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Geographic information — Geodetic register

Information géographique — Registre géodésiques

iTeh STANDARD PREVIEW
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Contents

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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*.

This first edition cancels and replaces ISO/TS 19127:2005, which has been technically revised.

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

— the title has changed from Geodetic codes and parameters to Geodetic register;

— the normative references are updated to reflect revisions, ISO 19115-1:2014 and ISO 19162:2015 are added and ISO 19112 removed;

— the Management of a register of geodetic codes and parameters clause is removed;

— the Management of a register of geodetic codes and parameters clause is replaced by Geodetic register management roles and responsibilities and Geodetic register management rules and procedures clauses with the latter referencing ISO 19135-1:2015 in specifying modified, unmodified and additional requirements;

— a Terms of reference of the control body for the ISO 19127 geodetic register clause is added;

— the Content of a register of geodetic codes and parameters clause is replaced by a Geodetic register content requirements clause which references ISO 19111:2007 and ISO 19135-1:2015 in specifying modified, unmodified and additional content;

— an ISO 19127 geodetic registry data export clause is added;

— Annex A (normative) is extended and updated to reflect revisions;

— Annex B (normative) is extended and updated to reflect the required elements within the geodetic register;

— Annex C (informative) is updated to reflect revisions and extended to include extents;

— Annex D (informative) Metadata and Annex E (informative) Requirements list are added.

In accordance with the ISO/IEC Directives, Part 2, 2018, *Rules for the structure and drafting of International Standards*, in International Standards the decimal sign is a comma on the line. However, the General Conference on Weights and Measures (*Conférence Générale des Poids et Mesures*) at its meeting in 2003 passed unanimously the following resolution:

"The decimal marker shall be either a point on the line or a comma on the line."

In practice, the choice between these alternatives depends on customary use in the language concerned. In the technical areas of geodesy and geographic information it is customary for the decimal point always to be used, for all languages. That practice is used throughout this document.

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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ISO 19127:2019
https://standards.iteh.ai/catalog/standards/sist/16480416-98d0-44e0-
9889-9badd8debc1a/iso-19127-2019

Introduction

This document specifically governs procedures for the ISO 19127 geodetic register, but may have applicability to similar national and international registers of geodetic information.

The ISO 19127 geodetic register and the ISO 19127 geodetic registry are referred to as the ISO geodetic register and ISO geodetic registry, respectively, throughout this document.

ISO 19135-1:2015 specifies procedures for the registration of items of geographic information. ISO/IEC JTC 1 defines registration as the assignment of an unambiguous name to an object in a way that makes the object available to interested parties. ISO 19135-1:2015 has changed the definition of registration to the assignment of linguistically independent identifiers, rather than names, to items of geographic information. ISO 19135-1:2015, Annex C is applicable to ISO/TC 211 registers. The ISO geodetic register is one such register.

ISO 19111:2007 describes elements necessary to define single and compound coordinate reference systems so that coordinates for positions on or near the Earth's surface can be unambiguously referenced. ISO 19111:2007 also describes elements to define coordinate operations that change coordinate values from one coordinate reference system to coordinate values based on another coordinate reference system.

This document describes how the procedures specified in the core schema within ISO 19135-1:2015 are to be applied to the ISO geodetic register of elements applicable to spatial referencing by coordinates in accordance with ISO 19111:2007. Some elements that are optional in ISO 19111:2007 become mandatory in this document to provide guidance on applicability and appropriate use.

Annex A, which is normative, provides four tests for conformance to this document.

Annex B, which is normative, provides tables that specify information for elements to be included in the ISO geodetic register.

Annex C, which is informative, provides best practices for the ISO geodetic register content.

Annex D, which is informative, provides the metadata for the ISO geodetic register.

Annex E, which is informative, provides a summary of the conformance requirements that are found in the text body of this document.

Geographic information — Geodetic register

1 Scope

This document defines the management and operations of the ISO geodetic register and identifies the data elements, in accordance with ISO 19111:2007 and the core schema within ISO 19135-1:2015, required within the geodetic register.

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 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*

ISO 19162:2015, *Geographic information — Well-known text representation of coordinate reference systems*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19111:2007, ISO 19135-1:2015 and the following 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 https://www.iso.org/obp

3.1
retirement
<register> declaration that a register item is no longer suitable for use in the production of new data

Note 1 to entry: The status of the retired item changes from "valid" to "retired". A retired item is kept in the register to support the interpretation of data produced before its retirement and has not been superseded by another item.

Note 2 to entry: In the geodetic register retired items are not necessarily invalid.

[SOURCE: ISO 19135-1:2015, 4.1.14, modified — Note 2 to entry has been added.]

3.2
supersession
<register> declaration that a register item has been retired and replaced by one or more new items

Note 1 to entry: The status of the replaced item changes from "valid" to "superseded".

Note 2 to entry: In the geodetic register superseded items are not necessarily invalid.

[SOURCE: ISO 19135-1:2015, 4.1.17, modified — Note 2 to entry has been added.]

4 Conformance

To conform to this document, the ISO geodetic register shall satisfy all of the conditions specified in Annex A.

5 Geodetic register management roles and responsibilities

The roles and responsibilities of the register owner, register manager, submitting organizations, control body, registry manager and register user are set out in ISO 19135-1:2015, Clause 5. This clause sets out specific requirements as follows:

NOTE   Reference to the ISO 19135-1:2015 requirement is denoted by ^{n} (i.e. [^{n}2] = Requirement 2).

— **Requirement 1 [^{n}1]:** The register owner shall set terms and conditions regarding different levels of access to the register and make the contents available to the public. In addition, the register owner shall specify the time period in which the approval process shall be completed.

— **Requirement 2 [^{n}2]:** The register owner shall appoint a register manager. The register owner may serve as the register manager for any register that it has established or it may appoint another organization to serve as the register manager.

— **Requirement 3 [^{n}3]:** The register owner shall decide whether a control body is required for the register and if so appoint the control body. The register owner may serve as the control body for any register that it has established or it may delegate that role to a subgroup within the organization or to the register manager.

— **Requirement 4 [^{n}4]:** The register owner shall specify the criteria that determine which organizations may act as submitting organizations.

— **Requirement 5 [^{n}5]:** The register owner shall clarify the process for a submitting organization to appeal decisions of the control body (if such a body is appointed). The register owner may establish a procedure for such a process. The specification of this procedure shall include appropriate time limits for the completion of the process. An alternative solution may be for a submitting organization to resubmit a new proposal with changes or a better justification.

— **Requirement 6 [^{n}6]:** The register manager shall manage a register in conformance with ISO 19135-1:2015, Clause 6.

— **Requirement 7 [^{n}7]:** Upon request, the register manager shall distribute an information package containing a description of the register and how to submit proposals for changes to the content of the register. The information package shall describe what proposed changes to the content may be considered to be substantive.

— **Requirement 8 [^{n}8]:** The register manager shall accept proposals from submitting organizations and manage the proposals as specified in ISO 19135-1:2015, 6.4. The register manager shall pass proposals to the control body for decisions as to acceptability and shall serve as the point of contact between the control body and the submitting organization for negotiations regarding changes to the proposal.

— **Requirement 9 [^{n}9]:** The register manager shall determine whether a submitting organization is qualified in accordance with the criteria established by the register owner.

— **Requirement 10 [^{n}10]:** If a control body is appointed, it shall accept proposals from the register manager and render a decision regarding each proposal within the time limits specified by the register owner.

— **Requirement 11 [^{n}11]:** The registry manager shall ensure the integrity of any register held in the registry and shall provide means for electronic access to the registry for register managers, control body members, and register users.

— **Requirement 12 [[^{n}12]]:** The register manager shall consider the requirements of different categories of users in selecting methods for publishing the content of a register.

— **Requirement 13:** The ISO geodetic register shall have a publicly available record of changes where historical content shall remain publicly available.

Submitting organizations for the ISO geodetic register consist of organizations and/or persons responsible for defining and maintaining geodetic parameters.

6 Geodetic register management rules and procedures

6.1 Introduction

The ISO geodetic register will be publicly available through a registry with a web-based human interface for browsing/displaying register content, provide a web service interface that ensures interoperability based on open standards, have a stable Internet domain name, be available at least 95 % of the time over one year period and have an authoritative review process.

The ISO geodetic register is a non-hierarchical register. References to principal registers and sub registers are excluded from this document.

Rules for managing a register of geographical information items, including the submission of information, are found in ISO 19135-1:2015, Clause 6.

NOTE   Reference to the ISO 19135-1:2015 requirement is denoted by [^{n}] (i.e. [[^{n}2]] = Requirement 2).

6.2 Unmodified ISO 19135-1:2015 requirements

The unmodified ISO 19135-1:2015 requirements are as follows.

— **Requirement 14 [[^{n}13]]:** Every register shall have a technical document describing the item classes to be registered.

   NOTE   For the ISO geodetic register that technical document is this document.

— **Requirement 15 [[^{n}14]]:** Items shall be individually managed, moving through a set of well-defined states. Information about the temporal history of each item shall be maintained.

— **Requirement 16 [[^{n}16]]:** A clarification shall not cause any substantive semantic or technical change to a registered item.

— **Requirement 17 [[^{n}17]]:** Clarification shall be accomplished by updating the existing item in the register. The clarification shall be recorded with a justification of the change and the date on which the register transaction was made.

— **Requirement 18 [[^{n}19]]:** Retirement shall be accomplished by leaving the item in the register, having its status changed to retired, and including the date on which the register transaction was made.

— **Requirement 19 [[^{n}21]]:** The register manager shall review proposals received from third parties for completeness and return proposals to the submitting organization if the proposal is incomplete or if the submitting organization is not qualified, else initiate the approval process.

— **Requirement 20 [[^{n}22]]:** The approval process shall be completed within the time period specified by the register owner.

— **Requirement 21 [[^{n}23]]:** A registry manager shall ensure that information about valid, invalidated, superseded, or retired items in the register is readily available to users.

6.3   Modified ISO 19135-1:2015 requirements

The ISO 19135-1:2015 requirements modified for this document are as follows.

— **Requirement 22 [[n]15]:** If an item is superseded by another item, the date the succession occurred shall be captured, along with references to and from the item that superseded it. At any given time, only one item in the series should be "valid".

   NOTE 1   The requirement that only one item in the series is "valid" is removed.

— **Requirement 23 [[n]20]:** If a register item is deemed to be no longer suitable for the use in the production of new data and has been superseded by a new register item, the original item shall remain in the register, have its status changed to superseded and have a reference to the item(s) that superseded it, including the date on which the register transaction was made.

   NOTE 2   The option of removing a superseded item from the register is removed.

— **Requirement 24 [[n]18]:** If an item in a register is found to have substantive error, it shall be left in the register, have its status changed to invalid, have a reference to the item(s) that replaced it and have the date when the register transaction was made.

   NOTE 3   The option of removing an invalidated item from the register is removed.

6.4   Additional requirements

The additional requirements are as follows.

— **Requirement 25:** The minimum level of information that the register manager shall accept from a submitting organization is complete data for a coordinate reference system that conforms to the requirements as specified in Clause 8. The register manager shall also accept data for compound coordinate reference systems, single coordinate operations and concatenated coordinate operations that conform to the requirements of ISO 19111:2007 and Clause 8.

— **Requirement 26:** The register manager shall assign individual registration identifiers for records for entities so that multiple records can point to them. Records for geodetic register entities are interdependent. When a record for an entity is modified, dependent records shall be assessed and, if required, modified.

— **Requirement 27:** The ISO geodetic register shall use open standardization (refer to C.1.) for the units of measure of ellipsoids, coordinate conversion and coordinate transformation parameters.

— **Requirement 28:** The ISO geodetic register shall conform to the ISO 6709:2008 conventions that geographic latitude is positive north of the equator and geographic longitude is positive east of Greenwich (refer to C.3.1).

— **Requirement 29:** Geographic coordinates and angles, which are natively in sexagesimal degree representation, shall be held in the ISO geodetic register as a single real number unit, termed a "sexagesimal DMS", which is a concatenation of degree, minute and second values stored as a single decimal number. A leading zero shall be used for the minute and second values less than 10 (refer to C.2).

— **Requirement 30:** The ISO geodetic register shall conform to the International Association of Geodesy's convention for a geocentric Cartesian coordinate system, with origin at the centre of the Earth, that the Z axis is along the Earth's rotation axis through the north pole, X is in the plane of the equator and through the intersection of the prime meridian with the equator, and Y is in the plane of the equator forming a right-handed coordinate system (refer to C.3.1).

— **Requirement 31:** The ISO geodetic register shall apply a closed standard (refer to C.1.) for the presentation of coordinate system coordinates as follows (refer to C.3.2):

   — geocentric Cartesian coordinates: X, Y, Z;

— geographical two-dimensional coordinates: latitude, longitude or longitude, latitude;

— geographical three-dimensional coordinates: latitude, longitude, ellipsoidal height or longitude, latitude, ellipsoidal height.

— **Requirement 32:** The ISO geodetic register shall apply an open standard (refer to C.1.) for the positive direction of axes, and the order in which the axes are presented, in a projected coordinate reference system as part of the system definition (i.e. the positive direction of axes may be in any order of north/south and east/west) (refer to C.3.1).

— **Requirement 33:** The ISO geodetic register shall implement an open standard (refer to C.1.) for coordinate system linear units. Allowing native units for coordinate system linear units will avoid the danger of corruption of values caused by the misunderstanding of conversion factors.

— **Requirement 34:** The ISO geodetic register shall apply an open standard to the two rotation conventions, which are to apply the rotations to the point's vector or to apply the rotations to the coordinate frame, with the proviso that the applied algorithm is valid for that convention (refer to C.4.1).

— **Requirement 35:** The ISO geodetic register shall name and describe coordinate operation formulae clearly and unambiguously.

— **Requirement 36:** The ISO geodetic register shall include coordinate operation formulae for each coordinate operation method, define the coordinate operation parameters that are used as variables in those formulae and have coordinate operation parameter values that are relevant to those formulae.

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— **Requirement 37:** The ISO geodetic register shall describe whether a coordinate operation method may be used for the reverse operation and, when reversible, indicate whether the coordinate operation parameters are used in the reverse operation with the same or reversed sign (refer to C.4.2).

— **Requirement 38:** The ISO geodetic register shall record coordinate transformation parameter values between a local coordinate reference system and a global coordinate reference system from the local system (source) to the global system (target), subject to this direction not being indeterminate (refer to C.7.11).

— **Requirement 39:** The ISO geodetic register shall identify the unit for each parameter and include the conversion ratio required to change that unit to the ISO standard unit. Scalars shall include the conversion ratio required to change the scalar to unity (refer to C.4.4).

— **Requirement 40:** The ISO geodetic register shall record zoned map projections individually (refer to C.4.5).

— **Requirement 41:** The ISO geodetic register shall apply a closed standard by recording the semi-major axis radius (a) and the inverse of the flattening (1/f) as defining parameters for the ellipsoid. Where the inverse of the flattening (1/f) is derived from other parameters, it should be captured to a precision of not less than 10 significant digits (refer to C.5).

— **Requirement 42:** The ISO geodetic register shall apply a naming format for coordinate systems as follows (refer to C.7.3):

<CS type>. Axes:*<axes description(s)>*. Orientations:*<orientation description(s)>*. Uom: *<unit of measure description(s)>*

— **Requirement 43:** The ISO geodetic register shall apply a naming format for geodetic and vertical coordinate reference systems as follows (refer to C.7.5, C.7.6 and C.7.9):

<Geodetic *CRS [abbreviated] name*> - *<coordinate system axes reference>*

<Vertical *CRS [abbreviated] name*> - *<coordinate system axis reference >*

— **Requirement 44:** The ISO geodetic register shall apply a naming format for projected coordinate reference systems as follows (refer to C.7.8):

<Base geodetic *CRS [abbreviated] name> / <projection coordinate operation [abbreviated] name> (<unit of measure if not the metre>)*

— **Requirement 45:** The ISO geodetic register shall apply a naming format for compound coordinate reference systems as follows (refer to C.7.10):

<Horizontal CRS [abbreviated] name> (<unit of measure if not the metre>) + <Vertical CRS [abbreviated] name> (<unit of measure if not the metre>)

— **Requirement 46:** The ISO geodetic register shall apply a naming format for coordinate transformations as follows (refer to C.7.11):

<Source CRS [abbreviated] name> to <Target CRS [abbreviated] name> [<transformation version name>]

— **Requirement 47:** The ISO geodetic register shall have a unique name for each unit of measure, coordinate operation, ellipsoid, prime meridian, datum, coordinate system and coordinate reference system.

7 Terms of reference of the control body for the ISO geodetic register

The control body for the ISO geodetic register shall consist of experts nominated by ISO/TC 211. Each P-member and external liaison is permitted to nominate only one primary person and an alternate. The control body itself may also invite geodetic experts to join the control body for a specified period of time. The Chair and Co-Chair of the control body shall be nominated by the International Association of Geodesy. The membership of the control body shall be reviewed every two years or as needed (e.g. for resignations). In rendering decisions to address specific technical issues, the control body may consult with external technical advisors as required.

The control body is responsible for approving the content of the ISO geodetic register and advising the register manager of its decisions.

Control body decisions shall be made by consensus. In the event that a consensus is not possible a decision may be made if there is a two thirds (2/3) voting majority of members. A minimum of three (3) votes is required.

Summary reports of control body activities shall be submitted to TC 211 annually or as otherwise appropriate.

8 Geodetic register content requirements

8.1 Geodetic register content from ISO 19135-1:2015

The ISO geodetic register shall conform to the core register schema in ISO 19135-1:2015, Clause 7. This clause sets out specific requirements as follows.

NOTE   Reference to the ISO 19135-1:2015 requirement is denoted by [n] (i.e. [n2] = Requirement 2).

— **Requirement 48 [n24]:** The core register shall conform to the register schema as specified in UML in ISO 19135-1:2015, Clause 7.

— **Requirement 49 [n25]:** The attribute identifier that designates an item class held in a register that conforms to ISO 19135-1:2015, Clause 7, shall uniquely denote the item class within the context of the register.

— **Requirement 50 [n26]:** The attribute *"itemIdentifier"* is represented as a *CharacterString* that is used to uniquely denote that item within an item class and is intended for information processing.

Once a value has been assigned, it shall not be reused. The class/identifier union shall be unique within the register.

8.2 Geodetic register content from ISO 19111:2007

— **Requirement 51:** The ISO geodetic register shall contain coordinate reference system data and coordinate operation data that conform to ISO 19111:2007 and are international in geographic extent of application, widely used and well defined. See Tables B.1 through B.16 for requirements for entries into the geodetic register.

8.3 Geodetic register additional and modified content requirements

Additional and modified geodetic register content requirements are as follows.

— **Requirement 52:** Information on the scope of a coordinate reference system and a coordinate operation and their elements is mandatory for acceptance in the register. Some coordinate reference systems have a legal status in their valid area; this status shall be included in the scope.

— **Requirement 53:** The geographic extent description and bounding box is mandatory for acceptance in the register.

— **Requirement 54:** The geographic extent shall comprise of a north up bounding box with the southern and western extents preceding the northern and eastern extents. The southern and northern extents shall be described as decimal degrees about the equator (±90) that are positive in the northern hemisphere. The western and eastern extents shall be described as decimal degrees about the zero meridian (±180) that are positive in the eastern hemisphere (refer to C.6.2).

— **Requirement 55:** The geographic area(s) where use of the coordinate reference system is accepted shall be logically consistent with the geographic area(s) where use of the datum is accepted and, if applicable, the geographic area where use of the map projection is accepted.

— **Requirement 56:** Description of valid area(s) for a coordinate operation shall be logically consistent with the valid area(s) for the source coordinate reference system and the target coordinate reference system.

— **Requirement 57:** Information on datum type is mandatory for registration validation purposes.

— **Requirement 58:** The attributes of the submitting organization shall be accessible to register users.

9 ISO geodetic registry data export

— **Requirement 59:** The ISO geodetic registry shall export data using well-known text in accordance with ISO 19162:2015.