1. **Test Dataset: 101AA00400001**

**S‐158 Recommended ENC Validation Checks covered in this section:**

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| **S‐58 Check** | **S‐158 Check** | **Description** |
| 14 | S100\_10a\_093 | For each interior boundary of a surface that intersects the exterior boundary or another interior boundary at more than one point. |
| 15 | S100\_10a\_090 | For each boundary of a surface where the start and end points are not COINCIDENT. |
| 16 | S100\_7\_007 | For each feature of primitive surface where the exterior boundary is not oriented clockwise (surface to the right) |
| 17 | S100\_7\_008 | For each feature of primitive surface where an interior boundary is not oriented anti-clockwise (surface to the right) |
| 42 | S101\_4\_002 | For each Ring Association Field (RIAS) which is referenced by Skin of the Earth geo features AND is not referenced by a meta feature Data Coverage which does not appear twice with different ORNT (forward and reverse) values. |
| 54a | S101\_A\_001 | For each Building, Crane, Fortified structure, Landmark, Silo/Tank or Wind turbine feature without the boolean attribute 'in the water' set to True which is COS100CurveRED\_BY a Depth area or a Dredged area feature object. |

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| **Dataset Name** | 101AA00400001 | | | | **S‐158 Check** | S100\_10a\_093 | | **Type** | | | C | | |
| **S-158 Description** | | For each interior boundary of a surface that intersects the exterior boundary or another interior boundary at more than one point. | | | | | | | | | | | |
| **Message** | | Self-intersection | | | | | | | | | | | |
| **Solution** | | Amend boundary to share at most one node. | | | | | | | **Conformity** | | | S-100 parts 7-4.3.2 and 10a-5.9.1 | |
| **Test Case No. 1** | | Exterior boundary of SeabedArea (S) shares two nodes with its interior boundary. | | | | | | | | | | | |
| **Location** | | | **Feature** | **Attributes** | | | **FRID** | | | **FOID** | | | **SPATIAL OBJECT** |
| 32°20'25.03"S 60°54'41.85"E | | | SeabedArea | natureOfSurface=9; waterLevelEffect=4 | | | FE-66 | | | 1810\_1516773422\_1 | | | Surface rcid="66" |
| **Screen Capture** | |  | | | | | | | | | | | |
| **Expected Test Results** | | Check S100\_10a\_093: “Interior surface boundary intersects the exterior boundary or another interior boundary at more than one point.” must be triggered. | | | | | | | | | | | |
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| **Dataset Name** | 101AA00400001 | | | | **S‐158 Check** | S100\_10a\_090 | | **Type** | | | C | | |
| **S-58 Description** | | For each feature object of geometric primitive area where the exterior boundary or an interior boundary is not closed. | | | | | | | | | | | |
| **Message** | | First and last edge of an area boundary do not meet at a common connected node. | | | | | | | | | | | |
| **Solution** | | Amend edges bounding the area to meet at a common connected node. | | | | | | | **Conformity** | | | Part 10a-5.9.1 | |
| **Test Case No. 1** | | ShorelineConstruction bounding an area without meeting at a common connected node. | | | | | | | | | | | |
| **Location** | | | **Feature** | **Attributes** | | | **FRID** | | | **FOID** | | | **SPATIAL OBJECT** |
| 32°20'22.23"S 60°54'35.90"E | | | ShorelineConstruction | waterLevel=2 | | | FE-55 | | | 1810\_1513852500\_1 | | | S100Curve-77; S100Curve-79; S100Curve-78 |
| **Screen Capture** | |  | | | | | | | | | | | |
| **Expected Test Results** | | Check S100\_10a\_090: “First and last edge of an area boundary do not meet at a common connected node” must be triggered. | | | | | | | | | | | |
| **Secondary Critical Errors** | |  | | | | | | | | | | | |
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| **Dataset Name** | 101AA00400001 | | | | **S‐158 Check** | S100\_7\_007 | | **Type** | | | C | | |
| **S-58 Description** | | For each feature object of geometric primitive area where the exterior boundary is not encoded clockwise. | | | | | | | | | | | |
| **Message** | | Area exterior boundary not encoded clockwise. | | | | | | | | | | | |
| **Solution** | | Ensure area exterior boundary is encoded clockwise. | | | | | | | **Conformity** | | | Part 3a-5 | |
| **Test Case No. 1** | | SeaAreaNamedWaterArea (S) outer boundary is not encoded clockwise. | | | | | | | | | | | |
| **Location** | | | **Feature** | **Attributes** | | | **FRID** | | | **FOID** | | | **SPATIAL OBJECT** |
| 32°20'28.17"S 60°54'34.61"E | | | SeaAreaNamedWaterArea | featureName/name=2 | | | FE-49 | | | 1810\_1513849309\_1 | | | S100Surface-49 |
| **Screen Capture** | |  | | | | | | | | | | | |
| **Expected Test Results** | | Check S100\_7\_007 : “Area exterior boundary not encoded clockwise” must be triggered. | | | | | | | | | | | |
| **Secondary Critical Errors** | | None | | | | | | | | | | | |
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| **Dataset Name** | 101AA00400001 | | | | **S‐158 Check** | S100\_7\_008 | | **Type** | | | C | | |
| **S-58 Description** | | For each feature object of geometric primitive area where an interior boundary is not encoded counter-clockwise. | | | | | | | | | | | |
| **Message** | | Area interior boundary not encoded counter-clockwise. | | | | | | | | | | | |
| **Solution** | | Ensure area interior boundary is encoded counter-clockwise. | | | | | | | **Conformity** | | | Part 3a-6 | |
| **Test Case No. 1** | | CableArea (S) inner boundary is encoded as clockwise. | | | | | | | | | | | |
| **Location** | | | **Feature** | **Attributes** | | | **FRID** | | | **FOID** | | | **SPATIAL OBJECT** |
| 32°20'22.19"S 60°54'46.96"E | | | CableArea | - | | | FE-63 | | | 1810\_1516772927\_1 | | | S100Surface-63 |
| **Screen Capture** | |  | | | | | | | | | | | |
| **Expected Test Results** | | Check S100\_7\_008: “Area interior boundary not encoded counter-clockwise.” must be triggered. | | | | | | | | | | | |
| **Secondary Critical Errors** | | None | | | | | | | | | | | |
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| **Dataset Name** | 101AA00400001 | | | | **S‐158 Check** | S101\_4\_002  (Check S-58 42) | | **Type** | | | C | | |
| **S-158 Description** | | For each Ring Association Field (RIAS) which is referenced by Skin of the Earth geo features AND is not referenced by a meta feature Data Coverage which does not appear twice with different ORNT (forward and reverse) values. | | | | | | | | | | | |
| **Message** | | Skin of the Earth Coverage Incomplete/Overlap | | | | | | | | | | | |
| **Solution** | | Amend Skin of the Earth coverage, to remove hole or overlap. | | | | | | | **Conformity** | | | S-101 PS 4.3.2.1.1; Annex B 5.1.28; Annex B 6.1.27 | |
| **Test Case No. 1** | | Created edge which is referenced by only one Group 1 feature. Also created the overlap of group 1 features. | | | | | | | | | | | |
| **Location** | | | **Feature** | **Attributes** | | | **FRID** | | | **FOID** | | | **SPATIAL OBJECT** |
| 32°20'50.10"S 60°54'17.69"E | | | DepthArea (S) | depthRangeMinimumValue =-2; depthRangeMaximumValue =0 | | | FE-03 | | | 1810\_1224965246\_22 | | | S100Surface-3 |
| 32°20'50.72"S 60°54'17.94"E | | | LandArea (S) | - | | | FE-71 | | | 1810\_1516774344\_1 | | | S100Surface-71 |
| 32°20'50.72"S 60°54'17.94"E | | | DepthArea (S) | depthRangeMinimumValue =-2; depthRangeMaximumValue =0 | | | FE-70 | | | 1810\_1516773533\_2 | | | S100Surface-70 |
| **Screen Capture** | |  | | | | | | | | | | | |
| **Expected Test Results** | | Check S101\_4\_002: “Group 1 coverage is not correct, a hole or an overlap exists” must be triggered for edges S100Curve-103 & S100Curve-104 | | | | | | | | | | | |
| **Secondary Critical Errors** | | Check S-101\_4\_003 (519a): “Skin of the earth (Group1) objects do not cover the data coverage (DataCoverage = 1).”  Check S-101\_4\_004 (519b): “Skin of the earth (Group1) objects overlap.” | | | | | | | | | | | |
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| **Dataset Name** | 101AA00400001 | | | | **S‐158 Check** | S101\_A\_001 | | **Type** | | | C | | |
| **S-158 Description** | | For each Building, Crane, Fortified structure, Landmark, Silo/Tank or Wind turbine feature without the boolean attribute 'in the water' set to True which is COVERED\_BY a Depth area or a Dredged area feature object. | | | | | | | | | | | |
| **Message** | | Object Missing "in the water" Attribute | | | | | | | | | | | |
| **Solution** | | Amend object to ensure it is situated on a suitable object. | | | | | | | **Conformity** | | | Logical consistency | |
| **Test Case No. 1** | | FortifiedStructure, LandMark and SiloTank created in DepthArea (S). | | | | | | | | | | | |
| **Location** | | | **Feature** | **Attributes** | | | **FRID** | | | **FOID** | | | **SPATIAL OBJECT** |
| 32°20’13.96”S 60°54’52.42”E | | | SiloTank (S) | inTheWater = false; | | | FE-38 | | | 1810\_1771863634\_48 | | | S100Surface-38 |
| 32°20’13.79”S 60°54’52.42”E | | | SiloTank (P) | inTheWater = false; | | | FE-39 | | | 1810\_57594784\_49 | | | S100Point-4 |
| 32°20’16.56”S 60°54’52.47”E | | | LandMark (S) | categoryOfLandmark=2;  inTheWater = false;  visualProminence =1 | | | FE-40 | | | 1810\_1220558023\_50 | | | S100Surface-40 |
| 32°20’16.52”S 60°54’50.30”E | | | LandMark (C) | categoryOfLandmark=2;  inTheWater = false;  visualProminence =1 | | | FE-42 | | | 1810\_270223935\_52 | | | S100Curve-64 |
| 32°20’16.53”S 60°54’54.87”E | | | LandMark (P) | categoryOfLandmark=2;  inTheWater = false;  visualProminence =1 | | | FE-41 | | | 1810\_1271734127\_51 | | | S100Point-3 |
| 32°20’19.13”S 60°54’52.45”E | | | FortifiedStructure (S) | inTheWater = false; | | | FE-44 | | | 1810\_1475377245\_54 | | | S100Surface-44 |
| 32°20’19.14”S 60°54’50.34”E | | | FortifiedStructure (C) | inTheWater = false; | | | FE-43 | | | 1810\_405597275\_53 | | | S100Curve-65 |
| 32°20’19.09”S 60°54’54.74”E | | | FortifiedStructure (P) | inTheWater = false; | | | FE-45 | | | 1810\_1415182570\_55 | | | S100Point-8 |
| **Test Case No. 2** | | | FortifiedStructure, LandMark and SiloTank created on MooringWarpingFacility features where categoryOfMooringWarpingFacility is NOT equal to 1 (dolphin), 2 (deviation dolphin) or 5 (post or pile) | | | | | | | | | | |
| 32-20-32.38S 060-54-26.38E | | | MooringWarpingFacility (P) | categoryOfMooringWarpingFacility =3  inTheWater = false; | | | FE-80 | | | 1810\_11563090\_63050 | | | S100Point-5 |
| 32-20-32.38S 060-54-26.38E | | | LandMark (P) | categoryOfLandmark =2;  inTheWater =false;  visualProminence =1 | | | FE-73 | | | 1810\_11563091\_63050 | | | S100Point-5 |
| 32-20-31.28S 060-54-28.80E | | | MooringWarpingFacility (P) | categoryOfMooringWarpingFacility =4  inTheWater = false; | | | FE-81 | | | 1810\_11563097\_63050 | | | S100Point-7 |
| 32-20-31.28S 060-54-28.80E | | | SiloTank (P) | inTheWater = false; | | | FE-79 | | | 1810\_11563106\_63050 | | | S100Point-7 |
| 32-20-30.42S 060-54-30.52E | | | MooringWarpingFacility (P) | categoryOfMooringWarpingFacility =6  inTheWater = false; | | | FE-84 | | | 1810\_11563099\_63050 | | | S100Point-6 |
| 32-20-30.42S 060-54-30.52E | | | FortifiedStructure (P) | inTheWater = false; | | | FE-78 | | | 1810\_11563107\_63050 | | | S100Point-6 |
| 32-20-29.36S 060-54-32.87E | | | MooringWarpingFacility (P) | categoryOfMooringWarpingFacility =7 | | | FE-83 | | | 1810\_11563093\_63050 | | | S100Point-9 |
| 32-20-29.36S 060-54-32.87E | | | LandMark (P) | categoryOfLandmark =2; visualProminence =1  inTheWater = false; | | | FE-82 | | | 1810\_11563094\_63050 | | | S100Point-9 |
| **Screen Capture** | |  | | | | | | | | | | | |
| **Expected Test Results** | | Check S101\_A\_001 : “Building, Crane, Fortified structure, Landmark, Silo/Tank or Wind turbine feature missing boolean attribute 'in the water' “must be triggered for each of the objects listed. | | | | | | | | | | | |
| **Secondary Critical Errors** | | None | | | | | | | | | | | |
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