Notes (For S-100 Edition 5.0.0 - last updated August 29 2022)

Notes, 2022-08-29:
Obsolete builds retained during pre-publication schema review are no longer available on the server, as announced in the 2022-07-31 notes below.
The post-publication retention policy will be applied after 31 August 2022. See Updates on page 5 for the pre- and post-publication retention policies.
References to the IHB have been replaced with references to the IHO Secretariat, including in the copyright/license comment within XSD files. Since this affects only a comment, new build directories have not been created.

Notes, 2022-07-31:
New build directories (e.g., "xyz/20220610") have been created for schema packages which were revised. Table 1 indicates which packages were updated.
Obsolete older build directories have been temporarily retained but will be removed about 31 July 2022 (see Updates on page 5 for the retention policy).
Build directories which are not obsolete will continue to be retained under their current names.
The updated examples under the samples directory reference the new build locations in *schemaLocation* attributes where necessary.

Terms
S-nnn An S-100-based product specification

Schema server:
The schemas are available on an Internet schema server at URL **https://schemas.s100dev.net**. This URL is used in the schemaLocation attribute of the S-100 5.0 schemas. Developers and distributors should use "XML catalogs" as described in the OASIS standard for XML catalogs (see #2 in "Additional notes" below) or other means such as configuring resolvers to resolve addresses to local substitute locations as needed, especially if access to Internet files is needed on board ship or in other conditions when real-time Internet access is unavailable, intermittent, or precluded by security considerations.

Ensure that your local firewall and networks allow access to **https://schemas.s100dev/net, https://schemas.opengis.net,** and **https://schemas.isotc211.org** before using the schema server or downloaded schemas, or obtain the zip archives from these sites and configure an XML Catalog or resolver accordingly to redirect external references to local directories (folders). Local installation from zip archives is generally preferable to avoid depending on Internet connection and excessive requests to W3C, OGC and ISO servers. See the example XML Catalog in the distribution for examples of such redirections.

Folder and file names on the server are case-sensitive. This means schemaLocation attributes and resolvers will need to use exactly the same folder and file name as on the server, including the extension. For example, retrieving S100_ExchangeCatalogue.XSD may return an error (as would s100_ExchangeCatalogue.xsd) because the file name is S100_ExchangeCatalogue.xsd. The file names are listed in the site map viewable at the root of the schema server (https://schemas.s100dev.net/index.html).

Folder Organization:

Wherever local files are referenced in the XSD files and XML sample files, the references are based on this organization of folders. The S-100 schemas are subdivided into packages corresponding to different Editions and Parts of S-100.

- There is a root folder "S100" containing the S-100 generic schemas. Schemas for other products will have corresponding named folders at the same level - for example, S-104 will have an "S104" folder.
- Each Edition of S-100 is in a sub-folder named after the edition number.
- Each package is in a sub-folder under the Edition folder. A package corresponds to an individual Part of S-100.
- Each build of the package is in a sub-folder under the package folder. Builds under the same package folder correspond to the same Edition/Package.

For more information about namespaces and builds, see **Namespaces** and **Version numbering** later in this document.
Obsolete S-100 packages are not listed on the schema server's landing page.

Table 1. File and folder organization

S-100 schemas and other files		
schemas/	This folder. Contains the S-100 and S-nnn schemas. In the 5.0.0 distribution, may contain the ISO schemas referenced by the S-100 schemas.	
ephemera/	Miscellaneous transient files. For examples, updates to ISO Schematron files for newer versions of the ISO schemas.	
S100/	S-100 schemas	
5.0.0/	Edition 5.0.0 schemas container	
S100CSL	Container for types defined in Part 1 of S-100 (**C**onceptual **S**chema **L**anguage).	
20220331/	Build 20220331 of the types.	
S100Catalog/	Exchange catalogue schema package container. Corresponds to Part 17.	
20220705/	Build 20220705 of the exchange catalogue schemas. Updates the 20220610 build to replace absolute schema references in import statements to relative references (applies only to imported S-100 schemas).	
(Files in build)	**S100_ExchangeCatalogue.xsd**	XML schema for S-100 exchange catalogue
	s100mds.xsd	container file for S-100 extensions to service identification metadata
	serviceIdentification.xsd	S-100 extensions to service identification metadata
	ISOTS19139A1Constraints_v1.4.sch	Schematron ISO 19139 constraints
	mmi.xsd **maintenance.xsd**	Profile of ISO 19115-1 maintenance metadata, used in the exchange catalogue.
	S100_XC.sch	Schematron file with S-100-specific validation checks for exchange catalogues
S100SE/	Signatures/Data encryption schema container. Formerly S100DE in	

	the Edition 4.0.0 schemas.
20220728/	Build 20220728 of the signatures and encryption XML schema. Corresponds to Part 15. Updates the 20220331 build to replace absolute schema references in import statements to relative references (applies only to imported S-100 schemas).
S100FC/	Feature catalogue schema container
20220610/	Build 20220610 of the feature catalogue schemas. Corresponds to Part 5 with updates resulting from S-100 WG review of May 2022 (see schema review form).
S100GML/	GML profile container
20220620	Build 20220620 of the GMl profile. Corresponds to Part 10b.
S100PC/	Container for S-100 portrayal schemas. Corresponds to Part 9. Formerly S100XSLTPR, renamed because these portrayal schemas are not dependent on XSLT portrayal.
20220705/	Build 20220705 of the S-100 Part 9 schemas. Updates the 20220331 build to replace absolute schema references in import statements to relative references (applies only to imported S-100 schemas).
S100IC/	Schemas for S-100 interoperability (Part 16).
20220728/	Build 20220728 of the S-100 Interoperability schemas. Updates the 20220331 build to replace absolute schema references in import statements to relative references (applies only to imported S-100 schemas).
S100LA/	Schemas for Part 18 (language packs).
20220728/	Build 20220728 of the S-100 Part 18 schemas. Updates the 20220331 build to replace absolute schema references in import statements to relative references (applies only to imported S-100 schemas).
resources/	Container for resource files
Codelists/	Container for S-100 codelists (see the next table)
XMLCatalogs/	Container for XML catalogs. Currently empty, reserved for developer-provided XML catalogs.
w3c/	(folder hierarchy with W3C XLink and xml.xsd schemas) 20220620 - W3C xml.xsd schema added (it is referenced by the SVG schemas in S100PC).
ISO schemas and other files	
standards.iso.org/	Old ISO TC211 schemas. The references to ISO schemas in the S-100 5.0 distribution have been updated to use the "new" ISO TC211 schema site https://schemas.isotc211.org. Notes: (1) Developers using these ISO schemas may obtain the schema archives for the standards listed below from the ISO site (https://standards.iso.org/iso/). The resolver or XML catalog must be updated to point to the local installation directory. (2) Some ISO schemas import other schema files from the ISO site, so unless an implementation uses XML catalogs, resolvers, or other solution to location resolution, those imports will continue to cause accesses to the ISO Internet site. (3) The standards.iso.org server contains older versions of ISO TC211 schemas which are now **deprecated for S-100 purposes**, and likely to be removed for the next edition of S-100**. Developers are urged to use the schemas.isotc211.org distribution instead.**

schemas.isotc211.org/	New ISO TC211 schemas. These can also be obtained from the ISO distribution site at https://schemas.isotc211.org. While ISO TC211 may add new versions from time to time, the old versions are expected to continue to remain available. Notes: (1) The resolver or XML catalog must be updated to point to the local installation directory. (2) The namespaces in the ISO schemas referenced from the S-100 distribution may still include "standards.iso.org" even when the schemaLocation has been updated to schemas.isorc211.org. (3) Some ISO schema files import other schema files from the ISO site, so unless an implementation uses XML catalogs, resolvers, or other solution to location resolution, those imports will continue to cause accesses to the ISO Internet site files.
19110/	
19111/	
19115/	If downloading from the ISO schemas site, obtain the version labeled "ISO 19115-1, Geographic Information - Metadata - Part 1: Fundamentals and ISO 19115-2, Geographic Information - Metadata - Part 2: Extensions for acquisition and processing. As implemented by ISO 19115-3:2016."
19139/	
19157/	
schemas.opengis.net/	GML schemas from the Open Geospatial Consortium (OGC) and OGC versions of ISO 19139 schemas used by the GML schemas. Note: Developers may obtain the relevant schemas (see following rows) from schemas.opengis.net. The resolver or XML catalog must be configured according to the local installation.
gml/	OGC GML 3.2.1 schemas
3.2.1/	(use the gml-3.2.1.2 folder from the schemas.opengis.net distribution)
(XSD files)	basicTypes.xsd, coordinateOperations.xsd, etc., etc.
iso/	ISO 19139 schemas used by the GML schemas, as provided by the OGC. (Use the 20070417_4-v20180321 archive from the iso19139-20070417 archive from schemas.opengis.net.)
19139/	ISO 19139 schemas used by GML
20070417/	Contains gco/, gmd/, etc.
Schemas for product specifications	
S98/ **S101/** **S104/** **S111/** **S131/** **etc.**	Folders for schemas for individual product specifications, including metadata/exchange catalogue schemas extending the S-100 generic schemas and Schematron files implementing product-specific restrictions on metadata. (Except for S-98 draft schemas, these are not included in the 5.0 distribution because they will have to be updated for S-100 Edition 5. Note also that the S-98 schemas have still to be updated to reference S-100 Edition 5.)
Samples	
samples/	Samples folder
S100_5_0/	Folder with S-100 5.0 generic samples
PartX/	Each PartX folder contains a sample for the relevant Part. For example, Part 5 contains a sample feature catalogue. The samples many not correspond to actual datasets.

yyyymmdd/	Newer examples are placed in subfolders corresponding to the build date of the schema they demonstrate.

Table 2. Codelists

S-100 Codelist locations	
schemas/S100/5.0.0/resources/Codelists/	Container for S-100 codelist folders
cat/codelists.xml	Comprehensive ISO codelists file. IHO S-100 codelists in ISO catalog format. Supplements the ISO codelists file by defining two codelists not defined in that file (language and character set codes). Also includes a codelist for the data encoding format described in S-100 Part 10c, for use by specifications which encode that in metadata files.
cat/codelists.html	Human-readable list of codelists and codes.
gml/*.xml	IHO S-100 codelists in GML dictionary format (currently none)
ISO Codelist locations	
standards.iso.org/iso/191xx/.../<file>.xml **or** **schemas.isotc211.org/191xx/.../<file>.xml**	ISO codelists for individual ISO schema packages. The file name and location varies but they are generally located within a *.../resources/* folder hierarchy.
cat/codelists.xml	Codelists in ISO catalog format.
gml/*.xml	Codelists in GML dictionary format. Optional, current practice in S-100 uses the ISO catalog format.
Product-specific codelist locations	
<Snnn>/<version>/resources/Codelists/...	Codelists specific to S-nnn products. The "codelists.html" files present them in reader-friendly HTML format.

Updates

During the Edition 5.0 pre-publication review: For corrections to the draft schemas before finalization of S-100 Edition 5.0:

- the namespace will be stable (i.e., the 5.0 namespace will be retained);
- the version attribute in the *<schema>* tag will be updated (see **Version Numbering** below);
- the new schema will be in a new build folder;
- older build folders **may be removed**, depending on the nature of the change.

Post-publication - After finalization of S-100 Edition 5.0: After publication of S-100 Edition 5.0:

- the namespace will be updated if and only if the old and new schemas do not cross-validate (see Namespaces below);
- the version attribute in the *<schema>* tag will be updated (see **Version Numbering** below);
- the new schema will be in a new build folder;
- older schema build folders **will be retained** for the sake of implementation continuity.

Namespaces

The namespace for a package includes the S-100 edition number (or product edition number for product-specific schemas).

New builds **that do not allow cross-validation with the previous build** will get a new namespace (with the exception noted below), by either:

- changing the edition number in the namespace (if derived from a new revision of S-100 or the relevant product specification), or
- suffixing the build number to the namespace (if not derived from a new revision of S-100 or the relevant product specification).

The exception is a correction of a discrepancy between the schema and the corresponding S-100 Part (or Product Specification). This will be in a new build folder but the namespace will not be updated.

Note that the cross-compatibility requirement above means that even backward-compatible schemas will get a new namespace unless both the following are true:

- The old schema validates all files that conform to the new schema.
- The new schema validates all files that conform to the old schema.

This is to ensure that attempts to validate a new-format XML file with an old schema will raise a namespace discrepancy flag.

Each S-100 schema has a version number in the root “schema” tag. See **Version numbering** below.

Note: The GML profile schema in the S100GML (Part 10b) package (*gmlProfile.xsd),* being a subset of the official GML schema(s), must use the GML namespace and will therefore not have its namespace updated for succeeding revisions, if any (because revisions must continue to use the GML namespace). The S-100 extensions schema *gmlbase.xsd* in the same package has an S-100 namespace which will be updated as described earlier.

Version numbering:

Both S-100 and S-nnn schemas have the version number in the <schema> root element’s “version” attribute. The format is N1.N2.N3-YYYYMMDD where:

- N1, N2, and N3 are the major version, revision, and clarification number respectively of the S-100 edition
- YYYYMMDD the build date of the schema.

Example: <schema . . . version="5.0.0-20220331"> indicates build 20220331 of the schemas for S-100 Edition 5.0.0.

Clarifications to the S-100 standard may or may not result in an update of the XSD files. If an update does result, it will be a "non-substantive change" and will not change the structure of the schema, but may correct grammatical and spelling errors (including element definitions); or amend or update cross references. If the schemas are updated, the build date will also be updated.

Corrections to XSD files which are due to errors or amendments to the XSD files themselves and not caused by changes in S-100 will result in a new version of the schema files which has the same S-100 edition component but a different build date from the previous version of the schemas.

Dependency on particular versions of the schemas should be checked by comparing at least the N1.N2 and YYYYMMDD portions of the schema version. This means that the schema build date may have to be included where there is a dependency on XML schema structure (including the presence of enumerates, upper and lower bounds on multiplicity, etc.)

Namespaces will be updated according to a different regime depending on the effects of the change on schema validation (see **Namespaces** above). The regimes are designed so the numbering components in the version attribute and namespace stay harmonized for substantive changes to the relevant S-100 Part while allowing non-substantive changes that do not affect cross-validation with previous versions to retain the same namespace.

Additional notes:

1) ISO-provided Schematron files for validation are now included in the folders for the revised schemas and are also on the ISO's web site. There are additional or substitute Schematron validation files where needed, for example, cit.sch is provided in the folder standards.iso.org/19115/-3/cit/1.0/. The older versions generally DO NOT work for the newer versions (due to namespace mismatches). ISO may update them; meanwhile, the "ephemera" folder contains updated versions for use with S-100 (only for two files – contact us if more are needed).
2) XML catalogs describe mappings between external references and locally cached equivalents. They allow software tools and applications to resolve references to external entities (e.g., in schemaLocation attributes) in terms of locally cached files.
(See "XML Catalogs - OASIS Standard V1.1, 7 October 2005" URI: <https://www.oasis-open.org/committees/download.php/14810/xml-catalogs.pdf>.) The development of XML catalogs for S-100 is not planned at present though a sample is provided. This folder may be used for depositing XML catalogs that may be prepared by developers.

Updates and changes

Please do not change locations, namespaces, or file names in the schemas and samples in this package without consulting me (Raphael), or unless you are an XML expert and have checked the side-effects.
Any changes to the schemas on the official IHO distribution should get a new build date and an update in the file history at the beginning of the file describing the change and identifying the author. This README document should also be updated accordingly.

Bug reports and questions should be sent to Julia Powell (S-100 WG Chair) with a copy to Raphael Malyankar (author).
After publication of S-100 Edition 5, requests for revisions should be submitted to the IHO S-100 WG Chair through the regular S-100 maintenance proposal process.