
Standard representation of geographic point location by coordinates

*Représentation normalisée de la localisation des points
géographiques par coordonnées*



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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).

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*, 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 third edition cancels and replaces the second edition (ISO 6709:2008), which has been technically revised. It also incorporates the Technical Corrigendum ISO 6709:2008/Cor. 1:2009.

The main changes are as follows:

- Harmonization with other recently revised ISO/TC 211 International Standards;
- Clarification of normative requirements to maintain rigid backwards compatibility when required;
- Correction of the issues contained in the Technical Corrigendum ISO 6709:2008/Cor. 1:2009;
- Correction of annexes that contained normative requirements but were labelled as informative;
- Deletion of annexes and concepts which have changed and were no longer suitable for the revised edition;
- Correction of instances where European numeric formatting conventions were incorrectly inserted. These conventions will no longer be recommended;
- Clarification of editorial issues.

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.

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.

Introduction

Geographic point location (GPL) is the description of a well-defined geographic place using a single coordinate tuple. Efficient interchange of GPL data requires formats which are universally interpretable and which allow the identification of points on, above and below the Earth's surface. Users in various disciplines have different requirements. This is exemplified by the use of degrees and decimal degrees, as well as the traditional degrees, minutes and seconds, for recording latitude and longitude. User applications can also require various levels of precision and can use latitude and longitude without height.

ISO 6709:1983 defined a specific format representation of latitude and longitude, and optionally altitude.

ISO 6709:2008 revised the format representation of the 1983 edition by:

- adding the ability to identify the coordinate reference system (CRS) to which coordinates are referenced, without which location is ambiguous, and
- expanding the use of altitude to allow for any ellipsoidal or gravity-related height or depth.

Since the first edition of this document in 1983, the field of geodesy has undergone significant technological advances, along with the continued development of other related geodesy and geomatics standards.

The aim of this edition is to address these new advances and standards and to revise the coordinate string suitable for digital representation ([Clause 6](#)) while continuing to support the requirements of the previous edition ([Annex B](#)).

[Clause 7](#) defines a simpler structure for the unambiguous representation of GPL in a human-readable format.

In addition, a series of annexes are provided with the following content:

- [Annex A](#) (normative) defines the abstract test suite used for conformance testing;
- [Annex B](#) (normative) defines the representation of latitude and longitude coordinates that maintain backwards compatibility with ISO 6709:2008;
- [Annex C](#) (informative) presents a description and examples of how the position of coordinates can appear ambiguous without the use of a CRS;
- [Annex D](#) (informative) presents a table of mathematical precision values of resolution for latitude and longitude;
- [Annex E](#) (informative) describes the changes in this document compared to the previous edition of ISO 6709;
- [Annex F](#) (normative) specifies encodings for character strings and delimiters required in this document.

The following options are highlighted to users of this document:

- a) For all cases where backwards compatibility is not required, this document recommends using the methods and rules specified in [Clause 6](#), GPL representation, or [Clause 7](#), human-readable GPL representation;
- b) However, in systems and environments where backwards compatibility with ISO 6709:2008 is required, the methods and rules specified in [Annex B](#) can be used.

In addition, when using [Annex B](#), it is recommended that suitable and comprehensive ancillary documentation, not defined within this document or in previous editions of this document, be

prepared and accompany all instances of geographic point location text strings and human-readable representations claiming backwards compatibility.

The use of this document:

- establishes an expanded point representation string format supporting the current concepts and standards of geodesy and geographic information;
- when required, continues to support the needs of established user communities by maintaining backwards compatibility with the previous edition of this document (ISO 6709:2008);
- reduces the cost of interchange of data;
- reduces the delay in converting non-standard coding structures in preparation for interchange by providing advance knowledge of the standard interchange format; and
- provides flexible support for geographic point representation.

Standard representation of geographic point location by coordinates

1 Scope

This document specifies the representation of latitude and longitude and optionally height or depth compatible with previous editions of ISO 6709.

This document also supports the representations of other coordinate types and time that can be associated with those coordinates as defined through one or more coordinate reference systems (CRS).

This document describes a text string of coordinates, suitable for electronic data exchange, for one point, including reference system identification to ensure that the coordinates unambiguously represent the position of that point. Files containing multiple points with a single common reference system identification are out of scope. This document also describes a simpler text string structure for coordinate representation of a point location that is more suitable for human readability.

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 8601-1, *Date and time — Representations for information interchange — Part 1: Basic rules*

ISO 8601-2, *Date and time — Representations for information interchange — Part 2: Extensions*

ISO/IEC 10646:2020, *Information technology — Universal coded character set (UCS)*

ISO 19111, *Geographic information — Referencing by coordinates*

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

3 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:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

accuracy

closeness of agreement between a test result or measurement result and the true value

[SOURCE: ISO 3534-2:2006, 3.1.1, modified — Notes to entry have been removed.]

3.2

altitude

height where the chosen reference surface is mean sea level