|  |
| --- |
| C:\Documents and Settings\julia.powell\My Documents\IHO TSMAD\S100-0 main\IHO S-100 Main Oct 1 2007.doc © ISO/IEC 2007 – All rights reservedISO-IEC\_ 63Complementary elementIntroductory element — Main elementÉlément introductif — Élément central — Élément complémentaireIntroductory element — Main element — Complementary elementE2007-10-2 ISO/IECISO/IEC     2007 ISO/IEC ISO/IEC \_(E).        2Heading 2Heading 1    02 STD Version 2.1c20   4 |
|  |
|  |
|  |

**S-158:124**



Published by the

International Hydrographic Organization

4b quai Antoine 1er

Principauté de Monaco

Tel: (377) 93.10.81.00

Fax: (377) 93.10.81.40

info@iho.int

www.iho.int

**Navigational Warnings Validation Checks**

**(Draft) Edition 0.2.0-20241204**

**Aligned to S-124 Edition 1.5.0**

|  |
| --- |
| © Copyright International Hydrographic Organization 2024 |
| This work is copyright. Apart from any use permitted in accordance with the [Berne Convention for the Protection of Literary and Artistic Works](http://www.wipo.int/treaties/en/ip/berne/trtdocs_wo001.html) (1886), and except in the circumstances described below, no part may be translated, reproduced by any process, adapted, communicated or commercially exploited without prior written permission from the International Hydrographic Organization (IHO). Copyright in some of the material in this publication may be owned by another party and permission for the translation and/or reproduction of that material must be obtained from the owner. |
| This document or partial material from this document may be translated, reproduced or distributed for general information, on no more than a cost recovery basis. Copies may not be sold or distributed for profit or gain without prior written agreement of the IHO Secretariat and any other copyright holders. |
| In the event that this document or partial material from this document is reproduced, translated or distributed under the terms described above, the following statements are to be included: |
| *“Material from IHO publication [reference to extract: Title, Edition] is reproduced with the permission of the IHO Secretariat (Permission No ……./…) acting for the International Hydrographic Organization (IHO), which does not accept responsibility for the correctness of the material as reproduced: in case of doubt, the IHO’s authentic text shall prevail. The incorporation of material sourced from IHO shall not be construed as constituting an endorsement by IHO of this product.”* |
| *“This [document/publication] is a translation of IHO [document/publication] [name]. The IHO has not checked this translation and therefore takes no responsibility for its accuracy. In case of doubt the source version of [name] in [language] should be consulted.”*  The IHO Logo or other identifiers shall not be used in any derived product without prior written permission from the IHO Secretariat. |

Document History

Changes to this Specification are coordinated by the IHO World-Wide Navigational Warning Service Sub-Committee (WWNWS-SC). New editions will be made available via the IHO web site. Maintenance of the Specification shall conform to IHO Resolution 2/2007 (as amended).

|  |  |  |  |
| --- | --- | --- | --- |
| **Version Number** | **Date** | **Author/Editor** | **Purpose** |
| 0.1.0 | 2024-10-11 | RM | Initial draft for S100 Validation Checks GitHub repository |
| 0.2.0 | 2024-12-04 | RM | Extended conformance statement; revised maintenance clause |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Summary of Substantive Changes in Edition x.x

Bold references in the Clauses Affected column indicate the principal sections/clauses that are affected by the described change.

|  |  |
| --- | --- |
| Change Summary | Clauses Affected |
| (To be populated for editions following Edition 1.0.0) |  |
|  |  |
|  |  |

Contents Page

[1 Introduction 1](#_Toc179556251)

[1.1 Scope 1](#_Toc179556252)

[1.2 Conformance 1](#_Toc179556253)

[1.3 References 1](#_Toc179556254)

[1.3.1 Normative references 1](#_Toc179556255)

[1.3.2 Informative references 1](#_Toc179556256)

[1.4 Terms, definitions and abbreviations 2](#_Toc179556257)

[1.4.1 Terms and definitions 2](#_Toc179556258)

[1.4.2 Abbreviations 3](#_Toc179556259)

[1.4.3 Symbols 3](#_Toc179556260)

[1.5 Use of language 3](#_Toc179556261)

[1.6 General description 3](#_Toc179556262)

[1.7 Specification metadata and maintenance 3](#_Toc179556263)

[1.7.1 Specification metadata 3](#_Toc179556264)

[1.7.2 Specification maintenance 4](#_Toc179556265)

[2 Check Structure 5](#_Toc179556266)

[3 Check Syntax 5](#_Toc179556267)

[4 Organisation 5](#_Toc179556268)

[5 Other Applicable Checks 5](#_Toc179556269)

[5.1 Generic S-100 checks 5](#_Toc179556270)

[5.2 Interoperability checks 6](#_Toc179556271)

[6 Check Application Sequence 6](#_Toc179556272)

[7 Check Classification 7](#_Toc179556273)

[8 Geometry and Spatial Operators 7](#_Toc179556274)

[9 Other Components of this Specification 7](#_Toc179556275)

# Introduction

This document specifies a set of checks that producers of S-124 Navigational Warnings (NAVWARN) validation tools must implement in their validation software. Validation software is used to ensure that S-124 NAVWARN data are compliant with the S-124 Product Specification. The initial list of checks for S-124 was compiled by the IHO World-Wide Navigational Warning Service Sub-Committee (WWNWS-SC).

The checks listed in this document are product-specific. They supplement but do not replace the generic S-100 validation checks applicable to all S-100 products which are defined in a separate IHO publication (S-158:100 – Universal Hydrographic Model Validation Checks).

## Scope

This document, designated as “S-158:124” by the IHO, specifies validation checks for data products conforming to Edition(s) 2.0.x of the S-124 (Navigational Warnings) Product Specification.

This document specifies product-specific validation checks for both S-124 datasets and exchange sets containing S-124 datasets.

The checks specified in this document supplement the checks described in Edition 1.0.0 of S-158:100 (Universal Hydrographic Data Model Validation Checks). Both sets of validation checks, those described in S-158:100 as well as those defined in S-158:124, must be applied to test the validity of S-124 datasets and exchange sets. For datasets and exchange sets intended for use on ECDIS, additional cross-product checks, defined in S-158:98, must also be applied.

The checks described are intended for production systems designed to produce S-124 Navigational Warning datasets. The checks can be administered at any time during the production phase. All checks should be considered as warnings, even though more severe classifications are available, due to the status of the development and lack of experience with system use of S-124 datasets, it is considered premature to classify any checks as error or critical error at this time. All operators and spatial expressions are defined in Annex A.

## Conformance

This specification conforms to Edition 1.0.0 of IHO specification S-158 (Validation Checks – Introduction and Structure).

The validation checks described herein conform to Edition(s) 2.0.x of IHO Product Specification S-124 (Navigational Warnings).

Edition 1.0.0 is an Implementation version in accordance with IHO TR 2/2007 and there may be revisions issued by the Working Group prior to the Operational Edition 2.0.0 being published.

## References

### Normative references

S-98 *Data Product Interoperability in S-100 Navigation Systems, IHO Publication S-98, Edition 2.0.0, ??? 2025*. In Preparation.

S-100 *IHO Universal Hydrographic Data Model*, Edition 5.2.0, June 2024

S-124 *Geospatial Standard for Navigational Warnings, Edition 2.0.0, ??? 2024*. In preparation.

S-158 *Validation Checks – Introduction and Structure, Edition 1.0.0, ??? 2025.* In preparation.

S-158:100 *Universal Hydrographic Data Model Validation Checks, Edition 1.0.0, ??? 2025*. In preparation.

### Informative references

ISO 19157:2013 *Geographic information – Data Quality.* As amended by Amendment 1, 2018

## Terms, definitions and abbreviations

### Terms and definitions

The terms and definitions listed in S-158 apply to this document. In addition, the following terms and definitions are used:

aggregation

special form of association that specifies a whole-part relationship between the aggregate (whole) and a component part (see composition) [ISO 19103]

association

semantic relationship between two or more classifiers that specifies connections among their instances [ISO 19103]

NOTE: A binary association is an association among exactly two classifiers (including the possibility of an association from a classifier to itself)

composition

form of aggregation association with strong ownership and coincident lifetime as part of the whole [ISO 19103]

NOTE: Parts with non-fixed multiplicity may be created after the composite itself, but once created they live and die with it (that is, they share lifetimes). Such parts can also be explicitly removed before the death of the composite. Composition may be recursive. Synonym: Composite aggregation.

enumeration

a fixed list of valid identifiers of named literal values. Attributes of an enumerated type may only take values from this list [???]

exterior

difference between the universe and the closure [ISO 19107]

NOTE The concept of exterior is applicable to both topological and geometric complexes

feature association

relationship that links instances of one feature type with instances of the same or a different feature type [ISO 19110]

feature attribute

characteristic of a feature [ISO 19101]

NOTE: A feature attribute may occur as a type or an instance. Feature attribute type or feature attribute instance is used when only one is meant.

NOTE: A feature attribute type has a name, a data type and a domain associated to it. A feature attribute instance has an attribute value taken from the value domain of the feature attribute type.

NOTE: In a Feature Catalogue, a feature attribute may include a value domain but does not specify attribute values for feature instances.

EXAMPLE 1: A feature attribute named communication channel may have an attribute value VHF0007 which belongs to the data type text

EXAMPLE 2: A feature attribute named length may have an attribute value 82.4 which belongs to the data type real

multiplicity

specification of the number of possible occurrences of a property, or the number of allowable elements that may participate in a given relationship [ISO 19103]

EXAMPLES: 1..\* (one to many); 1 (exactly one); 0..1 (zero or one)

relationship

semantic connection among model elements [ISO 19103]

NOTE: Kinds of relationships include association, generalization, metarelationship, flow, and several kinds grouped under dependency.

### Abbreviations

This Specification uses the abbreviated terms defined in S-158.

In addition, this specification uses the following abbreviated terms:

ENC Electronic Navigational Chart

GML Geography Markup Language

MRN Maritime Resource Name

NAVWARN Navigational Warning

### Symbols

The symbols used in logical and spatial expressions are defined in S-158 clause 1.3.3 (Symbols).

## Use of language

Within this document:

* “Must” indicates a mandatory requirement.
* “Should” indicates an optional requirement, that is the recommended process to be followed, but is not mandatory.
* “May” means “allowed to” or “could possibly”, and is not mandatory.

## General description

S-158:124 is a specification describing product-specific validation checks for S-124 products. There are no data products based directly on this edition of S-158:124 and therefore no general information applicable to data products conforming to it.

The validation checks are intended for production systems designed to produce S-124 Navigational Warning datasets. The checks can be administered at any time during the production phase.

## Specification metadata and maintenance

### Specification metadata

This information uniquely identifies this Specification and provides information about its creation and maintenance.

**Title:** Naviational Warnings Validation Checks

**Version:** 0.2.0

**Date:** 2024-12-04

**Language:** English

**Classification:** Unclassified

**Contact:** International Hydrographic Organization.

4 quai Antoine 1er,

B.P.445 MC 98011 MONACO CEDEX

Telephone: +377 93 10 81 00

B.P. 445 Fax: + 377 93 10 81 40

Email: [info@iho.int](mailto:info@iho.int)

**Role:** Owner

**URL:** <https://registry.iho.int>

**Identifier:** S-158:124

**Maintenance:** Changes to this Specification are coordinated by the IHO World-Wide Navigational Warning Service Sub-Committee (WWNWS-SC) and made available via the IHO Publications website. Maintenance of the Product Specification must conform to IHO Technical Resolution 2/2007 (revised 2010). For reporting issues which need correction, use the contact information.

### Specification maintenance

#### Introduction

Changes to S-158:124 will be released by the IHO as a New Edition, revision, or clarification.

The list of checks, which accompanies this document is considered part of this Specification and changes to it are considered changes to this Specification.

S-158:124 is not accompanied by separate artefacts such as an XML Schema, Feature or Portrayal Catalogue and therefore this clause does not address the question of changes to such derived artefacts.

#### New Edition

New Editions of S-158:124 include at least one of the following changes:

* introduce a new validation check (of any classification);
* remove an existing validation check (of any classification);
* change the classification of a validation check, whether upgrade (such as Error to Critical) or downgrade (such as Error to Warning);
* extend a validation check to include new features, conditions, etc., in a way that requires validation software manufacturers to change their software.

New Editions are likely to require validation software manufacturers to change their software or invalidate datasets which passed validation according to the previous Edition of S-158:124.

All cumulative revisions and clarifications must be included with the release of approved New Editions.

#### Revision

Revisions are defined as substantive semantic changes to S-158:124. Typically, revisions will change S-158:124 to correct factual errors or introduce necessary changes that have become evident as a result of practical experience or changing circumstances. Revisions include corrections of misinterpretations of S-124, or extensions to checks that do not require changes to validation software..

A revision must not be classified as a clarification. All cumulative clarifications must be included with the release of approved revisions.

#### Clarification

Clarifications are changes to S-158:124 arising from non-substantive reasons.

Typically clarifications for non-substantive reasons remove ambiguity; correct grammatical and spelling errors; amend or update cross references; revise check messages or clarify check descriptions without requiring manufacturers to change their software.

#### Version numbers

The associated version control numbering to identify changes (n) to S-158:124 must be as follows:

New Editions denoted as **n**.0.0

Revisions denoted as n.**n**.0

Clarifications denoted as n.n.**n**

# Check Structure

Check structure in S-158:124 includes the fields specified in S-158.

[PT to state if the now-optional Data Quality Measures column is used or not.]

# Check Syntax

The check syntax conforms to the syntax and operators for product-specific checks described in S-158 clause 4.2.

# Organisation

The list of validation checks for this edition of S-158:124 is available separately (see clause 9). The list of checks accompanies this specification and forms an integral part of it.

[Describe numbering scheme and organization, if the Project Team uses any special organization or numbering scheme. To do, by Project Team]

# Other Applicable Checks

## Generic S-100 checks

S-124 datasets and exchange sets must also be validated using the following subset of the generic S-100 validation checks defined in S-158:100:

| **Document reference in S‑158:100 list** | **Checks** | **Apply to** | **Remarks** |
| --- | --- | --- | --- |
| Part 1 | N/A | Product Specification | No direct implementation on datasets or exchange sets |
| Part 2 / 2a | N/A | Product Specification | No direct implementation on datasets or exchange sets |
| Part 4a | All Collection A checks | Exchange catalogue |  |
| Part 4b | N/A | Product Specification | No direct implementation on datasets or exchange sets |
| Part 5 / 5a | S100\_Dev0069 (not applied to datasets or exchange sets) | Product Specification | No direct implementation on datasets or exchange sets |
| S100\_Dev0077  S100\_Dev0468  S100\_Dev0161  S100\_Dev0162  S100\_Dev0163  S100\_Dev0164  S100\_Dev0165  S100\_Dev0166  S100\_Dev0167  S100\_Dev0168  S100\_Dev0169  S100\_Dev0170  S100\_Dev0171 | Datasets |  |
| Part 6 | Only checks in Collection A, if any | Datasets |  |
| Part 7 | All checks in Collection A except those for arc, circle, and spline primitives or Level 3b geometry | Datasets | S-124 uses Level 3a geometry.  S-124 Ed. 1.5.0 does not use arc, spline, and circle spatial primitives |
| Part 8 | None | N/A | Part 8 does not apply to S-124 |
| Part 9 / 9a / 13 | N/A | Product Specitication | Validation checks for Portrayal Catalogue |
| Part 10a | None | N/A | S-124 does not use the ISO 8211 format |
| Part 10b | All checks in Collection A | Dataset | Generic validation checks for the S-100 GML format |
| Part 10c | None | N/A | S-124 does not use the S-100 HDF5 format |
| Part 11 | S100\_Dev0466 | Dataset | There is only one Part 11 generic check, for dataset size |
| Part 15 | All collection A checks | Exchange catalogue  Exchange set |  |
| Part 17 | All checks in Collection A except those applying to elements not used in S-124 | Exchange catalogue  Exchange set |  |

## Interoperability checks

S-124 datasets and exchange sets intended for use on ECDIS must also pass the applicable interoperability checks from those listed in S-158:98.

# Check Application Sequence

The check application sequence expands and modifies the application sequence described in S-158.

Table 6-1 - Suggested application order of validation checks

| **Order** | **Check Collection** | **Defined in** | **Apply to** |
| --- | --- | --- | --- |
| 1 | S-100 generic checks for datasets | S-158:100 | Dataset, in isolation |
| 2 | Product-specific checks for datasets | S-158:124 | Dataset, in isolation |
| 2.1 | ??? | S-158:124 checks numbered Nxxx | Dataset, in isolation |
| 2.2 | ??? | S-158:124 checks numbered Nxxx | Dataset, in isolation |
| 2.3 | ??? | S-158:124 checks numbered Nxxx | Dataset, in isolation |
| 3 | Interoperability checks for single S-124 dataset | S-158:98 | Dataset, in isolation |
| ~~4~~ | Inter-dataset, intra-product checks | S-158:124 checks numbered Nxxx | Adjacent or intersecting datasets |
| ? | Inter-version checks(?) | S-158:124 checked numbered Nxxx | Related datasets for different versions of S-124 |
| 5 | Interoperability checks for combinations of datasets from different products | S-158:98 | S-124 dataset in combination with relevant datasets from other products (e.g., S-102) |
| 6 | S-100 generic checks for exchange sets | S-158:100 | Exchange set |
| 7 | Product-specific checks for exchange sets | S-158:124 checks numbered Nxxx | Exchange set |
| 8 | Product catalogue checks | S-158:128 | S-128 datasets describing S-124 datasets |

# Check Classification

The check classification conforms to the scheme described in S-158.

All checks should be considered as warnings, even though more severe classifications are available, due to the status of the development and lack of experience with system use of S-124 datasets, it is considered premature to classify any checks as error or critical error at this time.

# Geometry and Spatial Operators

Geometry and spatial operators conform to the operators for vector products described in S-158.

For all spatial operators a default tolerance of [??? - PT to decide] should be applied in validation software.

# Other Components of this Specification

The other components of this Specification listed below are provided as separate documents or artefacts accompanying this document and form an integral part of this Specification.

1. Spreadsheet of S-124 validation checks named S158\_124\_0\_2\_0\_YYYYMMDD