INTERNATIONAL STANDARD

ISO 19112

Second edition
2019-02

Geographic information — Spatial referencing by geographic identifiers

Information géographique — Système de références spatiales par identificateurs géographiques

Reference number
ISO 19112:2019(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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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 on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*.

This second edition cancels and replaces the first edition (ISO 19112:2003), which has been technically revised.

The main changes compared to the first edition are as follows:

- revision of the conceptual schema to meet current standards and harmonise with other ISO/TC 211 standards;
- introduction of the class LocationClass to replace the class SI_LocationType;
- introduction of the class Location to replace the class SI_LocationInstance;
- introduction of the class SpatialReferenceSystemUsingGeographicIdentifiers to replace the class SI_SpatialReferenceSystemUsingGeographicIdentifiers;
- introduction of the class Gazetteer to replace the class SI_Gazetteer;
- introduction of the class GeographicIdentifier;
- recognition that a gazetteer is a sub-type of Register as defined in ISO 19135-1, and that Location Class is an ItemClass and Location a RegisterItem in that context;
- changes to package identifiers.

The changes are elaborated in Annex D.

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.

Introduction

Geographic information contains spatial references that relate information represented in data or text to positions in geographic space.

Spatial references fall into two categories:

a) those using coordinates;

b) those using geographic identifiers.

This document deals only with spatial referencing by geographic identifiers. This type of spatial reference is sometimes called “indirect”. Spatial referencing by coordinates is the subject of ISO 19111.

Spatial reference systems using geographic identifiers are based not explicitly on coordinates but on a relationship with a location defined by a geographic feature or features. The relationship of the position to the feature may be as follows:

— containment, where the position is within the geographic feature, for example in a country;

— local measurements, where the position is defined relative to a fixed point or points in the geographic feature or features, for example at a given distance along a street from a junction with another street. This aspect, known as linear referencing, is the subject of ISO 19148;

— loosely related, where the position has a fuzzy relationship with the geographic feature or features, for example adjacent to a building or between two buildings.

The purpose of this document is to specify ways to define and describe systems of spatial references using geographic identifiers. It only covers the definition and recording of the referencing feature, and does not consider the forms of the relationship of the position relative to that feature.

A spatial reference system using geographic identifiers is a collection of Location classes of different sub-types, while a gazetteer is a collection of Location instances (of one or more Location sub-types).

A common form of spatial referencing system using geographic identifiers is addressing. This is the subject of ISO 19160-1.

Geographic information — Spatial referencing by geographic identifiers

1 Scope

This document defines the conceptual schema for spatial references based on geographic identifiers. It establishes a general model for spatial referencing using geographic identifiers and defines the components of a spatial reference system. It also specifies a conceptual scheme for a gazetteer.

Spatial referencing by coordinates is addressed in ISO 19111. However, a mechanism for recording complementary coordinate references is included in this document.

This document enables producers of data to define spatial reference systems using geographic identifiers and assists users in understanding the spatial references used in datasets. It enables gazetteers to be constructed in a consistent manner and supports the development of other standards in the field of geographic information.

This document is applicable to digital geographic data, and its principles may be extended to other forms of geographic data such as maps, charts and textual documents.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 19107:2003, *Geographic information — Spatial schema*

ISO 19111:2007, *Geographic information — Spatial referencing by coordinates*

ISO 19115-1:2014, *Geographic information — Metadata — Part 1: Fundamentals*

ISO 19135-1:2015, *Geographic information — Procedures for item registration — Part 1: Fundamentals*

3 Terms, definitions and notation

3.1 Terms and definitions

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

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

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

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

3.1.1
gazetteer
register of location instances of one or more location sub-types, containing some information regarding position

Note 1 to entry: The positional information need not be coordinates, but could be descriptive.

3.1.2
geographic identifier
spatial reference in the form of a label or code that identifies a location

EXAMPLE "Spain" is an example of a label (country name); "SW1P 3AD" is an example of a code (postcode).

3.1.3
location
particular place or position

Note 1 to entry: A location identifies a geographic place.

EXAMPLE "Madrid", "California".

3.1.4
spatial reference
description of position in the real world

Note 1 to entry: This may take the form of a label, code or coordinate tuple.

[SOURCE: ISO 19111:2007, 4.43]

3.2 Conceptual schema notation

Several model elements used in this document are defined in packages specified in other International Standards; these are listed in Table 1.

Table 1 — Packages defined in other International Standards

Prefix	Package	International standard
EX	Extent	ISO 19115-1
CI	Citation	ISO 19115-1
CRS	Coordinate Reference System	ISO 19111
GM	Geometry	ISO 19107
MD	Metadata	ISO 19115-1
RE	Register	ISO 19135-1

4 Conformance

4.1 General

Two classes of conformance are defined for this document:

— Spatial reference system using geographic identifiers — the minimum requirements for establishing a spatial reference system using geographic identifiers;

— Gazetteer — the minimum requirements for establishing a gazetteer.

4.2 Spatial reference system using geographic identifiers conformance class

Table 2 defines the characteristics of the spatial reference system using geographic identifiers conformance class.

Table 2 — Spatial reference system using geographic identifiers conformance class

Conformance class identifier	<http://standards.isotc211.org/19112/-1/2/conf/srs>
Standardization target	Spatial reference system using geographic identifiers
Dependency	None
Requirements	All requirements in Clause 6
Requirements class identifier	<http://standards.isotc211.org/19112/-1/2/req/srs>
Tests	All tests in A.1

4.3 Gazetteer conformance class

Table 3 defines the characteristics of the gazetteer conformance class.

Table 3 — Gazetteer conformance class

Conformance class identifier	<http://standards.isotc211.org/19112/-1/2/conf/gaz>
Standardization target	Gazetteer
Dependency	None
Requirements	All requirements in Clause 7
Requirements class identifier	<http://standards.isotc211.org/19112/-1/2/req/gaz>
Tests	All tests in A.2

5 Conceptual schema overview

Clauses 6 and 7 specify a conceptual schema (expressed in UML) for

— a spatial referencing system using geographic identifiers, and

— a gazetteer.

An overview of the schema is provided in Figure 1. The classes originating in this document (depicted by unshaded boxes in Figures 1, 2 and 3) are elaborated in Figures 2 and 3 and are fully specified in 6.3, 6.4, 7.3, 7.4 and 7.5.

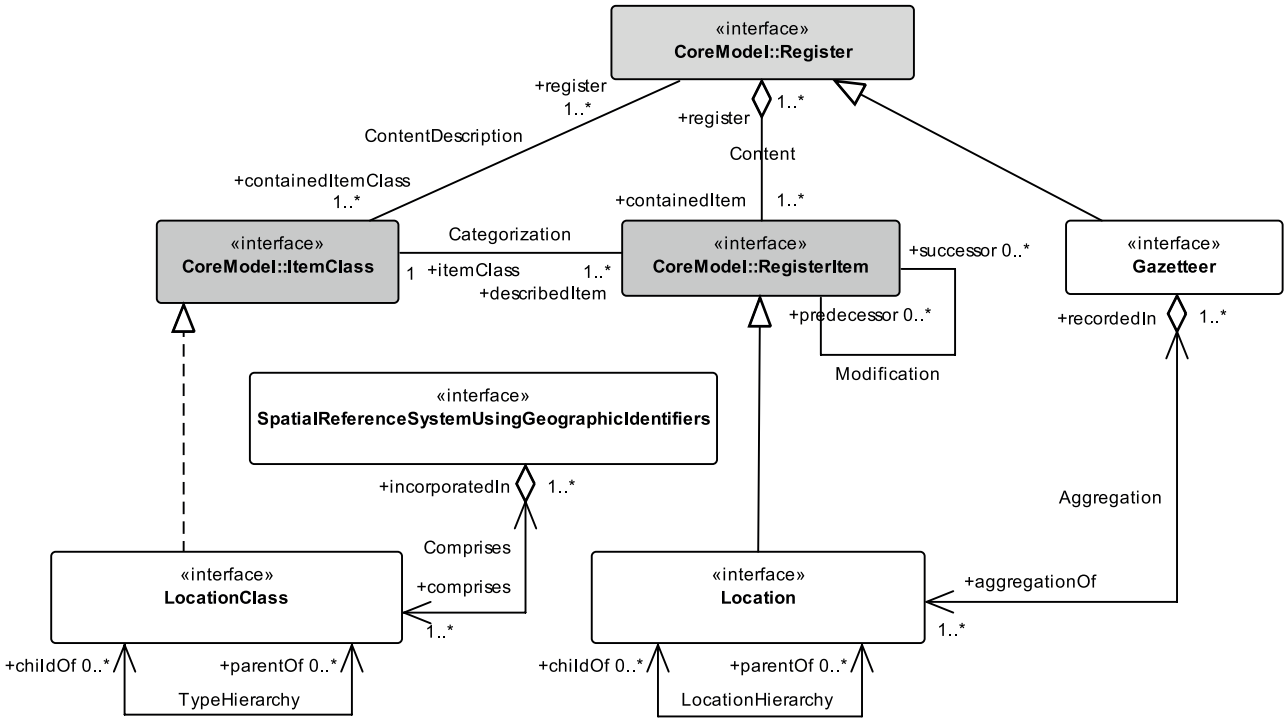

Figure 1 — Conceptual schema overview

6 Requirements for spatial reference systems using geographic identifiers

6.1 Spatial reference system using geographic identifiers

A spatial reference system using geographic identifiers comprises a related set of one or more location classes, together with their corresponding geographic identifiers. These location classes may be related to each other through aggregation or disaggregation, possibly forming a hierarchy.

Examples of spatial reference systems using geographic identifiers are shown in Table 4.

Table 4 — Examples of spatial reference systems

Spatial reference system using geographic identifiers	Location class	Geographic identifiers
countries as defined in ISO 3166-1	country	country name country code
set of population centres in a region	town	town name
addresses in a town	property	property address
hydrological hierarchy	river basin river river reach	river basin name river name river reach reference
link – node	link	link code

6.2 Conceptual schema for spatial referencing using geographic identifiers

The conceptual schema presented in this document includes two classes for describing a spatial referencing system that uses geographic identifiers, these being

— SpatialReferenceSystemUsingGeographicIdentifiers, and

— LocationClass.

The classes are illustrated in Figure 2 and are fully specified in 6.3 and 6.4.

Requirement 1 A spatial referencing system using geographic identifiers shall conform to the schema (presented in UML) that is illustrated in Figure 2 and specified in 6.3 and 6.4.

[Requirement identifier <http://standards.isotc211.org/19112/-1/2/req/srs/srs>]

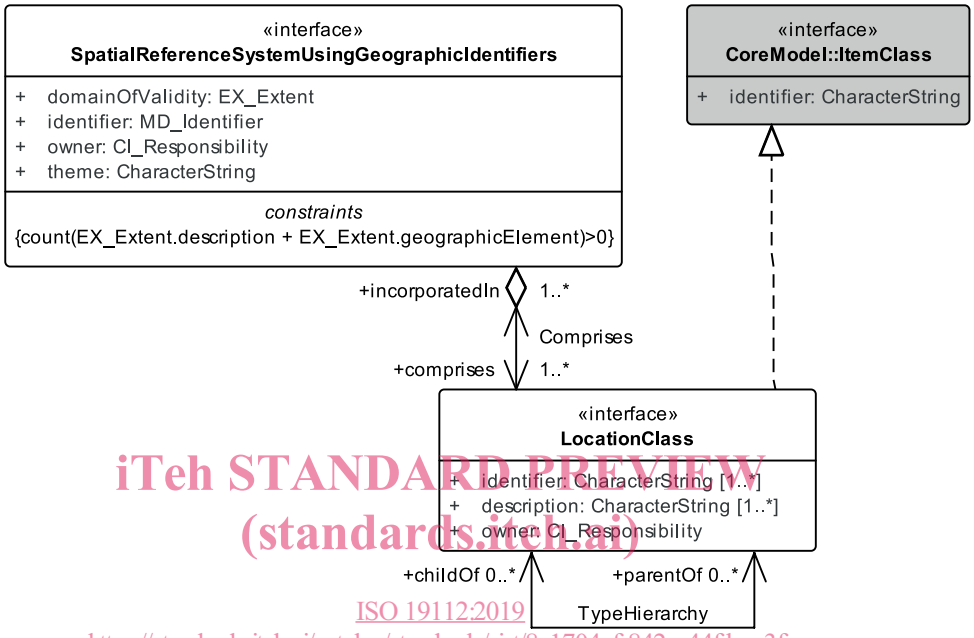

Figure 2 — Conceptual schema — Spatial referencing using geographic identifiers

6.3 Object Type: SpatialReferenceSystemUsingGeographicIdentifiers

The characteristics of object type SpatialReferenceSystemUsingGeographicIdentifiers are specified in Table 5.

Table 5 — Object Type SpatialReferenceSystemUsingGeographicIdentifiers

SpatialReferenceSystemUsingGeographicIdentifiers	
Definition:	
system for identifying position in the real world by reference to a location defined by a geographic feature or features	
Type:	
Object Type	
Attribute:	
Name:	domainOfValidity
Definition:	geographic area in which the spatial reference system using geographic identifiers is applicable
Multiplicity:	1
Value type:	EX_Extent (ISO 19115-1:2014, 6.6.1)
Constraint:	domainOfValidity shall contain at least one of description and geographicElement