use (C1) characters (C1 as defined in S-57 Part 3, Annex B).	C1 characters used in text attribute values.	Correct text attribute values.	Part 3 Annex B	C
~~552~~	*Check removed.*				
553	For each Group 1 feature object where any of DATSTA, DATEND, PERSTA or PEREND is Present AND Known.	Attributes DATSTA, DATEND, PERSTA or PEREND are encoded on Group 1 objects.	Remove these attributes from Group 1 objects.	3.10.1 and Logical consistency	C

554	For each edge referenced by only one M_COVR meta object where CATCOV is Equal to 1 (coverage available) AND is also shared by more than one Group 1 feature object.	Edge of M_COVR (coverage available) referenced by more than one Group 1 object.	Ensure edges on the extent of data coverage only reference one Group 1 object.	3.10.1	C
555a	If the order of the data in a base or update file is not correct, except for when: 1. Isolated nodes (SG2D) are listed before isolated nodes (SG3D) OR 2. Connected nodes are listed before isolated nodes (SG3D) OR 3. Connected nodes are listed before isolated nodes (SG2D) OR 4. Geo features are listed before Meta features.	Incorrect data order.	Issue a New Edition of data to solve data order errors. Contact production software producer, to discuss the output of data order errors.	6.1.1	C
555b	If the order of the data in a base or update file is such that: 1. Isolated nodes (SG2D) are listed before isolated nodes (SG3D) OR 2. Connected nodes are listed before isolated nodes (SG3D) OR 3. Connected nodes are listed before isolated nodes (SG2D) OR 4. Geo features are listed before Meta features.	Incorrect data order.	Issue a New Edition of data to solve data order errors. Contact production software producer, to discuss the output of data order errors.	6.1.1	E
~~556a~~	*Check renumbered 1024a.*				
~~556b~~	*Check renumbered 1024b.*				
557	For each SIGSEQ attribute value which does not conform to the correct structure (that is string content is not in accordance with format specification).	SIGSEQ attribute not formatted correctly.	Amend formatting of SIGSEQ attribute value.	Appendix A Ch.2 (code 143)	E
558	For each feature object where SIGSEQ is Known AND SIGPER is Not equal to the sum of the intervals of light and eclipse given in SIGSEQ.	SIGPER does not correspond to SIGSEQ.	Ensure SIGPER corresponds to the sum of the intervals of light and eclipse given in SIGSEQ.	Appendix A Ch.2 (code 143) and Logical consistency	E
559a	For each feature object where STATUS contains the value 1 (permanent) in combination with at least one of 2 (occasional), 5 (periodic/intermittent) or 7 (temporary).	Illogical combination of STATUS values.	Amend values for STATUS.	Appendix A Ch.2 (code 149) and Logical consistency	E

559b	For each feature object where STATUS contains the value 3 (recommended) in combination with at least one of 4 (not in use) or 11 (extinguished).	Illogical combination of STATUS values.	Amend values for STATUS.	Appendix A Ch.2 (code 149) and Logical consistency	E
559c	For each feature object where STATUS contains the value 4 (not in use) in combination with at least one of 5 (periodic/intermittent) or 9 (mandatory).	Illogical combination of STATUS values.	Amend values for STATUS.	Appendix A Ch.2 (code 149) and Logical consistency	E
559d	For each feature object where STATUS contains the value 5 (periodic/intermittent) in combination with 11 (extinguished).	Illogical combination of STATUS values.	Amend values for STATUS.	Appendix A Ch.2 (code 149) and Logical consistency	E
559e	For each feature object where STATUS contains the value 9 (mandatory) in combination with 11 (extinguished).	Illogical combination of STATUS values.	Amend values for STATUS.	Appendix A Ch.2 (code 149) and Logical consistency	E
559f	For each feature object where STATUS contains the value16 (watched) in combination with 17 (un-watched).	Illogical combination of STATUS values.	Amend values for STATUS.	Appendix A Ch.2 (code 149) and Logical consistency	E
559g	For each feature object where STATUS contains the value 8 (private) in combination with 14 (public).	Illogical combination of STATUS values.	Amend values for STATUS.	Appendix A Ch.2 (code 149) and Logical consistency	E
560a	For all feature objects with the same FOID where the object class and attribute values are not identical.	Objects with the same FOID do not have the same feature encoding.	Ensure objects with the same FOID have the same object class and attribute values.	3.1	C
560b	For all feature objects with the same FOID where the geometric primitives are Point OR are not of the same geometric primitive e.	Objects with the same FOID are of geometric primitive point or have different geometric primitives.	Ensure point objects do not have the same FOID and that line and area objects which share FOIDs have the same geometric primitive.	3.1	C
~~561~~	*Check removed.*				
~~562~~	*Check removed.*~~For each NEWOBJ feature object where INFORM does not commence with the CLSNAM AND contain the CLSDEF of the feature object.~~	~~The text in INFORM does not commence with the CLSNAM object or contain the CLSDEF of the NEWOBJ feature object.~~	~~Ensure that the text in INFORM commences with the CLSNAM followed by the CLSDEF of the NEWOBJ feature object.~~	~~Supplement No.3 Ch.4 (3.3.1) and Appendix B1, Annex A (16)~~	~~W~~
~~563~~	*Check removed.*				
~~564~~	*Check removed.*				
~~565~~	*Check removed.*				
566	For each NEWOBJ feature object with the attributes CLSDEF, CLSNAM and SYMINS not populated with exactly one of the following combinations:	Invalid use of NEWOBJ.	Amend to reflect encoding guidance.	Appendix B1, Annex A (12.14.1.1)	C

	CLSDEF	CLSNAM	SYMINS		
	A Virtual object which indicates navigable water lies northwards	Virtual AtoN, North Cardinal	SY(BRTHNO01);SY(BCNCAR01); TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)		
	A Virtual object which indicates navigable water lies eastwards	Virtual AtoN, East Cardinal	SY(BRTHNO01);SY(BCNCAR02); TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)		
	A Virtual object which indicates navigable water lies southwards	Virtual AtoN, South Cardinal	SY(BRTHNO01);SY(BCNCAR03); TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)		
	A Virtual object which indicates navigable water lies westwards	Virtual AtoN, West Cardinal	SY(BRTHNO01);SY(BCNCAR04); TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)		
	A Virtual object marking the port side of a channel	Virtual AtoN, Port Lateral	SY(BRTHNO01);SY(BOYLAT24); TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)		
	A Virtual object marking the starboard side of a channel	Virtual AtoN, Starboard Lateral	SY(BRTHNO01);SY(BOYLAT13); TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)		
	A Virtual object marking the port side of a channel	Virtual AtoN, Port Lateral	SY(BRTHNO01);SY(BOYLAT23); TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)		
	A Virtual object marking the starboard side of a channel	Virtual AtoN, Starboard Lateral	SY(BRTHNO01);SY(BOYLAT14); TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)		
	A Virtual object marking an isolated danger	Virtual AtoN, Isolated Danger	SY(BRTHNO01);SY(BCNISD21); TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)		
	A Virtual object marking safe water	Virtual AtoN, Safe Water	SY(BRTHNO01);SY(BOYSAW12); TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)		
	A Virtual object used to mark an area or feature referred to in nautical documents	Virtual AtoN, Special Purpose	SY(BRTHNO01);SY(BOYSPP11); TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)		
	A Virtual object marking a wreck	Virtual AtoN, Wreck Marking	SY(BRTHNO01);SY(BOYSPP11); TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)		
567	For each attribute of type 'list' (excluding COLOUR, NATQUA and NATSUR) with more than one instance of the same value.	List attribute contains the same value more than once.	Remove unnecessary attribute value.	Logical consistency	E
568	For each feature object where PERSTA and PEREND are Known AND their values are identical.	Object has identical values of PERSTA and PEREND.	Ensure values of PERSTA and PEREND are logical.	Logical consistency	E
569	For each feature object where PERSTA is Known AND PEREND is Unknown OR not Present.	Object has PERSTA without a value of PEREND.	Populate PEREND or remove PERSTA.	Logical consistency	E
570	For each feature object where PEREND is Known AND PERSTA is Unknown OR not Present.	Object has PEREND without a value of PERSTA.	Populate PERSTA or remove PEREND.	Logical consistency	E
571	For each edge which contains vertices at a density Greater than 0.3mm at compilation scale.	Vertex density exceeds the allowable tolerance.	Generalise edge(s).	3.8	W
572	For each feature object where NINFOM is Known AND INFORM is Unknown OR not Present.	NINFOM is populated without INFORM.	Populate INFORM.	3.11.1	E
573	For each feature object where NPLDST is Known AND PILDST is Unknown OR not Present.	NPLDST is populated without PILDST.	Populate PILDST.	3.11.1	E
574	For each feature object where NTXTDS is Known AND TXTDSC is Unknown OR not Present.	NTXTDS is populated without TXTDSC.	Populate TXTDSC and include relevant text file.	3.11.1	E

575	If the DSTR subfield of the DSSI field is Not equal to 2 (chain node).	DSTR does not equal 2.	Set the DSTR subfield to 2 (chain node).	6.3.2.2 and 6.4.2.2	C
576	For each M_QUAL meta object which OVERLAPS or is WITHIN another M_QUAL meta object.	M_QUAL objects overlap.	Amend objects to remove overlap.	3.4 and Appendix B1, Annex A (2.2.3.1)	E

3.3 Exchange Set Level Checks

No	Check description	Check message	Check solution	Conformity to:	Cat
~~1000~~	*Check removed.*				
~~1001~~	*Check removed.*				
~~1002~~	*Check removed.*				
~~1003~~	*Check removed.*				
~~1004~~	*Check removed.*				
~~1005~~	*Check removed.*				
1006	If an update and its base cell do not have the same lexical level.	Update and base cell do not have the same lexical level.	Amend the lexical level of the update.	Part 3 (8.4.2.2a)	C
~~1007~~	*Check removed.*				
1008	For each ER (update) file where an AGEN subfield value of the DSID field or FOID field is not identical to the AGEN subfield values in the EN (base) file.	AGEN subfield values do not agree between ER (update) and EN (base) files.	Amend AGEN subfield values to agree.	Part 3 (4.3.1) and (7.3.1.1)	C
1009	For a catalogue file where the DDR does not contain only the description of the catalogue file structure.	Invalid DDR in catalogue file.	Amend DDR.	Part 3 (7) and Part 3 (A.2)	W
1010	For each FRID field in an ER (update) file where RUIN is Equal to 3 (modify) AND the FOID for the modified object is not identical in the EN (base) and ER (update) files.	FOID for the modified object is not identical in the EN (base) and ER (update) files.	Amend FOIDs to be identical or make separate insert and delete updates.	Part 3 (8.4.2)	C
1011	For each feature object where TXTDSC, NTXTDS, PICREP is Known and references a file that is Not present in the exchange set OR their names do not conform to the ENC Product Specification.	Text or picture file referenced by a feature object is not present in the exchange set or its name is non-conformant.	Ensure referenced files exist and are named correctly.	Appendix B.1 (5.4.1 and 5.6.4)	C
1012	If a catalogue file does not exist.	No catalogue file exists.	Create a catalogue file.	Appendix B.1 (5.4.1)	C
1013	If volume name is not in accordance with the ENC Product Specification.	Volume name is not in accordance with the ENC Product Specification.	Amend the volume name.	Appendix B.1 (5.4.2)	C
1014	If the directory structure for physical media is not in accordance with the ENC Product Specification.	The directory structure for physical media is not in accordance with the ENC Product Specification.	Correct the directory structure of the physical media.	Appendix B.1 (5.4.3)	C
1015	If the text and picture file names are not in accordance with the ENC Product Specification.	Text and picture file names have incorrect format/name.	Use correctly formatted and named text and picture files.	Appendix B.1 (5.6.4) and Appendix B.1, Annex A (2.3)	C
1016	If the calculated CRC value of a file is Not equal to that stated in the catalogue file.	CRC values do not match.	Amend CRC value.	Appendix B.1 (5.9.1)	C
1017	If the format of the catalogue file is not correct.	Catalogue file format not correct.	Amend format of the catalogue file.	Appendix B.1 (6.2)	C

1018	If the IMPL subfield of the CATD field is Not equal to “BIN” for the data set file.	CATD-IMPL is not equal to “BIN”.	Amend CATD-IMPL.	Appendix B.1 (5.1 and 6.2.2)	E
1019	For each feature object where TXTDSC AND NTXTDS are Known AND the files referenced are identical or empty.	Files referenced by TXTDSC and NTXTDS are the same or empty.	Ensure files are different.	Logical consistency	W
~~1020~~	*Check removed*.				
1021a	If the data set is not a re-issue AND the UPDN subfield is not equivalent to the extension of the data set file name.	Update number is incorrect or not equivalent to the data set file name extension.	Amend UPDN subfield.	Appendix B.1, Annex A (2.2.2)	C
~~1021b~~	*Check removed*.				
~~1022~~	*Check removed*.				
1023	For each picture file which is not in the TIF format.	Picture file not in TIF format.	Replace picture file with TIF format version.	Appendix B.1, Annex A (4.8.20)	C
1024a	For a base cell file if the limits contained in the subfields SLAT, WLON, NLAT, and ELON of the CATD field of the catalogue file are Not equal to the furthest coordinates of the M_COVR meta object in the corresponding base cell file.	Limits in catalogue do not correspond to M_COVR limits for a base cell file.	Amend limits in catalogue or base cell file M_COVR object to agree.	Appendix B.1 (5.6.3 and 6.2.2) and Logical consistency	C
1024b	For an update cell file if the limits are not identical to the limits of the base cell to which they apply.	Update with limits different to that of the base cell.	Amend limits of update file.	Appendix B.1 (5.6.3 and 6.2.2) and Logical consistency	C
1024c	For each M_COVR feature object where CATCOV is Equal to 1 (coverage available) in an update cell file that moves any part of the M_COVR boundary of the base cell file coverage by more than 0.25mm at compilation scale.	ER file changes the extent of data coverage.	Issue as new edition.	Appendix B.1, Annex A (2.6)	E

3.4 Checks Relating to the Use of the Object Catalogue for ENC

No	Check description	Check message	Check solution	Conformity to:	Cat
1500a	For each CBLARE feature object which is WITHIN OR OVERLAPS a LNDARE feature object of geometric primitive area.	CBLARE object overlaps a LNDARE object.	Amend objects to remove overlap.	Logical consistency	W
1500b	For each SBDARE feature object which is WITHIN, CROSSES OR OVERLAPS a LNDARE feature object of geometric primitive area.	SBDARE object is within or crosses a LNDARE object.	Amend objects to remove overlap.	Logical consistency	W
~~1501~~	*Check removed.*				
1502	For each spatial object where the attribute HORDAT is Present.	HORDAT used in a spatial object.	Remove HORDAT.	2.1.1	E
1503	For each feature object (excluding M_VDAT and M_SDAT) where VERDAT is Known AND all of the following attributes are Unknown: ELEVAT, HEIGHT, VERCCL, VERCLR, VERCOP and VERCSA.	Value of VERDAT without corresponding vertical distance value.	Remove VERDAT or populate vertical distance attribute.	2.1.2	E
1504a	If the value of the VDAT subfield of the DSPM field is Null.	VDAT is not populated.	Populate the VDAT subfield with the vertical datum of the cell.	2.1.2	C
1504b	If the value of the VDAT subfield of the DSPM field is notNull AND is Not equal to 3, 16, 17, 18, 19, 20, 21, 24, 25, 26, 28, 29 or 30.	VDAT does not refer to a high water or local datum.	Encode an allowable value for VDAT.	2.1.2	E
1505	For each M_VDAT meta object where VERDAT is Known AND is Equal to the value of VERDAT in the VDAT subfield of the DSPM field.	Value of VERDAT is identical to the value of the VDAT subfield of the DSPM field.	Remove unnecessary value of VERDAT from M_VDAT object.	2.1.2	E
1506	For each feature object where any of ELEVAT, HEIGHT, VERCCL, VERCLR, VERCOP or VERCSA is Known AND which OVERLAPS OR CROSSES at least one M_VDAT meta object.	Object with vertical distance value not split at boundary of M_VDAT object.	Split object at boundary of M_VDAT object or amend the M_VDAT object to cover the entire feature object.	2.1.2	E
1507	For each M_VDAT meta object which OVERLAPS OR is COVERED_BY another M_VDAT meta object.	M_VDAT objects overlap.	Edit M_VDAT objects so that they do not overlap.	2.1.2	E
1508	For each M_SDAT meta object which OVERLAPS OR is COVERED_BY another M_SDAT meta object.	M_SDAT objects overlap.	Edit M_SDAT objects so that they do not overlap.	2.1.3	E
~~1509~~	*Check removed.*				

1510a	If the value of the SDAT subfield of the DSPM field is Null.	SDAT is not populated.	Populate the SDAT subfield with the sounding datum of the cell.	2.1.3	C
1510b	If the value of the SDAT subfield of the DSPM field is notNull AND is Not equal to any of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 19, 22, 23, 24, 25, 26 or 27.	SDAT does not refer to a low water or local datum.	Encode an allowable value for SDAT.	2.1.3	E
1511	For each M_SDAT meta object where VERDAT is Equal to the value of the SDAT subfield of the DSPM field.	M_SDAT object has the same VERDAT as in the SDAT subfield of the DSPM.	Remove M_SDAT object or amend value of VERDAT.	2.1.3	E
1512a	For each SOUNDG feature object which does not lie WITHIN a M_SDAT meta object AND INTERSECTS a M_SDAT meta object.	SOUNDG object reference multiple sounding datums.	Split SOUNDG object at boundary of M_SDAT object.	2.1.3	E
1512b	For each feature object where any of VALSOU, VALDCO, WATLEV, EXPSOU, DRVAL1 or DRVAL2 is Known AND which OVERLAPS OR COVERS OR CROSSES at least one M_SDAT meta object.	Object with depth information intersects boundary of M_SDAT objects.	Split object at boundary of M_SDAT object.	2.1.3	E
1512c	For each point of a SOUNDG feature object that TOUCHES a M_SDAT feature object.	SOUNDG object reference multiple sounding datums.	Adjust boundary of M_SDAT to clear the sounding.	2.1.3	E
1513	If the value of the HUNI subfield of the DSPM field is Not equal to 1 (metres).	HUNI subfield is not equal to 1 (metres).	Set value of HUNI to 1 (metres).	2.1.4	C
~~1514~~	*Check removed.*				
1515a	For each feature object where a value of DATEND, DATSTA, PEREND or PERSTA does not conform to the formatting defined in S-57 Appendix B.1, Annex A.	Date attribute not formatted according to the S-57 Use of the Object Catalogue for ENC.	Amend formatting to conform to the S-57 Use of the Object Catalogue for ENC.	2.1.5	C
1515b	For each feature object where a value of SORDAT, SUREND or SURSTA does not conform to the formatting defined in S-57 Appendix B.1, Annex A.	Date attribute not formatted according to the S-57 Use of the Object Catalogue for ENC.	Amend formatting to conform to ISO the S-57 Use of the Object Catalogue for ENC.	2.1.5	E
1516	For each Group 2 feature object with allowable attributes STATUS, PEREND and PERSTA, where STATUS contains the value 5 (periodic/intermittent) AND PEREND or PERSTA are Unknown OR not Present.	PEREND or PERSTA not populated where STATUS = 5.	Populate PEREND or PERSTA with values or remove STATUS = 5 (periodic/intermittent).	2.1.5.1	W

1517	For each feature object where TIMEND or TIMSTA is Known AND their values do not conform to the format defined in Chapter 2 of S-57 Appendix A.	TIMEND or TIMSTA are not formatted correctly.	Amend the formatting of TIMEND or TIMSTA.	2.1.6	E
1518a	If the AGEN subfield of the DSID field is not one of the values listed in S-62 sections I and II.	Producing Agency code is not a valid S-62 value.	Amend AGEN subfield to a valid S-62 value.	2.2.1	C
1518b	If the first 2 characters of the data set file name do not correspond to the value of the AGEN subfield of the DSID field.	Data set file name does not begin with the agency code corresponding to that set in the AGEN subfield of the DSID field.	Amend the first 2 characters of the data set file name.	2.2.1	C
~~1519~~	*Check removed.*				
~~1520~~	*Check removed.*				
~~1521a~~	*Check renumbered 1021a.*				
~~1521b~~	*Check removed.*				
~~1522a~~	*Check removed.*				
1522b	If the file extension is not ".000" AND the UADT subfield of the DSID field is notNull.	UADT is notNull for an update.	Encode UADT as missing subfield value.	2.2.2 and Appendix B.1 (5.7 and 6.1.4)	C
~~1523a~~	*Check removed.*				
1523b	If the data set file name extension is Equal to ".000" AND the ISDT subfield of the DSID field is Less than the value of the UADT subfield.	The ISDT of a base cell file precedes the UADT.	Amend UADT or ISDT accordingly.	2.2.2 and Appendix B.1 (5.7)	C
1524	For each M_QUAL meta object which is not COVERED_BY a SWPARE feature object AND where DRVAL1 is Known.	M_QUAL object which is not covered by a SWPARE object contains DRVAL1.	Remove DRVAL1 from M_QUAL object.	2.2.3.1 and 5.6	W
1525	For each M_QUAL meta object where POSACC is Known AND DRVAL1 is Known.	M_QUAL object with both DRVAL1 and POSACC populated.	Remove POSACC from M_QUAL object.	2.2.3.1	E
~~1526~~	*Check removed.*			.	
~~1527~~	*Check removed.*				
~~1528~~	*Check removed.*				
1529	For each feature object COVERED_BY a M_QUAL meta object where TECSOU is Known AND the value of TECSOU is Equal to the TECSOU of the M_QUAL meta object.	TECSOU value of a feature object is equal to value for the M_QUAL object it lies within.	Remove unnecessary value of TECSOU from feature object.	2.2.3.1 and 2.2.3.5	E
1530	For each feature object COVERED_BY a M_QUAL meta object where SOUACC is Known AND the value of SOUACC is Equal to the SOUACC OR is equivalent to the CATZOC values of the M_QUAL meta object.	SOUACC value of a feature object is equal to the SOUACC value or equivalent to the value of CATZOC of the M_QUAL object it lies within.	Remove unnecessary value of SOUACC from feature object.	2.2.3.1 and 2.2.3.4	E

1531	For each M_QUAL meta object where the value of POSACC, SOUACC or TECSOU is Known AND is equivalent to or degrades the accuracy indicated by the value of CATZOC.	Value of POSACC, SOUACC, or TECSOU is equivalent to or degrades the accuracy indicated by the value of CATZOC.	Amend CATZOC value or remove inappropriate value of POSACC, SOUACC or TECSOU from M_QUAL object.	2.2.3.1	E
1532	For each M_QUAL meta object where SURSTA is Not equal to the smallest (oldest) value of SURSTA of the M_SREL meta objects it COVERS.	SURSTA of a M_QUAL object is not equal to the oldest survey within the M_QUAL object.	Amend the SURSTA value of M_QUAL object to reflect the oldest survey within it.	2.2.3.1	E
1533	For each DRGARE feature object where SOUACC is Known AND it is equivalent to or degrades the CATZOC value of the M_QUAL meta object it OVERLAPS OR is WITHIN.	SOUACC of a DRGARE object is equivalent to or degrades the CATZOC value of the underlying M_QUAL object.	Amend the CATZOC value of M_QUAL.	2.2.3.1	E
1534	For each UWTROC feature object where SOUACC is Known AND is equivalent to or degrades the CATZOC value of the M_QUAL meta object it is COVERED_BY.	SOUACC of an UWTROC object is equivalent to or degrades the CATZOC value of the underlying M_QUAL object.	Amend CATZOC value of M_QUAL object.	2.2.3.1	E
1535	For each UWTROC feature object where SOUACC is Known AND is Equal to or degrades the SOUACC value of the M_QUAL meta object it is COVERED_BY.	SOUACC of an UWTROC object is equal to or degrades the SOUACC value of the underlying M_QUAL object.	Remove or amend the SOUACC value of M_QUAL object.	2.2.3.1	E
1536	For each WRECKS feature object where SOUACC is Known AND is equivalent to or degrades the CATZOC value of the M_QUAL meta object it is COVERED_BY OR OVERLAPS.	SOUACC of a WRECKS object is equivalent to or degrades the CATZOC value of the underlying M_QUAL object.	Amend the CATZOC value of M_QUAL object.	2.2.3.1	E
1537	For each WRECKS feature object where SOUACC is Known AND is Equal to or degrades the SOUACC value of the M_QUAL meta object it is COVERED_BY OR OVERLAPS.	SOUACC of a WRECKS object is equal to or degrades the SOUACC value of the underlying M_QUAL object.	Amend the SOUACC value of M_QUAL object or WRECKS object as appropriate.	2.2.3.1	E
1538	For each OBSTRN feature object where SOUACC is Known AND is equivalent to or degrades the CATZOC value of the M_QUAL meta object it is COVERED_BY, OVERLAPS OR CROSSES.	SOUACC of an OBSTRN object is equivalent to or degrades the CATZOC value of the underlying M_QUAL object.	Amend the SOUACC value of M_QUAL object or OBSTRN object as appropriate.	2.2.3.1	E

1539	For each OBSTRN feature object where SOUACC is Known AND is Equal to or degrades the SOUACC value of the M_QUAL meta object it is COVERED_BY, OVERLAPS OR CROSSES.	SOUACC of an OBSTRN object is equal to or degrades the SOUACC value of the underlying M_QUAL object.	Remove or amend the SOUACC value of M_QUAL object or OBSTRN object as appropriate.	2.2.3.1	E
~~1540~~	*Check removed.*				
1541	For each single sounding where the value of QUASOU of the SOUNDG feature object is Equal to the QUASOU value of the M_SREL meta object it is COVERED_BY.	QUASOU of a SOUNDG object is equal to the QUASOU value of the underlying M_SREL object.	Remove QUASOU from SOUNDG object.	2.2.3.3	E
1542	For each spatial object where the value of POSACC is Equal to the POSACC value of the M_ACCY meta object it is COVERED_BY OR CROSSES.	POSACC of a spatial object is equal to the POSACC value of the underlying M_ACCY object.	Remove unnecessary POSACC value from spatial object.	2.2.4.1	W
~~1543~~	*Check removed.*				
1544	For each M_ACCY meta object where HORACC, SOUACC or VERACC are Present.	M_ACCY object includes HORACC, SOUACC or VERACC.	Remove HORACC, SOUACC or VERACC from M_ACCY object.	2.2.4.1	E
1545	For each feature object where HORACC is Known AND HORCLR is Unknown OR not Present.	Value for HORACC without a value of HORCLR.	Add HORCLR value or remove HORACC.	2.2.4.2	E
1546	For each feature object where VERACC is Known AND VERCLR, VERCOP, VERCSA and VERCCL are Unknown OR not Present.	Value for VERACC without value of VERCLR, VERCOP, VERCSA or VERCCL.	Remove VERACC or populate vertical clearance value.	2.2.4.3	E
~~1547~~	*Check removed.*				
1548	For each feature object where SORIND is Known AND SORDAT is Unknown OR not Present.	Value of SORIND without a value of SORDAT.	Populate SORDAT with an appropriate value.	2.2.5.2	W
1549	If the value of CSCL subfield of the DSPM field is Null.	CSCL is not populated with a value.	Populate CSCL with an appropriate value.	2.2.6	C
1550	For each M_CSCL meta object where CSCALE is Equal to the value of CSCL subfield of the DSPM field.	CSCALE of M_CSCL object is equal to the value given CSCL subfield of the DSPM field.	Remove unnecessary M_CSCL object.	2.2.6	E
1551a	For each M_CSCL meta object which OVERLAPS OR is WITHIN another M_CSCL meta object.	M_CSCL objects overlap.	Amend M_CSCL objects so that they do not overlap.	2.2.6	E
1551b	If the combined coverage of M_CSCL meta objects EQUALS the combined coverage of M_COVR meta objects with CATCOV = 1(coverage is available)	M_CSCL object has the same geometry as a M_COVR meta object with CATCOV = 1.	Consider removing the M_CSCL meta object and/or reconsider the value of the CSCL of the dataset.	2.2.6	W
~~1552~~	*Check removed.*				

1553	For each value of SCAMIN which is Less than OR Equal to the compilation scale of the data for the area.	SCAMIN value less than or equal to compilation scale.	Amend SCAMIN value.	2.2.6 and 2.2.7	E
1554a	For each Group 1 feature object where SCAMIN is Present.	SCAMIN present for a Group 1 object.	Remove SCAMIN.	2.2.7	C
1554b	For each meta object where SCAMIN is Present.	SCAMIN present for a meta object.	Remove SCAMIN.	2.2.7	C
~~1555~~	*Check removed.*				
~~1556~~	*Check renumbered 1022.*				
~~1557~~	~~For each T_HMON feature object where T_MTOD is Not equal to 1 (simplified harmonic method of tidal prediction) OR 2 (full harmonic method of tidal prediction).~~	~~Invalid value of T_MTOD for T_HMON object.~~	~~Set value of T_MTOD to 1 (simplified harmonic method of tidal prediction) or 2 (full harmonic method of tidal prediction).~~	~~3.2.2~~	~~E~~
~~1558~~	~~For each T_NHMN feature object where T_MTOD is Not equal to 3 (time and height difference non-harmonic method).~~	~~Invalid value of T_MTOD for T_NHMN object.~~	~~Set value of T_MTOD to 3 (time and height difference non-harmonic method).~~	~~3.2.3~~	~~E~~
1559	For each T_NHMN feature object which is not associated (using the C_ASSO collection object) with a T_TIMS or T_HMON feature object.	T_NHMN which is not associated with a T_TIMS or a T_HMON object.	Associate T_NHMN object with a T_TIMS or T_HMON object.	3.2.3	E
~~1560~~	~~For each TS_PRH feature object where T_MTOD is Not equal to 1 (simplified harmonic method of tidal prediction) OR 2 (full harmonic method of tidal prediction).~~	~~Invalid value of T_MTOD for TS_PRH object.~~	~~Set value of T_MTOD to 1 (simplified harmonic method of tidal prediction) or 2 (full harmonic method of tidal prediction).~~	~~3.3.3~~	~~E~~
~~1561~~	~~For each TS_PNH feature object where T_MTOD is Not equal to 3 (time and height difference non-harmonic method).~~	~~Invalid value of T_MTOD for TS_PNH object.~~	~~Set value of T_MTOD to 3 (time and height difference non-harmonic method).~~	~~3.3.4~~	~~E~~
1562	For each TS_PNH feature object which is not associated (using the C_ASSO collection object) with a TS_TIS OR TS_PRH feature object.	TS_PNH object which is not associated with a TS_TIS or TS_PRH object.	Associate TS_PNH object with a TS_TIS or TS_PRH object using a C_ASSO object.	3.3.4	E
1563	For each RIVERS, CANALS, LAKARE, DOCARE or LOKBSN feature object which is not COVERED_BY a LNDARE or UNSARE feature object of geometric primitive area.	Non navigable water objects not covered by UNSARE or LNDARE object.	Amend LNDARE or UNSARE to cover non navigable water objects.	4.1	W
1564	For each CTRPNT feature object where VERACC or VERDAT are Present.	Prohibited attribute VERACC or VERDAT populated for a CTRPNT object.	Remove VERACC or VERDAT from CTRPNT object.	4.3	E

1565	For each edge of a LNDARE feature object of geometric primitive area which is not COINCIDENT with one of the following feature objects: a) COALNE, SLCONS, GATCON or DAMCON of geometric primitive line. OR b) M_COVR, GATCON, DAMCON, RIVERS, TUNNEL, DRYDOC, CANALS, LAKARE, LOKBSN, DOCARE or LNDARE of geometric primitive area. OR c) CAUSWY, SLCONS, MORFAC, WRECKS, OBSTRN or PYLONS where WATLEV is Equal to 1 (partly submerged at high water) OR 2 (always dry) OR 6 (subject to inundation or flooding).	LNDARE object not enclosed by appropriate linear or area object.	Ensure LNDARE is enclosed by an appropriate object.	4.5	E
1566	For each edge of a COALNE or SLCONS feature object of geometric primitive line which is COINCIDENT with a RIVERS, CANALS, LAKARE, DOCARE, DRYDOC or LOKBSN feature object AND is not COINCIDENT with a DEPARE, DRGARE, UNSARE, PONTON, FLODOC or HULKES feature object.	COALNE or SLCONS object used as the boundary of objects on land.	Remove COALNE or SLCONS object.	4.5, 4.6.6.1 and 4.6.6.3	E
1567	For each COALNE feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a COALNE object.	Remove values of VERACC or VERDAT from COALNE object.	4.5.1	E
1568	For each SLCONS feature object of geometric primitive area which is not COVERED_BY the combined coverage of LNDARE, DEPARE or UNSARE feature objects of geometric primitive area.	Area SLCONS object not covered by an appropriate Group 1 object.	Amend appropriate Group 1 object to cover SLCONS object.	4.5.2	E

1569	For each SLCONS feature object of geometric primitive area where WATLEV is Equal to 3 (always under water/submerged) OR 4 (covers and uncovers) OR 5 (awash) AND which is not COVERED a DEPARE and/or UNSARE feature object of geometric primitive area.	Area SLCONS object not covered by an appropriate Group 1 object.	Amend appropriate Group 1 object to cover SLCONS object.	4.5.2	E
1570	For each SLCONS feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a SLCONS object.	Remove values of VERACC or VERDAT from SLCON object.	4.5.2	E
1571	For each BERTHS feature object where VERDAT is Present.	Prohibited attribute VERDAT populated for a BERTHS object.	Remove value of VERDAT from BERTHS object.	4.6.2	E
1572	For each DRYDOC feature object where VERDAT is Present.	Prohibited attribute VERDAT populated for a DRYDOC object.	Remove value of VERDAT from DRYDOC object.	4.6.6.1	E
1573	For each DRYDOC feature object which is not COVERED_BY a LNDARE feature object of geometric primitive area.	DRYDOC object not covered by a LNDARE object.	Amend LNDARE object or DRYDOC object as required.	4.6.6.1	E
~~1574~~	*Check removed.*				
1575	For each FLODOC feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a FLODOC object.	Remove values of VERACC or VERDAT from FLODOC object.	4.6.6.2	E
~~1576~~	*Check removed.*				
1577	For each DOCARE feature object which EQUALS a SEAARE feature object.	DOCARE object equals SEAARE object.	Amend or remove SEAARE object as required.	4.6.6.3	W
1578	For each GATCON feature object where VERDAT is Known AND VERCLR is not Present.	VERDAT populated without VERCLR being present for a GATCON object.	Remove VERDAT or populate VERCLR for GATCON object.	4.6.6.4	E
~~1579~~	*Check removed.*				
1580	For each GATCON feature object which is not COVERED_BY the combined coverage of DEPARE, DRGARE, UNSARE or LNDARE feature objects of geometric primitive area.	GATCON object not covered by a DEPARE, DRGARE, UNSARE or LNDARE object.	Amend objects to ensure GATCON is covered by DEPARE, DRGARE, UNSARE or LNDARE.	4.6.6.4	E
1581	For each LOKBSN feature object where its geometric primitive EQUALS a SEAARE object.	LOKBSN object equals SEAARE object.	Amend or remove SEAARE object as required.	4.6.6.5	W
1582	For each GRIDRN feature object where HORACC or VERACC is Present.	Prohibited attribute VERACC or HORACC populated for a GRIDRN object.	Remove HORACC or VERACC from GRIDRN object.	4.6.6.6	E

1583	For each MORFAC feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a MORFAC object.	Remove VERACC or VERDAT from MORFAC object.	4.6.7.1	E
1584	For each MORFAC feature object of geometric primitive area where WATLEV is Equal to 1 (partly submerged at high water) OR 2 (always dry) OR 6 (subject to inundation or flooding) which is not COVERED_BY a LNDARE feature object of geometric primitive area.	Area MORFAC object with WATLEV = 1, 2 or 6 not covered by a LNDARE object.	Amend MORFAC object or LNDARE object as required.	4.6.7.1	E
1585	For each PILPNT feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a PILPNT object.	Remove VERACC or VERDAT from PILPNT object.	4.6.7.2	E
1586	For each PONTON feature object where VERACC is Present.	Prohibited attribute populated for a PONTON object.	Remove VERACC from PONTON object.	4.6.7.3	E
1587	For each HULKES feature object where HORACC or VERACC is Present.	Prohibited attribute HORACC or VERACC populated for a HULKES object.	Remove HORACC or VERACC from HULKES object.	4.6.8	E
~~1588~~	*Check removed.*				
1589	For each feature object where CONDTN is Equal to 1 (under construction), OR 3 (under reclamation) OR 5 (planned construction) AND SORDAT is Unknown OR not Present.	Object with CONDTN = 1, 3 or 5 without a value for SORDAT.	Populate SORDAT.	4.6.10	W
1590	For each LNDRGN feature object that is DISJOINT from a LNDARE feature object.	LNDRGN not covered by LNDARE object.	Ensure LNDRGN object is covered by or contains a LNDARE object.	4.7.1	W
1591	For each LNDELV feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a LNDELV object.	Remove VERACC or VERDAT from LNDELV object.	4.7.2	E
1592	For each COALNE feature object which is COINCIDENT with a LNDRGN feature object where CATLND contains the value 2 (marsh) AND CATCOA for the COALNE feature object is Not equal to 8 (marshy shore) OR QUAPOS is Not equal to 4 (approximate).	Invalid value of QUAPOS or CATCOA for a COALNE object adjacent to a LNDRGN where CATLND = 2.	Amend value of CATCOA or QUAPOS as required for COALNE object.	4.7.3	W
1593	For each SLOGRD feature object where NATCON or NATQUA is Present.	Prohibited attribute NATCON or NATQUA populated for a SLOGRD object.	Remove NATCON or NATQUA from SLOGRD object.	4.7.4	E

1594	For each SLOTOP feature object where NATCON, NATQUA, VERACC or VERDAT is Present.	Prohibited attribute NATCON, NATQUA, VERACC or VERDAT populated for a SLOTOP object.	Remove NATCON, NATQUA, VERACC or VERDAT from SLOTOP object.	4.7.5	E
1595	For each SLOTOP feature object where CATSLO is Equal to 6 (cliff) AND is COINCIDENT with a COALNE object.	SLOTOP object where CATSLO = 6 coincides with a COALNE object.	Remove SLOTOP object. Only COALNE with CATCOA = 1 (steep coast) should be encoded.	4.7.5	W
~~1596~~	*Check removed.*				
1597	For each RIVERS feature object which EQUALS a SEAARE feature object.	RIVERS object equals a SEAARE object.	Amend SEAARE object.	4.7.6	E
1598	For each RAPIDS feature object where VERACC is Present.	Prohibited attribute VERACC populated for a RAPIDS object.	Remove VERACC from RAPIDS object.	4.7.7.1	E
1599a	For each RAPIDS or WATFAL feature object which is not COVERED_BY a RIVERS feature object.	RAPIDS or WATFAL object not within or touching a RIVERS object.	Ensure RAPIDS object or WATFAL object is within or touching a RIVERS object.	4.7.7.1 and 4.7.7.2	W
1599b	For each RAPIDS or WATFAL feature object which is not COVERED_BY a LNDARE or UNSARE feature object.	RAPIDS or WATFAL object not within LNDARE or UNSARE object.	Ensure RAPIDS object or WATFAL object is covered by LNDARE or UNSARE object.	4.7.7.1 and 4.7.7.2	W
1600	For each WATFAL feature object where VERACC is Present.	Prohibited attribute VERACC populated for a WATFAL object.	Remove VERACC from WATFAL object.	4.7.7.2	E
1601	For each LAKARE feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a LAKARE object.	Remove VERACC and VERDAT from LAKARE object.	4.7.8	E
1602	For each LAKARE feature object which EQUALS a SEAARE feature object.	LAKARE object equals SEAARE object.	Amend objects to remove overlap.	4.7.8	W
~~1603~~	*Check removed.*				
1604	For each COALNE feature object which is COINCIDENT with a LNDRGN feature object where CATLND contains the value 15 (salt pan) AND CATCOA for the COALNE feature object is Not equal to 2 (flat coast).	COALNE object adjacent to LNDRGN object with CATLND = 15 does not have CATCOA = 2.	Populate CATCOA = 2 (flat coast) for the COALNE object.	4.7.9	W
1605	For each ICEARE feature object which is not COVERED_BY the combined coverage of LNDARE, UNSARE AND DEPARE feature objects of geometric primitive area.	ICEARE object not covered by appropriate Group 1 objects.	Amend objects to ensure Group 1 objects cover.	4.7.10	E

1606	For each COALNE feature object where CATCOA is Not equal to 6 (glacier (seaward end)) AND which is COINCIDENT with an ICEARE feature object where CATICE is Equal to 5 (glacier).	COALNE object without CATCOA = 6 touching an ICEARE object with CATICE = 5.	Populate CATCOA = 6 (glacier (seaward end)) for the COALNE object.	4.7.10	W
1607a	For each COALNE feature object where CATCOA is Not equal to 7 (mangrove) AND is COINCIDENT with a VEGATN feature object where CATVEG contains the value 7 (mangroves).	COALNE object with CATCOA not equal to 7 is coincident with a VEGATN object with CATVEG = 7.	Populate CATCOA = 7 (mangrove) for the COALNE object.	4.7.11	W
1607b	For each VEGATN feature object where CATVEG contains the value 7 (mangroves) AND the QUAPOS of the spatial object is Not equal to 4 (approximate).	VEGATN object where CATVEG = 7 without QUAPOS = 4.	Populate QUAPOS = 4 (approximate) for the VEGATN object.	4.7.11	W
1608	For each VEGATN feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a VEGATN object.	Remove VERACC or VERDAT from the VEGATN object.	4.7.11	E
1609	For each CANALS feature object which EQUALS a SEAARE object.	CANALS object equals SEAARE object.	Remove SEAARE object or amend objects to remove overlap.	4.8.1	W
1610	For each RAILWY feature object where VERACC is Present.	Prohibited attribute VERACC populated for a RAILWY object.	Remove VERACC from RAILWY object.	4.8.2	E
1611	For each TUNNEL feature object where BURDEP is Present.	Prohibited attribute BURDEP populated for a TUNNEL object.	Remove BURDEP from TUNNEL object.	4.8.3	E
~~1612~~	*Check removed.*				
1613	For each TUNNEL feature object which COVERS a CANALS feature object AND where any of HORACC, HORCLR, VERACC or VERCLR is Known.	TUNNEL which covers a CANALS object has values of HORACC, HORCLR, VERACC or VERCLR.	Remove HORACC, HORCLR, VERACC or VERCLR from TUNNEL object.	4.8.3	E
1614	For each TUNNEL feature object which COVERS any non-hydrographic object (for this check hydrographic objects are DEPARE, DEPCNT, DRGARE and LNDARE).	TUNNEL object contains non Hydrographic object.	Remove objects within TUNNEL object which are unnecessary.	4.8.3	W
~~1615~~	*Check removed.*				
1616	For each DAMCON feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a DAMCON object.	Remove VERACC or VERDAT from DAMCON object.	4.8.5	E

1617	For each DAMCON feature object of geometric primitive area which is not COVERED_BY a LNDARE feature object of geometric primitive area.	DAMCON not covered by LNDARE.	Ensure DAMCON object is covered by a LNDARE object.	4.8.5	C
1618	For each DYKCON feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a DYKCON object.	Remove VERACC or VERDAT from DYKCON object.	4.8.7	E
1619	For each DYKCON feature object of geometric primitive area which is not WITHIN a LNDARE feature object of geometric primitive area.	DYKCON area object not covered by LNDARE object.	Ensure DYKCON object is covered by a LNDARE object.	4.8.7	E
1620	For each edge of a DYKCON feature object which is COINCIDENT with both a LNDARE feature object AND a DEPARE or DRGARE or UNSARE feature object of geometric primitive area AND is not COINCIDENT with a SLCONS feature object of geometric primitive line where CATSLC is not Present.	DYKCON object not enclosed by SLCONS object where it forms the boundary between water and land.	Add SLCONS object to ensure boundary between land and water is shown.	4.8.7	E
~~1621~~	*Check removed.*				
~~1622~~	*Check removed.*				
1623	For each BRIDGE feature object which OVERLAPS OR CROSSES a DEPARE or DRGARE feature object AND the supports are not encoded with PYLONS feature objects where CATPYL is Equal to 4 (bridge pylon/tower) OR 5 (bridge pier).	BRIDGE object over navigable water with supports not encoded using a valid PYLONS object/attribute combination.	Ensure bridge supports are encoded using PYLONS objects with CATPYL = 4 (bridge pylon/tower) or 5 (bridge pier).	4.8.10	E
~~1624~~	*Check removed.*				
1625	For each AIRARE or RUNWAY feature object associated using a C_AGGR collection object.	AIRARE object or RUNWAY object associated using C_AGGR.	Encode association using C_ASSO not C_AGGR.	4.8.12	W
1626	For each AIRARE feature object where CONVIS is Present.	Prohibited attribute CONVIS populated for an AIRARE object.	Remove CONVIS from AIRARE object.	4.8.12	E
1627	For each RUNWAY feature object where CONVIS is Present.	Prohibited attribute CONVIS populated for a RUNWAY object.	Remove CONVIS from RUNWAY object.	4.8.12	E
1628	For each PRDARE feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a PRDARE object.	Remove VERACC or VERDAT from PRDARE object.	4.8.13	E

1629	For each BUAARE feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a BUAARE object.	Remove VERACC or VERDAT from BUAARE object.	4.8.14	E
1630	For each RIVERS, LOKBSN, DOCARE, LAKARE or CANALS feature object of geometric primitive area which OVERLAPS OR is WITHIN a BUAARE feature object.	Area RIVERS, LOKBSN, DOCARE, LAKARE or CANALS object overlaps a BUAARE object.	Amend BUAARE object to remove overlap.	4.8.14	W
1631	For each BUISGL feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a BUISGL object.	Remove values of VERACC or VERDAT from BUISGL object.	4.8.15	E
1632	For each SILTNK feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a SILTNK object.	Remove VERACC or VERDAT from SILTNK object.	4.8.15	E
1633	For each LNDMRK feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a LNDMRK object.	Remove VERACC or VERDAT from LNDMRK object.	4.8.15	E
1634	For each FNCLNE feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a FNCLNE object.	Remove VERACC or VERDAT from FNCLNE object.	4.8.16	E
1635	For each FORSTC feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a FORSTC object.	Remove VERACC or VERDAT from FORSTC object.	4.8.17	E
1636	For each PYLONS feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a PYLONS object.	Remove VERDAT or VERACC from PYLONS object.	4.8.18	E
1637	For each PYLONS feature object of geometric primitive area where WATLEV is Equal to 1 (partly submerged at high water) OR 2 (always dry) OR 6 (subject to inundation or flooding) which is not COVERED_BY a LNDARE feature object of geometric primitive area.	Area PYLONS object with WATLEV = 1, 2 or 6 not covered by a LNDARE object.	Ensure area PYLONS object is covered by a LNDARE object.	4.8.18	E
~~1638~~	*Check renumbered 1023.*				
1639	For each DEPCNT feature object where VERDAT is Present.	Prohibited attribute VERDAT populated for a DEPCNT object.	Remove VERDAT from DEPCNT object.	5.2	E
1640	For each SOUNDG feature object where VERDAT is Present.	Prohibited attribute VERDAT populated for a SOUNDG object.	Remove VERDAT from SOUNDG object.	5.3	E

1641	For each UWTROC feature object which INTERSECTS a SOUNDG feature object (horizontal component only).	UWTROC shares position with SOUNDG object.	Remove object that is not required.	5.3	E
1642	For each DEPARE feature object where VERDAT or SOUACC is Present.	Prohibited attribute VERDAT or SOUACC populated for a DEPARE object.	Remove VERDAT or SOUACC from DEPARE object.	5.4.1	E
~~1643~~	*Check removed.*				
1644	For each edge bounding a DEPARE feature object which is COINCIDENT with a M_COVR meta object AND is COINCIDENT with a feature object of type line.	DEPARE object on the edge of data coverage not bounded by linear spatial objects without linear feature objects.	Ensure DEPARE objects at the edge of the dataset only have spatial objects without linear feature objects as their outer boundary.	5.4.2 (Fig.5)	W
~~1645~~	*Check removed.*				
1646	For each DRGARE feature object where DRVAL2 is Known AND is Equal to the value of DRVAL1.	DRVAL1 and DRVAL2 have the same value for a DRGARE object.	Amend values or remove value of DRVAL2.	5.5	W
1647	For each DRGARE feature object where VERDAT is Present.	Prohibited attribute VERDAT populated for a DRGARE object.	Remove VERDAT from DRGARE object.	5.5	E
~~1648~~	*Check removed.*				
1649	For each DRGARE feature object where SOUACC is Known AND is Less than or equal to the value of SOUACC of the M_QUAL meta object it OVERLAPS, CONTAINS OR is WITHIN.	Value of SOUACC on DRGARE is equal to or degrades the value on the underlying M_QUAL object.	Amend or remove value of SOUACC from DRGARE object.	5.5 and 2.2.3.1	E
1650	For each SWPARE feature object where VERDAT is Present.	Prohibited attribute VERDAT populated for a SWPARE object.	Remove VERDAT from SWPARE object.	5.6	E
1651	For each SWPARE feature object which OVERLAPS, CONTAINS OR is WITHIN a LNDARE, UNSARE, FLODOC, HULKES or PONTON feature object of geometric primitive area.	SWPARE object not covered by DRGARE or DEPARE objects.	Amend limits of SWPARE object or edit Group 1 objects.	5.6	C
1652	For each SWPARE feature object which EQUALS a M_QUAL meta object AND the DRVAL1 values of the two objects are Not equal.	SWPARE object sharing geometry of M_QUAL object where DRVAL1 values are not equal.	Amend value of DRVAL1 for the SWPARE or M_QUAL object.	5.6	E
1653	For each SWPARE feature object where SOUACC is Known AND is equal to the SOUACC value of the M_QUAL meta object it is WITHIN.	SOUACC of a SWPARE object is equal to the SOUACC of the M_QUAL object it is within.	Remove or amend or the SOUACC value of the M_QUAL object.	5.6	E

~~1654~~	~~For each SWPARE feature object where TECSOU is Known AND is Not equal to 6 (swept by wire-drag) OR 8 (swept by vertical acoustic system) OR 13 (swept by side-scan sonar).~~	~~Prohibited value of TECSOU for a SWPARE object~~	~~Set value of TECSOU to 6 (swept by wire-drag), 8 (swept by vertical acoustic system) or 13 (swept by side-scan sonar) for the SWPARE object.~~	~~5.6~~	~~E~~
1655	For each M_QUAL meta object where POSACC is Known which EQUALS a SWPARE feature object.	POSACC encoded on M_QUAL object which covers a SWPARE object.	Remove POSACC from M_QUAL object.	5.6	E
1656	For each UWTROC feature object where VERDAT is Present.	Prohibited attribute VERDAT populated for an UWTROC object.	Remove VERDAT from UWTROC object.	6.1.2	E
1657	For each UWTROC feature object where the values of VALSOU, QUASOU, WATLEV, TECSOU and SOUACC are not as defined in the table below (additional values may be encoded).	Possible illogical attribute values for UWTROC object.	Amend to logical attribute combination for UWTROC object.	6.1.2	W

VALSOU	QUASOU	WATLEV	TECSOU SOUACC
unknown	2 OR not Present	3, 4, 5 OR Unknown	Not Present
	2 OR not Present	unknown	Not Present
< 0	1, 3, 4, 6, 8, 9 OR not Present	4	Optional
	7	4	Not Present
0	1, 3, 4, 6, 8, 9 OR not Present	5	Optional
	7	5	Not Present
> 0	1, 3, 4, 6, 8, 9 OR not Present	3	Optional
	7	3	Not Present

1658	For each WRECKS feature object where VERACC, VERDAT or VERLEN are Present.	Prohibited attribute VERDAT, VERACC or VERLEN populated for a WRECKS object.	Remove VERDAT, VERACC or VERLEN from WRECKS object.	6.2.1	E
1659a	For each WRECKS feature object where VALSOU is Known AND EXPSOU is Equal to 1 (within the range of depth of the surrounding depth area) OR is not Present AND VALSOU is Less than or equal to the DRVAL1 OR Greater than DRVAL2 of the DEPARE feature object it OVERLAPS OR is COVERED_BY.	VALSOU for WRECKS object with EXPSOU = 1 or not present is outside of the range of the underlying DEPARE object.	Populate an appropriate value of EXPSOU for the WRECKS object.	6.2.1	E

1659b	For each WRECKS feature object where VALSOU is Known AND EXPSOU is Equal to 1 (within the range of depth of the surrounding depth area) OR is not Present AND VALSOU is Less than or equal to the DRVAL1 OR Greater than DRVAL2 of the DRGARE feature object it OVERLAPS OR is COVERED_BY AND DRVAL2 is Known AND Not equal to DRVAL1.	VALSOU for WRECKS object with EXPSOU = 1 or not present is outside of the range of the underlying DRGARE object.	Populate an appropriate value of EXPSOU for the WRECKS object.	6.2.1	E
1660	For each WRECKS feature object where VALSOU is Known AND EXPSOU is Equal to 2 (shoaler than the range of depth of the surrounding depth area) AND VALSOU is Greater than the DRVAL1 of the DEPARE or DRGARE feature object it OVERLAPS OR is COVERED_BY AND DRVAL1 is Known.	WRECKS object where EXPSOU = 2 and VALSOU is greater than the DRVAL1 of the underlying DEPARE/DRGARE object.	Populate an appropriate value of EXPSOU for the WRECKS object.	6.2.1	E
1661a	For each WRECKS feature object where VALSOU is Known AND EXPSOU is Equal to 3 (deeper than the range of depth of the surrounding depth area) AND VALSOU is Less than or equal to DRVAL2 of the DEPARE feature object it OVERAPS OR is COVERED_BY AND DRVAL2 is Known.	WRECKS object where EXPSOU = 3 and VALSOU is less than DRVAL2 of the underlying DEPARE object.	Populate an appropriate value of EXPSOU for the WRECKS object.	6.2.1	E
1661b	For each WRECKS feature object where EXPSOU is Equal to 3 (deeper than the range of depth of the surrounding depth area) AND VALSOU is Less than or equal to the DRVAL2 of the DRGARE feature object it OVERLAPS OR is COVERED_BY where DRVAL1 and DRVAL2 are Known.	WRECKS object where EXPSOU = 3 and VALSOU is less than DRVAL2 of the underlying DRGARE object.	Populate an appropriate value of EXPSOU for the WRECKS object.	6.2.1	E

1661c	For each WRECKS feature object where EXPSOU is Equal to 3 (deeper than the range of depth of the surrounding depth area) AND VALSOU is Less than or equal to the DRVAL1 of the DRGARE feature object it OVERLAPS OR is COVERED_BY where DRVAL2 is not Present.	WRECKS object where EXPSOU= 3 and VALSOU is less than DRVAL1 of the underlying DRGARE object where only DRVAL1 is populated.	Populate an appropriate value of EXPSOU for the WRECKS object.	6.2.1	E
~~1662~~	*Check removed.*				
1663	For each WRECKS feature object where the attribute values do not correspond to the table below.	WRECKS object with illogical attribute combination.	Amend attributes in accordance with the logical values defined in the table.	6.2.1	W

VALSOU	WATLEV	CATWRK	QUASOU	HEIGHT	TECSOU SOUACC
not Present	3 OR Unknown	1, 2, 3 OR Unknown	2 OR not Present	not Present	not Present
	4 OR 5	Present	2 OR not Present	not Present	not Present
	1 OR 2	4, 5 OR Unknown	not Present	Optional	not Present
Unknown	3 OR Unknown	1, 2, 3 OR not Present	2 OR not Present	not Present	not Present
	4 OR 5	Optional	2 OR not Present	not Present	not Present
< 0	4	Optional	7	not Present	not Present
	4	Optional	1, 3, 4, 6, 8, 9 OR not Present	not Present	Optional
0	5	1, 2, 3 OR not Present	7	not Present	not Present
	5	Optional	1, 3, 4, 6, 8, 9 OR not Present	not Present	Optional
> 0	3	1, 2, 3 OR not Present	7	not Present	not Present
	3	1, 2, 3 OR not Present	1, 3, 4, 6, 8, 9 OR not Present	not Present	Optional

1664	For each OBSTRN feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for an OBSTRN object.	Remove VERACC or VERDAT from OBSTRN object.	6.2.2	E
1665a	For each OBSTRN feature object where VALSOU is Known AND EXPSOU is Equal to 1 (within the range of depth of the surrounding depth area) OR not Present AND VALSOU is Less than or equal to DRVAL1 OR Greater than DRVAL2 of the DEPARE feature object it OVERLAPS, CROSSES OR is COVERED_BY.	VALSOU for OBSTRN object with EXPSOU = 1 or not present is outside of the range of the underlying DEPARE object.	Populate an appropriate value of EXPSOU for the OBSTRN object.	6.2.2	E

1665b	For each OBSTRN feature object where VALSOU is Known AND EXPSOU is Equal to 1 (within the range of depth of the surrounding depth area) OR not Present AND VALSOU is Less than or equal to DRVAL1 OR Greater than DRVAL2 of the DRGARE feature object it OVERLAPS, CROSSES OR is COVERED_BY AND DRVAL2 is Known AND Not equal to DRVAL1.	VALSOU for OBSTRN object with EXPSOU = 1 or not present is outside of the range of the underlying DRGARE object.	Populate an appropriate value of EXPSOU for the OBSTRN object.	6.2.2	E
1666	For each OBSTRN feature object where VALSOU is Known AND EXPSOU is Equal to 2 (shoaler than the range of depth of the surrounding depth area) AND VALSOU is Greater than the DRVAL1 of the DEPARE or DRGARE feature object it OVERLAPS, CROSSES OR is COVERED_BY AND DRVAL1 is Known.	OBSTRN object where EXPSOU = 2 and VALSOU is greater than DRVAL1 of the underlying DEPARE/DRGARE object.	Populate an appropriate value of EXPSOU for the OBSTRN object.	6.2.2	E
1667a	For each OBSTRN feature object where VALSOU is Known AND EXPSOU is Equal to 3 (deeper than the range of depth of the surrounding depth area) AND VALSOU is Less than or equal to DRVAL2 of the DEPARE feature object it OVERLAPS, CROSSES OR is COVERED_BY AND DRVAL2 is Known.	OBSTRN object where EXPSOU = 3 and VALSOU is less than DRVAL2 of the underlying DEPARE object.	Populate an appropriate value of EXPSOU for the OBSTRN object.	6.2.2	E
1667b	For each OBSTRN feature object where EXPSOU is Equal to 3 (deeper than the range of depth of the surrounding depth area) AND VALSOU is Less than or equal to the DRVAL2 of the DRGARE feature object it OVERLAPS, CROSSES OR is COVERED_BY AND DRVAL1 and DRVAL2 are Known.	OBSTRN object where EXPSOU = 3 and VALSOU is less than DRVAL2 of the underlying DRGARE object.	Populate an appropriate value of EXPSOU for the OBSTRN object.	6.2.2	E
1667c	For each OBSTRN feature object where EXPSOU is Equal to 3 (deeper than the range of depth of the surrounding depth area) AND VALSOU is Less than or equal to the DRVAL1 of the DRGARE feature object it OVERLAPS, CROSSES OR is COVERED_BY AND DRVAL2 is not Present.	OBSTRN object where EXPSOU = 3 and VALSOU is less than DRVAL1 of the underlying DRGARE object where only DRVAL1 is populated.	Populate an appropriate value of EXPSOU for the OBSTRN object.	6.2.2	E

1668	For each OBSTRN feature object where PRODCT is Present AND CATOBS is Not equal to 2 (wellhead) OR 3 (diffuser).	OBSTRN object with a value for PRODCT without a logical value of CATOBS.	Remove value of PRODCT or populate logical value of CATOBS for the OBSTRN object.	Logical consistency	W
1669	For each OBSTRN feature object where the attribute values do not correspond to the table below.	OBSTRN object with illogical attribute value combinations.	Amend attributes in accordance with the logical values defined in the table.	6.2.2	W

VALSOU	WATLEV	QUASOU	HEIGHT	TECSOU SOUACC
not Present	1 OR 2	not Present	Present	not Present
	7	not Present	Unknown	not Present
Unknown	3, 4, 5 OR Unknown	2 OR not Present	not Present	not Present
< 0	4	1, 3, 4, 6, 8, 9 OR not Present	not Present	Optional
	4	7	not Present	not Present
0	5	1, 3, 4, 6, 8, 9 OR not Present	not Present	Optional
> 0	3	1, 3, 4, 6, 8, 9 OR not Present	not Present	Optional
	3	7	not Present	not Present

1670	For each WRECKS or OBSTRN feature object of geometric primitive area where the values of EXPSOU, QUASOU, SOUACC, VALSOU and WATLEV are Not equal to the values of the shallowest MARCUL, OBSTRN, UWTROC or WRECKS feature object of geometric primitive point within the area.	Attributes of area WRECKS or OBSTRN object do not reflect the attributes of the shallowest point object within the area.	Ensure area WRECKS or OBSTRN object attribute values reflect the values of the shallowest point object.	6.3.2	W
1671	For each feature object of geometric primitive line which is COINCIDENT with an area feature object of the same feature object class AND has the same attribute values (excluding attributes SORIND, SORDAT and SCAMIN).	Line object touching area object of the same class with the same attribute values except SORIND, SORDAT and SCAMIN.	Remove unnecessary object.	Logical consistency	W
1672	For each feature object of geometric primitive point which is COVERED_BY an area feature object of the same class AND has the same attribute values AND is not a LNDARE, OBSTRN or WRECKS feature object.	Point object within an area object of the same class with the same attribute values.	Remove duplicate object or amend attributes accordingly.	Logical consistency	E
1673a	For each SBDARE feature object where NATSUR values are not separated by a comma or slash (without spaces).	NATSUR values not separated by a comma or slash.	Insert comma or slash for NATSUR value as required.	7.1	E
1673b	For each SBDARE feature object where NATSUR starts or ends with a comma or slash.	NATSUR starts or ends with a comma or slash.	Remove unnecessary comma or slash from NATSUR value.	7.1	W

1673c	For each SBDARE feature object where NATSUR contains ‘,,’ OR ‘//’.	Consecutive comma or slash within NATSUR.	Remove unnecessary comma or slash from NATSUR value.	7.1	W
1673d	For each SBDARE feature object where NATSUR contains commas or slashes AND the total of these does Not equal number of commas and slashes contained in NATQUA.	The number of commas and slashes in NATSUR is different from the number of commas and slashes in NATQUA.	Ensure appropriate commas or slashes are used to separate values.	7.1	W
1673e	For each SBDARE feature object where NATSUR contains ‘9/ ‘.	NATSUR contains ‘9/ ‘. (Rock is encoded as the surface layer, it should be underlying).	Remove or amend inappropriate NATSUR contents.	7.1	W
1674	For each SBDARE feature object of geometric primitive area COVERED_BY DEPARE feature objects where DRVAL1 is Unknown OR is Less than 0 AND WATLEV is Not equal to 4 (covers and uncovers).	SBDARE object in an inter-tidal area without WATLEV = 4.	Set value of WATLEV to 4 (covers and uncovers) for SBDARE object.	7.1 (g)	W
1675	For each SNDWAV feature object where VERACC is Present.	Prohibited attribute VERACC populated for a SNDWAV object.	Remove VERACC from SNDWAV object.	7.2.1	E
~~1676~~	*Check removed.*				
1677	For each MORFAC feature object where BOYSHP is Present AND CATMOR is Not equal to 7 (mooring buoy).	MORFAC object with BOYSHP without CATMOR = 7.	Set value of CATMOR to 7(mooring buoy) or remove BOYSHP for MORFAC.	4.6.7.1 and 9.2.4	E
1678	For each RECTRC feature object where DRVAL2 or VERDAT is Present.	Prohibited attributes DRVAL2 or VERDAT populated for a RECTRC object.	Remove DRVAL2 or VERDAT from RECTRC.	10.1.1	E
1679	For each feature object where attributes of types enumerated ('E'), float ('F'), integer ('I') or code string ('A') have more than one value.	More than one value present for attributes of the following types; enumerated ('E'), float ('F'), integer ('I') or code string ('A').	Remove unnecessary attribute values.	Appendix A, Ch.2 (2.1)	C
~~1680~~	*Check removed.*				
1681	For each RECTRC feature object of geometric primitive line where ORIENT is Known AND TRAFIC is Equal to 1 (inbound) OR 2 (outbound) OR 3 (one-way) AND the bearing of the line is more than 5 degrees Greater than OR Less than the value of ORIENT.	RECTRC where ORIENT does not correspond to the bearing of the line.	Populate an appropriate value of ORIENT consistent with the geometry of the RECTRC object.	10.1.1	C

1682	For each RECTRC or NAVLNE feature object which is not part of a C_AGGR collection object AND is not a RECTRC feature object with CATTRK is Equal to 2 (not based on a system of fixed marks).	RECTRC or NAVLNE object is not part of a C_AGGR collection object.	Add RECTRC or NAVLNE object to C_AGGR collection object.	10.1.2	W
1683	For each C_AGGR collection object with a single instance of both NAVLNE and RECTRC AND the ORIENT value of the RECTRC feature object is more than 3 degrees Greater than OR Less than the value (or reciprocal value) of the ORIENT value of the NAVLNE feature object.	RECTRC and NAVLNE objects as part of a C_AGGR do not have consistent values of ORIENT.	Amend values of ORIENT to agree for RECTRC or NAVLNE.	10.1.2	C
1684	For each group of feature objects forming a measured distance where the beacons and transit lines are not aggregated into a C_AGGR collection object AND the C_AGGR collection objects are not aggregated into another C_AGGR collection object including the track to be followed.	Measured distance not grouped using C_AGGR collection objects.	Encode C_AGGR objects and relate as appropriate.	10.1.3	E
1685a	For each TSSBND feature object that is not COINCIDENT with the outer limit of a TSSRON or TSSLPT feature object.	TSSBND object not on the outer limit of an appropriate TSS object.	Amend TSSBND object or other TSS objects so that the TSSBND object forms the outer limit.	10.2.1.2	E
1685b	For each TSSBND feature object that is COINCIDENT with the limits of a TSEZNE feature object AND one of the following feature objects: TSSRON, TSSLPT or ISTZNE.	TSSBND object separates a TSEZNE object AND one of the following objects: TSSRON, TSSLPT or ISTZNE.	Remove TSSBND object or amend other TSS objects so that the TSSBND object is not the outer limit between them.	10.2.1.2	E
1686	For each TSELNE feature object that is not COINCIDENT with two or more TSSLPT feature objects OR two or more DWRTPT feature objects OR (a TSSLPT feature object and an ISTZNE feature object) OR (a TSSLPT and a DWRTPT) OR (a TSSRON and an ISTZNE).	TSELNE object does not separate appropriate routing measure feature objects.	Amend encoding object to ensure the TSELNE separates appropriate objects.	10.2.1.3	E

1687	For each TSEZNE feature object which is not COINCIDENT with a single TSSRON OR two or more TSSLPT feature objects OR two or more DWRTPT feature objects OR (a TSSLPT feature object and a ISTZNE feature object) OR (a TSSLPT feature object and a DWRTPT feature object) OR (a TSSRON feature object and an ISTZNE feature object).	TSEZNE does not separate appropriate routing measure feature objects.	Amend encoding to ensure the TSEZNE separates appropriate objects.	10.2.1.4	E
1688	For each TSSCRS feature object which does not TOUCH four or more TSSLPT or TWRTPT feature objects.	TSSCRS object does not encode a crossing of 4 or more lanes.	Encode all lane parts or use another object.	10.2.1.5	E
1689	For each TSSCRS feature object which OVERLAPS, CONTAINS OR is WITHIN a TSEZNE feature object.	TSSCRS object overlaps a TSEZNE object.	Amend TSSCRS and TSEZNE objects to remove overlap.	10.2.1.5	E
1690	For each TSSRON feature object which OVERLAPS, CONTAINS OR is WITHIN a TSEZNE feature object.	TSSRON object overlaps a TSEZNE object.	Amend TSSRON and TSEZNE objects to remove overlap.	10.2.1.6	E
1691	For each DWRTPT feature object where DRVAL2 or VERDAT is Present.	Prohibited attribute DRVAL2 or VERDAT populated for a DWRTPT object.	Remove DRVAL2 or VERDAT from DWRTPT object.	10.2.2.1	E
1692	For each DWRTPT feature object which is not COVERED_BY the combined coverage of DEPARE and DRGARE feature objects.	DWRTPT object not covered by DEPARE or DRGARE objects.	Encode appropriate DEPARE or DRGARE objects.	10.2.2.1	E
~~1693~~	*Check removed.*~~For each DWRTPT or DWRTCL feature object where OBJNAM is Present AND is aggregated in a collection object.~~	~~DWRTPT or DWRTCL object with OBJNAM form part of a collection object.~~	~~Encode the name using a C_AGGR collection object or create a SEAARE object. Remove name from DWRTPT and/or DWRTCL object.~~	~~10.2.2.1~~	~~W~~
1694	For each DWRTCL feature object where ORIENT is Known AND TRAFIC is Equal to 1 (inbound) OR 2 (outbound) OR 3 (one-way) AND the bearing of the line is more than 5 degrees Greater than OR Less than the value of ORIENT.	One way DWRTCL object where ORIENT does not correspond to the bearing of the line.	Populate an appropriate value of ORIENT for the DWRTCL object consistent with the geometry of the object.	10.2.2.2	C
1695	For each DWRTCL feature object where VERDAT or DRVAL2 is Present.	Prohibited attribute DRVAL2 or VERDAT populated for a DWRTCL object.	Remove DRVAL2 or VERDAT from DWRTCL object.	10.2.2.2	E

1696	For each RCRTCL feature object where TRAFIC is Equal to 1 (inbound) OR 2 (outbound) OR 3 (one-way) AND the bearing of the line is more than 5 degrees Greater than OR Less than the value of ORIENT.	One-way RCRTCL object where ORIENT does not correspond to the bearing of the line.	Populate an appropriate value of ORIENT for the RCRTCL object consistent with the geometry of the object.	10.2.4	C
1697	For each RCRTCL feature object where DRVAL2 or VERDAT is Present.	Prohibited attribute DRVAL2 or VERDAT populated for RCRTCL object.	Remove DRVAL2 or VERDAT from RCRTCL object.	10.2.4	E
1698	For each TWRTPT feature object where DRVAL2 or VERDAT is Present.	Prohibited attribute DRVAL2 or VERDAT populated for a TWRTPT object.	Remove DRVAL2 or VERDAT from TWRTPT object.	10.2.6	E
1699	For each FAIRWY feature object where VERDAT is Present.	Prohibited attribute VERDAT populated for a FAIRWY object.	Remove VERDAT from FAIRWY object.	10.4	E
1700	For each TESARE feature object which OVERLAPS, CONTAINS OR is WITHIN an EXEZNE feature object.	TESARE object overlaps an EXEZNE object.	Amend TESARE or EXEZNE objects to remove overlap.	11.2	E
1701	For each CBLSUB feature object where VERDAT is Present.	Prohibited attribute VERDAT populated for a CBLSUB object.	Remove VERDAT from CBLSUB object.	11.5.1	E
1702	For each CBLSUB feature object where STATUS contains the value 4 (not in use) AND CATCBL is Present.	CBLSUB object where STATUS = 4 and CATCBL is populated.	Remove CATCBL or STATUS for CBLSUB object.	11.5.1	W
~~1703~~	~~For each CBLSUB feature object where CATCBL is Equal to 3 (transmission line).~~	~~CBLSUB has an inappropriate value of CATCBL.~~	~~Remove prohibited value of CATCBL for CBLSUB object.~~	~~11.5.1~~	~~E~~
1704	For each CBLOHD feature object where VERDAT is Present AND VERCLR and VERCSA are not Present.	VERDAT populated for CBLOHD object without value of VERCLR or VERCSA.	Remove VERDAT or populate VERCLR or VERCSA for CBLOHD object.	11.5.2	E
~~1705~~	*Check removed.*				
~~1706~~	~~For each CBLOHD, CBLSUB, PIPSOL or PIPOHD feature object where CONDTN is Known AND is Not equal to 1 (under construction) OR 5 (planned construction).~~	~~CBLOHD, CBLSUB, PIPSOL or PIPOHD object where CONDTN does not equal 1 (under construction) or 5 (planned construction).~~	~~Remove CONDTN or amend value of CONDTN accordingly for CBLOHD, CBLSUB, PIPSOL or PIPOHD object.~~	~~11.5.1, 11.5.2, 11.6.1 and 11.6.3~~	~~E~~
~~1707~~	~~For each CBLARE feature object where CATCBL is Equal to 3 (transmission line) OR 6 (mooring cable/chain).~~	~~CBLARE has an inappropriate value of CATCBL.~~	~~Remove prohibited value of CATCBL for CBLARE object.~~	~~11.5.3~~	~~E~~
1708	For each PIPSOL feature object where VERACC or VERDAT is Present.	Prohibited attributes VERACC or VERDAT populated for a PIPSOL object.	Remove VERACC or VERDAT from PIPSOL.	11.6.1	E

1709	For each PIPSOL feature object where STATUS contains the value 4 (not in use) AND CATPIP is Present.	PIPSOL object where STATUS = 4 (not in use) and CATPIP is populated.	Remove CATPIP or STATUS for PIPSOL object.	11.6.1	W
~~1710~~	*Check removed.*				
~~1711~~	*Check removed.*				
1712	For each PIPOHD feature object where STATUS contains the value 4 (not in use) AND CATPIP or PRODCT is Present.	PIPOHD object where STATUS = 4 (not in use) and CATPIP or PRODCT is populated.	Remove CATPIP and PRODCT, or STATUS, for PIPOHD object.	11.6.3	W
1713	For each PIPARE feature object where CONDTN is Present.	Prohibited attribute CONDTN populated for PIPARE object.	Remove CONDTN from PIPARE object.	11.6.4	E
~~1714~~	*Check removed.*				
1715	For each OFSPLF feature object where VERACC or VERDAT is Present.	Prohibited attributes VERACC or VERDAT populated for a OFSPLF object.	Remove VERACC or VERDAT from OFSPLF object.	11.7.2	E
1716	For each OSPARE feature object where VERACC is Present.	Prohibited attribute VERACC populated for an OSPARE object.	Remove VERACC from OSPARE object.	11.7.4	E
1717	For each FSHFAC feature object where VERACC is Present.	Prohibited attribute VERACC populated for a FSHFAC object.	Remove VERACC from FSHFAC object.	11.9.1	E
1718	For each MARCUL feature object where VERDAT is Present.	Prohibited attribute VERDAT populated for a MARCUL object.	Remove VERDAT from MARCUL object.	11.9.2	E
1719	For each MARCUL feature object where the attribute values do not correspond to the table below. [For each specific case, when QUASOU is encoded, it should contain one or more values selected from the list of allowed values given in the table.]	Illogical attribute combination for MARCUL.	Amend attributes in accordance with the logical values defined in the table.	11.9.2	W

WATLEV	VALSOU	QUASOU
1, 2, 5 OR 7	not Present	not Present
4	< 0	1, 3, 4, 6, 7, 8, 9 OR not Present
	not Present OR Unknown	2 OR not Present
5	0	1, 3, 4, 6, 8, 9 OR not Present
	not Present OR Unknown	2 OR not Present
3	> 0	1, 3, 4, 6, 7, 8, 9 OR not Present
	Unknown	2 OR not Present
Unknown	Unknown	2 OR not Present

1720	For each ICEARE feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for an ICEARE object.	Remove VERACC or VERDAT from ICEARE object.	11.13.1	E

1721	For each RADRFL feature object which is associated with a navigational aid feature object (BCNXXX, BOYXXX, LITFLT or LITVES).	RADRFL encoded on a navigational aid.	Remove RADRFL object and populate CONRAD = 3 (radar conspicuous has radar reflector) for the navigational aid object.	12.1.1	E
1722a	For each navigational aid equipment feature object which is not a slave to a navigational aid structure object OR another navigational aid equipment object.	Equipment object which is not a slave of a structure object or another equipment object.	Encode/include a master object in the relationship.	12.1.2 and 12.1.1	W
1722b	For each DAYMAR feature object that EQUALS another structure feature object AND is Not a slave to a structure feature object.	DAYMAR marked as structure object where another structure object exists.	Amend DAYMAR object to slave.	12.1.2 and 12.1.1	W
1723	For each feature object of geometric primitive point forming the same navigational aid which does not reference the same spatial object.	Object forming a navigational aid does not point to the same spatial object.	Ensure all components of the navigational aid point to the same spatial object.	12.1.2	C
1724	For each navigational aid equipment feature object where OBJNAM is Equal to the OBJNAM of the structure feature object.	OBJNAM on navigational aid equipment object repeats that of the structure object.	Remove repeated OBJNAM value.	12.1.2	W
1725	For each Master to Slave relationship where all component feature objects (master and slaves) are of the classes DAYMAR, FOGSIG, LIGHTS, RADSTA, RDOSTA, RETRFL, RTPBCN, SISTAT, SISTAW and/or TOPMAR AND where at least one feature object DAYMAR or LIGHTS is in the list AND where a DAYMAR or a LIGHTS feature object is not the master object.	Equipment object does not have coincident DAYMAR or LIGHTS object as a master.	Amend relationship so that the equipment object is slave to a LIGHTS or DAYMAR object.	12.1.2	W
1726	If the M_COVR meta object where CATCOV is Equal to 1 AND is Not equal to the combined coverage of M_NSYS meta objects where MARSYS is Known.	Data coverage not completely covered by M_NSYS objects with a value for MARSYS.	Ensure complete coverage of M_NSYS objects with MARSYS populated.	12.2	C
1727	For each M_NSYS meta object where MARSYS is Known which OVERLAPS or is WITHIN another meta M_NSYS object where MARSYS is Known.	M_NSYS objects with MARSYS values overlap.	Amend limits of M_NSYS objects to remove overlap.	12.2	C

1728	For each M_NSYS meta object where ORIENT is Known which OVERLAPS or is WITHIN another meta M_NSYS object where ORIENT is Known.	M_NSYS objects with ORIENT values overlap.	Amend limits of M_NSYS objects to remove overlap.	12.2	E
1729	For each feature object forming part of a BCNXXX or BOYXXX feature object AND MARSYS is Not equal to 9 (no system) OR 10 (other system) where the attributes for structure, top mark and lights do not conform to the value of MARSYS of the feature object or the M_NSYS meta object it is COVERED_BY.	Component of a navigational aid does not conform to the IALA system defined by the MARSYS attribute of the underlying M_NSYS object.	Ensure navigational aid attributes conform to the IALA system encoded in MARSYS.	12.2 and 12.4.1.1	E
1730	For each BCNCAR feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a BCNCAR object.	Remove VERACC or VERDAT from BCNCAR object.	12.3.1	E
1731	For each BCNISD feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a BCNISD object.	Remove VERACC or VERDAT from BCNISD object.	12.3.1	E
1732	For each BCNLAT feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a BCNLAT object.	Remove VERACC or VERDAT from BCNLAT object.	12.3.1	E
1733	For each BCNSAW feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a BCNSAW object.	Remove VERACC or VERDAT from BCNSAW object.	12.3.1	E
1734	For each BCNSPP feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a BCNSPP object.	Remove VERACC or VERDAT from BCNSPP object.	12.3.1	E
1735a	For each BCNXXX, BOYXXX feature object where MARSYS is Present AND is Equal to the value of MARSYS on the M_NSYS meta object it is COVERED_BY.	Value of MARSYS on BCNXXX or BOYXXX object is the same as the value on M_NSYS object.	Remove MARSYS from BCNXXX or BOYXXX object.	12.3.1 & 12.4.1	E
1735b	For each LIGHTS feature object where MARSYS is Present AND is Equal to the MARSYS value of the M_NSYS meta object it is COVERED_BY.	Value of MARSYS on LIGHTS object is the same as the value on M_NSYS object.	Remove MARSYS from LIGHTS object.	12.1.2 and 12.8.1	E
1736	For each DAYMAR feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a DAYMAR object.	Remove VERACC or VERDAT from DAYMAR object.	12.3.3	E

1737	For each BOYCAR feature object where VERACC is Present.	Prohibited attribute VERACC populated for a BOYCAR object.	Remove VERACC for BOYCAR object.	12.4.1	E
1738	For each BOYINB feature object where VERACC is Present.	Prohibited attribute VERACC populated for a BOYINB object.	Remove VERACC from BOYINB object.	12.4.1	E
1739	For each BOYISD feature object where VERACC is Present.	Prohibited attribute VERACC populated for a BOYISD object.	Remove VERACC from BOYISD object.	12.4.1	E
1740	For each BOYLAT feature object where VERACC is Present.	Prohibited attribute VERACC populated for a BOYLAT object.	Remove VERACC from BOYLAT object.	12.4.1	E
1741	For each BOYSPP feature object where VERACC is Present.	Prohibited attribute VERACC populated for a BOYSPP object.	Remove VERACC from BOYSPP object.	12.4.1	E
1742	For each BOYSAW feature object where VERACC is Present.	Prohibited attribute VERACC populated for a BOYSAW object.	Remove VERACC from BOYSAW object.	12.4.1	E
~~1743~~	*Check removed.*				
1744	For each LITVES feature object where HORACC or VERACC is Present.	Prohibited attribute HORACC or VERACC populated for LITVES object.	Remove HORACC or VERACC from LITVES object.	12.4.2	E
1745	For each LITFLT feature object where HORACC or VERACC are Present.	Prohibited attribute HORACC or VERACC populated for LITFLT object.	Remove HORACC or VERACC from LITFLT object.	12.4.2	E
1746	For each TOPMAR feature object where VERACC, VERDAT, VERLEN, HEIGHT or MARSYS is Present.	Prohibited attribute VERACC, VERDAT, VERLEN, HEIGHT or MARSYS populated for TOPMAR object.	Remove VERACC, VERDAT, VERLEN, HEIGHT or MARSYS from TOPMRK object.	12.6	E
1747	For each RETRFL feature object where MARSYS, VERACC or VERDAT is Present.	Prohibited attribute MARSYS, VERACC or VERDAT populated for RETRFL object.	Remove MARSYS, VERACC or VERDAT from RETRFL object.	12.7	E
~~1748~~	*Check removed.*				
1749	For each LIGHTS feature object where VERACC is Present.	Prohibited attribute VERACC populated for a LIGHTS object.	Remove VERACC from LIGHTS object.	12.8.1	E
1750	For each LIGHTS feature object which is a slave to a BOYXXX feature object OR MORFAC feature object where CATMOR = 7 (mooring buoy) AND HEIGHT is Present.	HEIGHT populated for a LIGHTS object which is slave to a buoy object.	Remove HEIGHT from LIGHTS object.	12.8.1	E
1751	For each LIGHTS feature object where ORIENT is Present AND CATLIT does Not contain value 1 (directional function) AND does Not contain value 16 (moiré effect).	ORIENT populated without CATLIT = 1 or 16.	Remove ORIENT or populate appropriate value of CATLIT for LIGHTS object.	12.8.1 and Appendix B.1 (3.5.2)	E

1752	For each LIGHTS feature object where LITCHR is Equal to 1 (fixed) AND SIGGRP, SIGPER or SIGSEQ is Present.	SIGGRP, SIGPER or SIGSEQ populated for LIGHTS object where LITCHR = 1.	Remove SIGGRP, SIGPER or SEGSEQ, not applicable to fixed lights.	12.8.1	E
~~1753~~	*Check removed.*				
1754	For each LIGHTS feature object where VERDAT is Known AND is Equal to the value of VERDAT on the M_VDAT meta object it is COVERED_BY.	LIGHTS object with VERDAT which is identical to that on the underlying M_VDAT object.	Remove VERDAT from LIGHTS object.	12.8.1	E
1755	For each LIGHTS feature object where VERDAT is Known AND is Equal to the value of VERDAT in the VDAT subfield of the DSPM field.	LIGHTS object with VERDAT which is identical to that in the VDAT subfield of the DSPM field.	Remove VERDAT from LIGHTS object.	12.8.1	E
1756	For each LIGHTS feature object where CATLIT contains the value 4 (leading light) AND does not contain the value 1 (directional function) AND does not contain the value 16 (moiré effect) AND ORIENT is present.	ORIENT present for non-directional leading LIGHTS object.	Remove ORIENT from LIGHTS object.	12.8.6.4, 12.8.6.5 and 12.8.6.6	E
1757	For each LIGHTS feature object where CATLIT contains the value 19 (horizontally disposed) OR contains the value 20 (vertically disposed) AND MLTYLT does not contain a value Greater than 1.	LIGHTS object where CATLIT = 19 or 20 without a value of MLTYLT.	Populate MLTYLT for the LIGHTS object.	12.8.7	E
1758	For each LIGHTS feature object where CATLIT contains the value 17 (emergency) AND its geometry does not EQUAL that of another LIGHTS feature object.	LIGHTS object with CATLIT = 17 (emergency) encoded without primary light.	Encode primary LIGHTS object.	12.8.7	E
1759	For each RDOSTA feature object where ORIENT is Known AND CATROS does not contain the value 2 (directional radiobeacon).	RDOSTA with ORIENT without CATROS = 2.	Remove ORIENT or populate CATROS = 2 (directional radiobeacon) for RDOSTA object.	12.9.1	E
1760	For each RADSTA feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a RADSTA object.	Remove VERACC or VERDAT from RADSTA object.	12.11.3	E
1761	For each RADRFL feature object where VERACC or VERDAT is Present.	Prohibited attribute VERACC or VERDAT populated for a RADRFL object.	Remove VERACC or VERDAT from RADRFL object.	12.12	E
1762	For each RADRFL feature object which INTERSECTS OR EQUALS an object of geometric primitive area or point having CONRAD as an allowable attribute.	Unnecessary RADRFL encoded.	Remove unnecessary RADRFL object and encode CONRAD = 3 (radar conspicuous, has radar reflector) on the associated object.	12.12	E

~~1763~~	*Check removed.*				
1764	For each feature object where STATUS contains the value 1 (permanent) AND PERSTA or PEREND is Present.	PERSTA or PEREND populated for an object with STATUS = 1.	Amend STATUS or Remove PERSTA/PEREND.	2.1.5.1 and Logical consistency	E
1765a	If the cell contains both M_QUAL and M_ACCY meta objects AND their combined coverage is Not equal to the M_COVR objects with CATCOV Equal to 1 (coverage available).	M_QUAL or M_ACCY do not provide full coverage.	Amend M_QUAL or M_ACCY objects to provide full coverage.	2.2.3.1	W
1765b	For each M_QUAL meta object that CONTAINS, OVERLAPS OR is WITHIN a M_ACCY meta object.	M_QUAL and M_ACCY objects overlap.	Amend M_QUAL or M_ACCY objects to remove overlap.	2.2.4.1	W
1766	For each PICREP, TXTDSC and NTXTDS attribute that contains more than one file name.	PICREP, TXTDSC or NTXTDS contains more than one file name.	Amend value of PICREP, TXTDSC or NTXTDS to only contain a single file name.	2.3 and 4.8.20	E
1767	For each edge which is COINCIDENT with a SBDARE feature object of geometric primitive area where WATLEV is Equal to 4 (covers and uncovers) AND is COINCIDENT with a DEPARE or DRGARE feature object of geometric primitive area where DRVAL2 is Less than or equal to 0 AND is COINCIDENT with a DEPARE or DRGARE feature object of geometric primitive area where DRVAL1 is Greater than or Equal to 0 OR an UNSARE feature object AND is not COINCIDENT with a DAMCON, GATCON, SLCONS or LNDARE feature object AND is not COINCIDENT with a DEPCNT feature object where VALDCO is Equal to 0.	Missing zero metre DEPCNT.	Capture an appropriate zero metre DEPCNT.	5.2	W
1768a	For each SOUNDG feature object where the depth value is equal to the DRVAL1 of the DEPARE feature object it is WITHIN (unless the DEPARE is an isolated shallow area).	SOUNDG object with depth equal to the DRVAL1 value of the underlying DEPARE object.	Amend bathymetry accordingly.	5.3	E

1768b	For each SOUNDG feature object where the depth value is Less than the DRVAL1 of the DEPARE or DRGARE feature object it is WITHIN.	SOUNDG object with depth less than the DRVAL1 value of the underlying DEPARE or DRGARE object.	Amend bathymetry accordingly.	5.3	E
~~1769~~	*Check removed.*				
1770a	For each SOUNDG feature object where EXPSOU is Equal to 3 (deeper than the range of depth of the surrounding depth area) AND the depth value is Less than or equal to DRVAL2 of the DEPARE feature object it is WITHIN AND DRVAL2 is Known.	SOUNDG object with EXPSOU = 3 (deeper than the range of depth of the surrounding depth area) and depth value less than or equal to the DRVAL2 of the underlying DEPARE object.	Remove EXPSOU or amend to EXPSOU = 1 (within the range of depth of the surrounding depth area) for SOUNDG object.	5.3	W
1770b	For each SOUNDG feature object where EXPSOU is Equal to 3 (deeper than the range of depth of the surrounding depth area) AND the depth value is Less than or equal to the DRVAL2 of the DRGARE feature object it is WITHIN AND DRVAL1 and DRVAL2 are Known.	SOUNDG object with EXPSOU = 3 (deeper than the range of depth of the surrounding depth area) and a depth value less than the DRVAL2 of the underlying DRGARE object.	Remove EXPSOU or amend to EXPSOU = 1 (within the range of depth of the surrounding depth area) for SOUNDG object.	5.3	W
1770c	For each SOUNDG feature object where EXPSOU is Equal to 3 (deeper than the range of depth of the surrounding depth area) where the depth value is Less than or equal to the DRVAL1 of the DRGARE feature object it is COVERED_BY AND DRVAL2 is not Present.	SOUNDG object with EXPSOU= 3 (deeper than the range of depth of the surrounding depth area) and a depth value less than the DRVAL1 of the underlying DRGARE object when only DRVAL1 is populated.	Amend EXPSOU = 2 (shoaler than the range of depth of the surrounding depth area) for SOUNDG object.	5.3	W
1771	For each edge which is COINCIDENT with a DEPCNT feature object AND two DEPARE feature objects AND VALDCO is Not equal to the minimum DRVAL2.	Illogical value of VALDCO of a DEPCNT object or DRVAL2 of one of the adjacent DEPARE object.	Amend VALDCO of DEPCNT or DRVAL2 of DEPARE to an appropriate value.	5.4.3	W
1772a	For each UWTROC feature object where VALSOU is Known AND EXPSOU is Equal to 1 (within the range of depth of the surrounding depth area) OR not Present AND VALSOU is Less than or equal to DRVAL1 OR Greater than DRVAL2 of the DEPARE feature object it is COVERED_BY.	VALSOU for UWTROC object with EXPSOU = 1 (within the range of depth of the surrounding depth area) or not present is outside the depth range of the underlying DEPARE object.	Populate appropriate value of EXPSOU for UWTROC object.	6.1.2	E

1772b	For each UWTROC feature object where VALSOU is Known AND EXPSOU is Equal to 1 (within the range of depth of the surrounding depth area) OR not Present AND VALSOU is Less than or equal to DRVAL1 OR Greater than DRVAL2 of the DRGARE feature object it is COVERED_BY AND DRVAL2 is Known AND Not equal to DRVAL1.	VALSOU for UWTROC object with EXPSOU = 1 (within the range of depth of the surrounding depth area) or not present is outside the depth range of the underlying DRGARE object.	Populate appropriate value of EXPSOU for UWTROC object.	6.1.2	E
1773	For each UWTROC feature object where VALSOU is Known AND EXPSOU is Equal to 2 (shoaler than the range of depth of the surrounding depth area) AND VALSOU is Greater than the value of DRVAL1 of the DEPARE or DRGARE feature object it is COVERED_BY AND DRVAL1 is Known.	UWTROC object with EXPSOU = 2 (shoaler than the range of depth of the surrounding depth area) and a VALSOU value deeper than the DRVAL1 of the underlying DEPARE or DRGARE object.	Remove EXPSOU or amend to EXPSOU = 1 (within the range of depth of the surrounding depth area) for UWTROC object.	6.1.2	W
1774a	For each UWTROC feature object where VALSOU is Known AND EXPSOU is Equal to 3 (deeper than the range of depth of the surrounding depth area) AND the VALSOU is Less than or equal to DRVAL2 of the DEPARE feature object it is COVERED_BY AND DRVAL2 is Known.	UWTROC object with EXPSOU = 3 (deeper than the range of depth of the surrounding depth area) and a VALSOU value less than or equal to the DRVAL2 value of the underlying DEPARE object.	Remove EXPSOU or amend to EXPSOU = 1 (within the range of depth of the surrounding depth area) for UWTROC object.	6.1.2	E
1774b	For each UWTROC object where VALSOU is Known AND EXPSOU is Equal to 3 (deeper than the range of depth of the surrounding depth area) AND VALSOU is Less than or equal to the DRVAL2 of the DRGARE feature object it is COVERED_BY AND DRVAL1 and DRVAL2 are Known.	UWTROC object with EXPSOU = 3 (deeper than the range of depth of the surrounding depth area) and a VALSOU less than DRVAL2 of the underlying DRGARE object.	Remove EXPSOU or amend to EXPSOU = 1 (within the range of depth of the surrounding depth area) for UWTROC object.	6.1.2	E
1774c	For each UWTROC feature object where VALSOU is Known AND EXSPOU is Equal to 3 (deeper than the range of depth of the surrounding depth area) AND VALSOU is Less than or equal to the DRVAL1 of the DRGARE feature object it is COVERED_BY AND DRVAL2 is not Present.	UWTROC object with EXPSOU= 3 (deeper than the range of depth of the surrounding depth area) and with a VALSOU value less than or equal to the DRVAL1 of the underlying DRGARE object when only DRVAL1 is populated.	Amend EXPSOU = 2 (shoaler than the range of depth of the surrounding depth area) for UWTROC object.	6.1.2	E

1775	For each navigational aid equipment feature object (except DAYMAR) which is COVERED_BY a DEPARE, DRGARE or UNSARE AND does not have a navigational aid structure feature object as a master AND the geometry of which is not COVERED_BY a BRIDGE, CBLOHD, COALNE, CONVYR, DAMCON, (with CATDAM Equal to 3 (flood barrage)), LNDARE, PIPOHD, PONTON, SLCONS or a navigational aid structure feature object.	Equipment object within DEPARE, DRGARE or UNSARE without an appropriate supporting structure object or underlying object.	Ensure equipment object is encoded with an appropriate structure object or underlying object.	12.1.2 and 12.8.8	C
1776	For each LIGHTS feature object where the value of LITCHR and SIGGRP are Known AND the combination of values is not as listed in the table below. LITCHR / SIGGRP 6 / (1) 7 / (1) 9 / () 10 / () 11 / () 28 / ()	Values of LITCHR and SIGGRP are not consistent.	Amend attributes in accordance with the logical values defined in the table.	12.8.3	W
1777	For each collection object which references feature objects which do not exist in the cell.	Collection object references objects which do not exist within the cell.	Remove invalid references.	15	E
1778a	For each LIGHTS feature object where CATLIT contains the value 1 (directional function) OR contains the value 16 (moiré effect) AND the value of the angle between SECTR1 and SECTR2 is Greater than 10.	LIGHTS object with CATLIT = 1 (directional function) or 16 (moiré effect) with a sector arc greater than 10 degrees.	Amend SECTR1 or SECTR2, or remove CATLIT = 1 (directional function) or 16 (moiré effect) for LIGHTS object.	12.8.6.5 and Appendix A Ch.2 (code 37)	W
1778b	For each LIGHTS feature object where CATLIT contains the value 1 (directional function) OR contains the value 16 (moiré effect) AND SECTR1 and SECTR2 have no values AND ORIENT is Unknown AND the associated structure feature object is not aggregated to a RECTRC or NAVLNE feature object in a C_AGGR collection object.	LIGHTS object with CATLIT = 1 (directional function) or 16 (moiré effect) with possible missing attribute values for SECTR1 and SECTR2 or for ORIENT.	Populate SECTR1 and SECTR2, or ORIENT reconsider the CATLIT value.	12.8.6.5 and12.8.6.6	W

1779	For each DEPARE feature object which is not an isolated shallow area where DRVAL1 is Equal to DRVAL2.	DRVAL1 is equal to DRVAL2 for a DEPARE object.	Amend DRVAL1 or DRVAL2 to logical values for DEPARE object.	5.4 and Logical consistency	W
1780	For each SBDARE feature object where NATSUR and NATQUA are Known AND the combination of values are not as listed in the table below.	Illogical combination of NATSUR and NATQUA.	Amend NATSUR or NATQUA for SBDARE object in accordance with the logical values defined in the table.	Logical consistency	W

NATQUA / NATSUR	1	2	3	4	5	6	7	8	9	10
1					x	x	x	x	x	
2					x	x	x			
3					x	x	x			
4	x	x	x			x		x	x	
5								x	x	
6								x	x	
7								x	x	
8								x	x	
9								x	x	
11								x		
14				x		x				
17				x					x	
18								x	x	

1781	For each BUISGL or LNDMRK feature object which is part of a Master to Slave relationship AND references a LIGHTS feature object as slave AND CATLIT does not contain the value 6 (air obstruction light) AND does not contain the value 8 (flood light) AND does not contain the value 9 (strip light) AND FUNCTN does not contain value 33 (light support).	BUISGL or LNDMRK object with a slave LIGHTS object without FUNCTN = 33 (light support)	Set FUNCTN to 33 (light support) for BUISGL or LNDMRK object.	12.3.2 and S-52	W
1782	For each SWPARE feature object which OVERLAPS, CONTAINS OR is WITHIN another SWPARE feature object.	SWPARE objects overlap.	Amend SWPARE objects to remove overlap.	5.6 and Logical consistency	E
1783a	For each feature object of geometric primitive area where WATLEV is Equal to 4 (covers and uncovers) AND OVERLAPS OR is WITHIN a DEPARE feature object where DRVAL1 is Greater than or equal to 0.	Area object with illogical value of WATLEV which is shoaler than the DRVAL1 value of the underlying DEPARE object.	Populate appropriate value of WATLEV.	Logical consistency	E

1783b	For each feature object of geometric primitive area where WATLEV is Equal to 5 (awash) AND OVERLAPS OR is WITHIN a DEPARE feature object where DRVAL1 is Greater than 0.	Area object with illogical value of WATLEV which is shoaler than the DRVAL1 value of the underlying DEPARE object.	Populate appropriate value of WATLEV.	Logical consistency	E
1784	For each spatial object where the value of HORDAT, POSACC or QUAPOS is Unknown.	HORDAT, POSACC or QUAPOS populated with an unknown value.	Remove attribute from spatial object or populate with a known value.	Logical consistency	W
1785	For each feature object where CONDTN is Equal to 4 (wingless) AND CATLMK does not contain the value 18 (windmill) AND does not contain the value 19 (windmotor).	Object other than windmill or windmotor with CONDTN = 4 (wingless).	Remove value of CONDTN or use an appropriate LNDMRK object.	Logical consistency	E
1786	For each feature object of geometric primitive area where WATLEV is Equal to 2 (always dry) AND is not COVERED_BY a LNDARE feature object of geometric primitive area.	Area object with WATLEV = 2 not covered by a LNDARE object.	Amend WATLEV value or ensure object is on land.	Logical consistency	W
1787	For each NAVLNE feature object which is COINCIDENT with a RECTRC feature object AND the values of ORIENT which are Not equal OR reciprocal.	ORIENT values for NAVLNE and RECTRC objects sharing an edge are not equal or reciprocal.	Ensure values of ORIENT for NAVLNE and RECTRC agree or are reciprocal.	Logical consistency	E
1788	For each NAVLNE feature object which is COINCIDENT with a RECTRC feature object AND is not part of the same C_AGGR collection object.	NAVLNE and RECTRC objects share an edge but are not aggregated using C_AGGR.	Aggregate NAVLNE and RECTRC objects using C_AGGR object.	10.1.2	W
1789a	For each DWRTCL, RECTRC and RCRTCL feature object of geometric primitive line where ORIENT is Known AND TRAFIC is Equal to 4 (two-way) AND the bearing of the line is more than 5 degrees Greater than OR Less than the value (or reciprocal value) of ORIENT.	DWRTCL, RECTRC or RCRTCL where the orientation of the geometry is not consistent with the value of ORIENT.	Populate an appropriate value of ORIENT consistent with the geometry of the DWRTCL, RECTRC or RCRTCL object.	Logical consistency	C
1789b	For each NAVLNE feature object where ORIENT is Known AND the bearing of the line is more than 5 degrees Greater than OR Less than the value (or reciprocal value) of ORIENT.	NAVLNE where the orientation of the geometry is not consistent with the value of ORIENT.	Populate an appropriate value of ORIENT consistent with the geometry of the NAVLNE object.	Logical consistency	C

1790a	For each LIGHTS feature object where ORIENT is Known AND SECTR1 OR SECTR2 is Known.	LIGHTS object where ORIENT and SECTR1 or SECTR2 is populated.	Remove values of SECTR1 and SECTR2 or ORIENT from LIGHTS object.	12.8.6.5 and 12.8.6.6	E
1790b	For each LIGHTS feature object where ORIENT is Known AND it is aggregated to a RECTRC or NAVLNE feature object in a C_AGGR collection object.	LIGHTS object where ORIENT is populated and is aggregated with a NAVLNE or RECTRC object within a C_AGGR collection object.	Set ORIENT to Unknown for LIGHTS object.	12.8.6.5 and 12.8.6.6	E
1790c	For each LIGHTS feature object where ORIENT is Known AND the associated structure feature object is aggregated to a RECTRC or NAVLNE feature object in a C_AGGR collection object.	LIGHTS object where ORIENT is populated and the associated structure feature object is aggregated with a NAVLNE or RECTRC object within a C_AGGR collection object.	Set ORIENT to Unknown for LIGHTS object.	12.8.6.5 and 12.8.6.6	E
1791a	For each NAVLNE feature object where CATNAV is Equal to 3 (leading line bearing a recommended track) AND is not COINCIDENT with a RECTRC where CATTRK is Equal to 1 (based on a system of fixed marks).	NAVLNE object with CATNAV = 3 (leading line bearing a recommended track) does not share the geometry of a RECTRC object with CATTRK = 1 (based on a system of fixed marks).	Encode RECTRC object with CATTRK = 1 (based on a system of fixed marks) coincident with NAVLNE object.	10.1.1	E
1791b	For each RECTRC feature object where CATTRK is Equal to 1 (based on a system of fixed marks) AND is not COINCIDENT with a NAVLNE where CATNAV is Equal to 3 (leading line bearing a recommended track).	RECTRC object with CATTRK = 1 (based on a system of fixed marks) does not share the geometry of a NAVLNE object with CATNAV =3 (leading line bearing a recommended track).	Encode NAVLNE object with CATNAV = 3 (leading line bearing a recommended track) coincident with RECTRC object.	10.1.1	E
1792	If the cell crosses the 180° meridian.	Cell crosses the 180° meridian.	Split the cell at the 180° meridian.	2.1.8.2	C
1793	For each Master to Slave relationship which references more than one LIGHTS feature object AND all of the LIGHTS feature objects are encoded with LITVIS which contains the value 6 (visibility deliberately restricted) OR contains the value 7(obscured).	Group of LIGHTS objects where all are LITVIS = 6 (visibility deliberately restricted) or 7 (obscured).	Confirm values of LITVIS for LIGHTS objects or encode primary light.	Logical consistency	E

1794	For each LIGHTS feature object where CATLIT contains the value 1 (directional function) OR contains the value 16 (moiré effect) AND is a slave in a Master to Slave relationship AND the master feature object is any of BOYXXX, LITVES, LITFLT or MORFAC (where CATMOR is Equal to 7 (mooring buoy)).	Directional light is a slave to a BOYXXX, LITVES LITFLT, MORFAC object (with CATMOR = 7 (mooring buoy)) master object.	Amend master to a logical object or remove value of CATLIT for LIGHTS object.	Logical consistency	E
1795a	For each feature object which is a slave in a Master to Slave relationship AND where DATSTA or PERSTA attributes are Known AND the values of DATSTA or PERSTA are Less than the values of DATSTA or PERSTA encoded on the master object.	Temporal attributes on a slave object extend beyond those on the master object.	Populate appropriate temporal attributes on master/slave objects.	2.1.5	C
1795b	For each feature object which is a slave in a Master to Slave relationship AND where PEREND or DATEND attributes are Known AND the values of PEREND or DATEND are Greater than the values of PEREND or DATEND encoded on the master object.	Temporal attributes on a slave object extend beyond those on the master object.	Populate appropriate temporal attributes on master/slave objects.	2.1.5	C
1795c	For each feature object which is a slave in a Master to Slave relationship AND where DATSTA is Known on the master object AND DATSTA is Not Present or Unknown on the slave object.	DATSTA not encoded for slave object of a master object where DATSTA exists.	Populate temporal attribute DATSTA on slave objects to match the master object.	2.1.5	C
1795d	For each feature object which is a slave in a Master to Slave relationship AND where PERSTA is Known on the master object AND PERSTA is Not Present or Unknown on the slave object.	PERSTA not encoded for slave object of a master object where PERSTA exists.	Populate temporal attribute PERSTA on slave objects to match the master object.	2.1.5	C
1795e	For each feature object which is a slave in a Master to Slave relationship AND where DATEND is Known on the master object AND DATEND is Not Present or Unknown on the slave object.	DATEND not encoded for slave object of a master object where DATEND exists.	Populate temporal attribute DATEND on slave objects to match the master object.	2.1.5	C

1795f	For each feature object which is a slave in a Master to Slave relationship AND where PEREND is Known on the master object AND PEREND is Not Present or Unknown on the slave object.	PEREND not encoded for slave object of a master object where PEREND exists.	Populate temporal attribute PEREND on slave objects to match the master object.	2.1.5	C
~~1796~~	*Check removed.*				
1797	For each of the feature object class, geometry and attribute combinations in the table below.	Object, geometry and attribute combinations which do not display in ECDIS.	Remove objects which do not display in ECDIS or use alternative encoding.	4.6.6.6, 4.7.4, 4.7.7.1, 4.7.7.2, 4.7.11, 4.8.3, 4.8.5, 4.8.8, 4.8.10, 4.8.12, 4.8.13 and 11.6.1	E

Object	Geometry	Attributes
BRIDGE	P	-
DAMCON	P	CATDAM ≠ 3
GRIDRN	P	
PIPSOL	P	
PRDARE	P	CATPRA = not Present
RAPIDS	P	
ROADWY	P	
RUNWAY	P	
SLOGRD	A	CATSLO is Null OR not Present OR (CATSLO = 1, 2, 3, 4, 5, 7 AND CONRAD ≠ 1)
TUNNEL	P	
WATFAL	P	

1798	For each value of INFORM OR NINFOM which contains more than 300 characters.	INFORM or NINFOM contains more than 300 characters.	Amend value of INFORM or NINFOM or use TXTDSC or NTXTDS if appropriate.	2.3	E
1799	For each BRIDGE feature object where the attribute values do not correspond to the table below.	BRIDGE object with illogical attribute combination.	Amend attributes in accordance with the logical values defined in the table.	4.8.10	W

CATBRG	VERCLR	VERCCL	VERCOP
1	Present	not Present	not Present
2	not Present	Present	Optional
2 AND 3	not Present	Present	Optional
2 AND 4	not Present	Present	Optional
2 AND 5	not Present	Present	Optional
2 AND 6	not Present	Present	Optional
2 AND 7	not Present	Present	Optional
2 AND 9	not Present	Present	Optional
1 AND 6	Present	not Present	not Present
1 AND 8	Present	not Present	not Present
1 AND 9	Present	not Present	not Present
1 AND 10	Present	not Present	not Present
1 AND 11	Present	not Present	not Present
1 AND 12	Present	not Present	not Present

~~1800~~	~~For each BRIDGE feature object where VERCLR is Known AND CATBRG is Equal to 2 (opening bridge) OR 3 (swing bridge) OR 4 (lifting bridge) OR 5 (bascule bridge) OR 7 (draw bridge).~~ *Check removed.*	~~VERCLR populated for BRIDGE object with an inappropriate value of CATBRG.~~	~~Ensure appropriate value of CATBRG is populated.~~	~~Logical consistency~~	~~W~~
~~1801~~	*Check removed.*				
~~1802~~	*Check removed.*				
1803	For each Master to Slave relationship where referenced feature objects have been populated with different values of SCAMIN.	Objects which are in a Master to Slave relationship with different values of SCAMIN.	Amend values of SCAMIN to agree.	Logical consistency	W
1804	For each OBSTRN, UWTROC or WRECKS feature object of geometric primitive point which TOUCHES an edge of a DEPARE, DRGARE or UNSARE feature object.	Point object touches an edge between Group 1 objects.	Amend Group 1 object geometry so that it does not touch the point object.	6.1	C
1805	For each SMCFAC feature object of geometric primitive area which OVERLAPS OR is COVERED_BY a DEPARE, DRGARE or UNSARE.	Area SMCFAC object is within a water feature.	Amend object to remove overlap with all water features.	4.6.5	W
1806	For each CTNARE feature object of geometric primitive area which is COINCIDENT with a DEPCNT feature object.	Area CTNARE object shares geometry with DEPCNT.	Amend the CTNARE object geometry so that it is nor coincident with the DEPCNT object.	6.6	W
1807	For each BOYXXX, LITVES, LITFLT feature object OR MORFAC feature object where CATMOR is Equal to 7 (mooring buoy) which is COVERED_BY a FLODOC, HULKES, LNDARE, PONTON or SLCONS feature object where WATLEV is Equal to 2 (always dry).	A floating navigational aid captured over land.	Reposition object over water feature.	Logical consistency	W
1808	For each LNDARE feature object of geometric primitive area which is WITHIN OR OVERLAPS a M_QUAL meta object where CATZOC is Not equal to 6 (zone of confidence U (data not assessed)).	M_QUAL object has invalid CATZOC over an area LNDARE object.	Remove M_QUAL object from LNDARE object or amend CATZOC to 6 (zone of confidence U (data not assessed)).	2.2.3.1	W

1809a	For each intertidal feature object (DEPARE feature object where DRVAL2 is Less than or equal to 0) AND both the Vertical Datum and Sounding Datum of that area are Equal.	Vertical and sounding datum's are the same for intertidal area.	Amend datum values so that the vertical datum is above the sounding datum, or if datum's are correct recompile to remove intertidal area.	Logical consistency	E
1809b	For each intertidal feature object (DEPARE feature object where DRVAL2 is Less than or equal to 0) AND both the Vertical Datum and Sounding Datum of that area are Equal to a Mean Sea Level datum (3 (Mean sea level), 19 (Approximate mean sea level) or 26 (Mean water level)).	Vertical and sounding datum's are the same for intertidal area.	Amend datum values so that the vertical datum is above the sounding datum, or if datum's are correct recompile to remove intertidal area.	Logical consistency	W
1810	For each omnidirectional LIGHTS feature object where CATLIT does not contain the value 5 (aero light) AND does not contain the value 6 (air obstruction light) AND LITCHR is Not equal to 12 (morse) AND VALMNR is Greater than or equal to 10 AND is COVERED_BY a LNDARE AND is not COINCIDENT with a navigational aid structure or equipment feature object.	No structure object for an omnidirectional light on land with a nominal range of 10 NM or more.	Encode an aid to navigation structure object coincident with the LIGHTS object such that the position of the light is visible in ECDIS.	Appendix B.1 (12.1.2)	E
1811	For each BRIDGE feature object where CATBRG includes the value 1 (fixed bridge) in combination with at least one of:- 2 (opening bridge), 3 (swing bridge), 4 (lifting bridge), 5 (bascule bridge) and 7 (draw bridge).	CATBRG is populated with fixed and opening bridge values.	Remove incorrect conflicting value of CATBRG and/or recapture fixed and opening sections as separate BRIDGE feature objects.	4.8.10 & logical consistency.	E
1812	For each edge which is COINCIDENT with a DAMCON and a LNDARE and a DEPARE feature AND is not COINCIDENT with an SLCONS feature of geometric primitive type line with CATSLC not Present.	Seaward edge of a DAMCON feature does not coincide with an SLCONS of geometric primitive line where attribute CATSLC is not present.	Ensure that a DAMCON whose seaward edge is coincident with the coastline has SLCONS feature of type line along its seaward edge, with no value populated for the attribute CATSLC.	4.8.5	E

3.5 Checks Relating to Allowable Attribute Values for Particular Feature Object Classes

No	Check description	Check message	Check solution	Conformity to:	Cat
2000	For each feature object where an attribute of type "L" (list) or type "E" (enumerated) is Present AND contains a value that is not listed in the table below for the given feature object class. - x-y-z: Allowable values (alone or in a list); *: All the pre-defined attribute values as listed in S-57 Edition 3.1 – Appendix A, Chapter 2 are allowed; #: The attribute is mandatory, and an Unknown value is allowed; (#): The attribute is mandatory, but an Unknown value is prohibited (no logical sense).	Attribute value which is not permitted on an object.	Remove disallowed attribute value.	Logical consistency	E

Attribute		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
	CBLOHD	21	1-3-4-5
	CBLSUB	22	1-4-5-6

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	1-3-4-5-6-9-10-11 #
	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
	CBLSUB	22	1-5
	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
	PIPSOL	94	1-5
	PONTON	95	1-2-5
	PRDARE	97	1-2-3-5
	PYLONS	98	1-2-5
	RAILWY	106	1-5
	ROADWY	116	1-2-5
	RUNWAY	117	1-2-5
	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	1-3-4-5-8-9-10-11
	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	1-2-3-4-5-6-7-8-9-10-11-12-13-16-17-18-19-20-21-22-23-24-25-27
	DWRTPT	41	1-2-3-4-5-6-8-9-10-11-12-13-16-17-18-19-20-21-22-23-24-25-27
	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	1-2-3-4-5-6-7-8-9-10-11-12-13-16-17-18-19-20-21-22-23-24-25-27
	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	1-2-3-4-5-6-7-8-9-10-11-12-13-16-17-18-19-20-21-22-23-24-25-27
	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	1-2-3-4-5-6-7-8-9-10-11-12-13-15-16-17-18-19-20-21-22-23-24-25-27
	MIPARE	83	1-2-3-4-5-6-7-8-9-10-11-12-13-15-16-17-18-19-20-21-22-23-24-25-27
	NEWOBJ	163	*
	OSPARE	88	1-2-3-4-5-6-7-8-9-10-11-12-13-15-16-17-18-19-20-21-22-23-24-25-27
	PIPARE	92	1-2-3-4-5-6-7-8-9-10-11-12-13-15-16-17-18-19-20-21-22-23-24-25-27
	PRCARE	96	1-2-3-4-5-6-8-9-10-11-12-13-16-17-18-19-20-21-22-23-24-25-27
	RESARE	112	*#
	SPLARE	120	1-2-3-4-5-6-7-8-9-10-11-12-13-15-16-17-18-19-20-21-22-23-24-25-27
	SUBTLN	133	1-2-3-4-5-6-7-8-9-10-11-12-13-16-17-18-19-20-21-22-23-24-25-27
	TESARE	135	1-2-3-4-5-6-7-8-9-10-11-12-13-16-17-18-19-20-21-22-23-24-25-26-27
	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 #
	TS_PNH	137	3 (#)
	T_HMON	140	1-2 #
	T_NHMN	141	3 (#)

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	3-16-17-18-19-20-21-24-25-26-28-29-30
	CBLOHD	21	3-16-17-18-19-20-21-24-25-26-28-29-30
	CONVYR	34	3-16-17-18-19-20-21-24-25-26-28-29-30
	CRANES	35	3-16-17-18-19-20-21-24-25-26-28-29-30
	GATCON	61	3-16-17-18-19-20-21-24-25-26-28-29-30
	LIGHTS	75	3-16-17-18-19-20-21-24-25-26-28-29-30

	PIPOHD	93	3-16-17-18-19-20-21-24-25-26-28-29-30
	M_SDAT	309	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-19-22-23-24-25-26-27 (#)
	M_VDAT	312	3-16-17-18-19-20-21-24-25-26-28-29-30 (#)

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	*

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