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Geographic information — Conformance and testing

Information géographique — Conformité et essais

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 287, *Geographic Information,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 19105:2000), which has been technically revised.

The main changes are as follows:

— the document has been reformatted to have a modular structure;

— conformance testing requirements have been added for modular specification;

— dependency relationships have been introduced among conformance classes;

— three-valued logic is supported on the overall result evaluation;

— the statements on process are omitted, leaving freedom for implementers.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The scope of ISO/TC 211 is standardization in the field of digital geographic information. This work aims at establishing a structured set of International Standards for information concerning objects or phenomena that are directly or indirectly associated with a location relative to the Earth. These International Standards can specify, for geographic information, methods, tools and services for data management (including definition and description). They can also specify the acquisition, processing, analysing, accessing, presentation and transferring of such data in digital/electronic form between different users, systems and locations. The work will be linked to appropriate International Standards for information technology and data, where possible, and provide a framework for the development of sector-specific applications using geographic data.

This document is based on concepts defined in ISO International Standards which describe conformance and testing. Certain components of the Open Geospatial Consortium (OGC) modular specification,[2] including requirements, requirements classes, abstract test cases and conformance classes, are also used in this document. While the framework of conformance testing described in these documents is also used in this document, some concepts have been modified for use in this particular domain.

Conformance testing does not include robustness testing, acceptance testing and performance testing, because the family of documents on geographic information does not establish requirements for these areas.

Conformance testing tests a candidate product according to normative requirements which are required to be satisfied by passing the tests of the abstract test suite. These abstract test cases are organized into conformance classes in a modular structure, each of which represents a mechanism for partial satisfaction of the International Standard in terms of the corresponding requirements class.

In the practical sense, it is very important to be able to ensure good quality in testing and conformance with the relevant requirement(s). This can be achieved via traceability and perhaps even with a traceability matrix where the requirement and the test result are correlated.

It is recommended that all applicable International Standards regarding geographic information and the relevant application domains follow the formatting for requirements used in this document.

The name and contact information of the Maintenance Agency for this document can be found at www.iso.org/maintenance_agencies.

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Geographic information — Conformance and testing

1 Scope

This document specifies the framework, concepts and methodology for conformance testing and criteria to be achieved to claim conformance to the family of applicable standardization documents regarding geographic information and relevant application domains. This document provides a framework for specifying abstract test suites composed of abstract test cases grouped in conformance classes and for defining the procedures to be followed during conformance testing.

Conformance can be claimed for data or software products or services or by specifications including any profile or functional standard. The structure of, and relationships between, conformance classes as defined in this document underly a systematic approach to configuration management involving managing dependencies within and between modules.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
abstract
<as a modifier> implementation-independent

3.2
abstract test case
conformance test case
test for a particular requirement or a set of related requirements

Note 1 to entry: An abstract or conformance test case is a formal basis for deriving executable test cases. It should be complete in the sense that it is sufficient to enable a test verdict to be assigned unambiguously to each potentially observable test outcome.

Note 2 to entry: The definition for "test case" can be found in ISO/IEC/IEEE 24765:2017, 3.4210.

3.3
abstract test suite
ATS
set of conformance classes that define tests for all requirements of a specification

Note 1 to entry: Evidence of conformance to all or part of a standard, awarded for passing one or more of the conformance test classes specified in that standard

[SOURCE: OGC 08-131r3, 4.2][2]

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3.4
conformance
conformity
fulfilment of a requirement

Note 1 to entry: When there is no ambiguity, the modifier “conformance” may be omitted. For example, "test report" is the same as "conformance test report".

3.5
conformance clause
conformity clause
clause containing all the requirements that need to be fulfilled for an International Standard or specification

Note 1 to entry: In this document, specification represents technical specification.

3.6
conformance class
conformance test class
set of abstract test cases that when applied receive a single certificate of conformance

Note 1 to entry: OGC 08-131r3 defines certificate of conformance as “evidence of conformance to all or part of a standard, awarded for passing one or more of the conformance test classes specified in that standard”.

3.7
conformance testing
testing of a product to determine the extent to which the product is a conforming implementation

3.8
conformance test report
test report
document that presents verdicts of each conformance class and abstract test case in an organized format

3.9
conformance test result
test result
all information recorded during the execution of an executable test case against an implementation under test

3.10
executable test case
specific test of an implementation to meet the specific requirements as stated in the specification containing the requirements

Note 1 to entry: Instantiation of an abstract test case with executable expressions.

3.11
executable test module
set of related executable test cases to test a single certificate of conformance

3.12
executable test suite
set of executable test modules

3.13
identifier
linguistically independent sequence of characters capable of uniquely and permanently identifying that with which it is associated

[SOURCE: ISO 19135-1:2015, 4.1.5]

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3.14
implementation
realization of a specification

Note 1 to entry: In the context of the applicable geographic information standards documents, this includes relevant specifications of geographic information services and datasets.

3.15
implementation conformance statement
statement of conformance classes that have been implemented

3.16
implementation under test
implementation that is being evaluated for conformance

[SOURCE: ISO/IEC 18477-4:2017, 3.1.40]

3.17
inconclusive verdict
test verdict when neither a pass verdict nor a fail verdict applies

3.18
modular
consisting of separate parts that, when combined, form a complete whole

3.19
modular specification
specification which organizes its requirements and conformance classes in a modular structure

3.20
modular standard
standard which organizes its requirements and conformance classes in a modular structure

3.21
requirements class
aggregate of all requirements that have the same specification target to satisfy a conformance test class

Note 1 to entry: OGC 08-131r3 defines a similar concept under the name "requirement class" as follows: "aggregate of all requirement modules that must all be satisfied to satisfy a conformance test class."

3.22
specification
document containing requirements and abstract test cases for those requirements

3.23
specification target
entity to which some requirements of a specification apply

Note 1 to entry: OGC 08-131r3 defines a similar concept under the name "standardization target" as follows: "an entity that may receive a proof of conformance for a requirements class."

3.24
standard
document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context

Note 1 to entry: Standards should be based on the consolidated results of science, technology and experience, and aimed at the promotion of optimum community benefits.

[SOURCE: ISO/IEC Guide 2:2004, 3.2]

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3.25
test tool
application that executes an executable test suite

4 Symbols and abbreviated terms

ATC	abstract test case
ATS	abstract test suite
CWA	closed world assumption
ETC	executable test case
ETM	executable test module
ETS	executable test suite
ICS	implementation conformance statement
IUT	implementation under test
OWA	open world assumption
SA	stub assumption
TEAM	test, evaluation, and measurement
UML	unified modeling language
URI	uniform resource identifier

5 Conformance

This document defines four conformance classes:

— “Modular specification” (specification target: specifications);

— “Modular standard” (specification target: standards);

— “Executable test suites” (specification target: executable test suites);

— “Conformance test report” (specification target: test tools).

A specification, standard, test suite or test tool claiming conformance to this document shall implement the conformance class relevant to that specification target.

Conformance with this standard shall be assessed using all the relevant conformance test cases specified in Annex A of this standard. Table 1 provides the uniform resource identifiers (URIs) of conformance classes.

Table 1 — Conformance class URIs

Conformance class	URI
Modular specification	https://standards.isotc211.org/19105/-/2/conf/ModularSpecification
Modular standard	https://standards.isotc211.org/19105/-/2/conf/ModularStandard
Executable test suites	https://standards.isotc211.org/iso19105/-/2/conf/TestSuite
Conformance test report	https://standards.isotc211.org/iso19105/-/2/conf/report

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