International Standard 6709

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Standard representation of latitude, longitude and altitude for geographic point locations

Représentation normalisée des latitude, longitude et altitude pour la localisation des points géographiques

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6709 was developed by Technical Committee ISO/TC 97, *Information processing systems*, and was circulated to the member bodies in November 1981.

It has been approved by the member bodies of the following countries :

Belgium	France	Romania
Canada	Germany, F. R.	South Africa, Rep. of
China	Italy	Spain
Czechoslovakia	Japan	Sweden
Egypt, Arab Rep. of	Netherlands	United Kingdom
Finland	Poland	USA

No member body expressed disapproval of the document.

Standard representation of latitude, longitude and altitude for geographic point locations

0 Introduction

Efficient interchange of geographic point location data requires formats which are universally interpretable and which allow unique identification of points on, above or below the earth's surface. Users in various disciplines may have different requirements. This is exemplified by the use of degrees and decimal degrees in addition to the traditional degrees, minutes and seconds for recording latitude and longitude. Users may also require different degrees of precision and may use latitude and longitude without altitude.

This International Standard provides a variable-length format which has the flexibility to cover these various requirements.

Use of this International Standard will :

a) reduce the cost of interchange of data;

b) reduce the delay in converting non-standard coding structures in preparation for interchange by providing advance knowledge of the standard interchange format.

1 Scope and field of application

This International Standard specifies a variable-length format for the representation of latitude, longitude and altitude for use in data interchange. The representation of altitude is optional and its presence or absence is implicit in the format.

This International Standard allows the use of normal sexagesimal notations involving degrees, minutes and seconds as well as various combinations of sexagesimal and decimal notations — degrees and decimal degrees; degrees, minutes and decimal minutes; degrees, minutes, seconds and decimal seconds. It makes use of the numeric characters 0 to 9, the graphic characters plus (+), minus (–), full stop (.) and comma (,).

This International Standard does not specify the use of fixed-length field formats which, although they may be consistent with the format in this International Standard, require prior agreement between parties in the data interchange.

This International Standard does not require special internal procedures, file organization techniques, storage medium, languages, etc., to be used in its implementation.

2 Requirements for the representation of latitude, longitude and altitude

2.1 Latitude

2.1.1 Latitudes north of the equator shall be designated by use of the plus sign (+), latitudes south of the equator shall be designated by use of the minus sign (–). The equator shall be designated by use of the plus sign (+).

2.1.2 The first two digits of the latitude string shall represent degrees. Subsequent digits shall represent minutes, seconds or decimal fractions according to the following convention in which the decimal mark (full stop or comma) indicates the transition from the sexagesimal system to the decimal system :

Degrees and decimal degrees :

DD.DD

Degrees, minutes and decimal minutes :

DDMM.MMM

Degrees, minutes, seconds and decimal seconds :

DDMMSS.SS

2.1.3 Leading zeros shall be inserted for degree values less than 10, and zeros shall be embedded in proper positions when minutes or seconds are less than 10.

2.2 Longitude

2.2.1 Longitudes east of Greenwich shall be designated by use of the plus sign (+), longitudes west of Greenwich shall be designated by use of the minus sign (−). The Prime Meridian shall be designated by use of the plus sign (+). The 180th meridian shall be designated by use of the minus sign (−).

2.2.2 The first three digits of the longitude string shall represent degrees. Subsequent digits shall represent minutes, seconds or decimal fractions according to the following convention in which the decimal mark (full stop or comma) indicates the transition from the sexagesimal system to the decimal system :

Degrees and decimal degrees :

DDD.DD

Degrees, minutes and decimal minutes :

DDDMM.MM

Degrees, minutes, seconds and decimal seconds :

DDDMMSS.SS

2.2.3 Leading zeros shall be inserted for degree values less than 100, and zeros shall be embedded in proper positions when minutes or seconds are less than 10.

2.3 Altitude

2.3.1 The representation of altitude is optional. If it is represented it shall comply with 2.3.2 and 2.3.3.

2.3.2 Altitudes above the geodetic reference datum shall be designated by use of the plus sign (+), altitudes below the geodetic reference datum shall be designated by use of the minus sign (−). Altitudes at the geodetic datum level shall be designated by use of the plus sign (+).

2.3.3 The altitude shall be represented in metres, using decimal fractions if required.

NOTE — Alternatively, feet may be used, but only where specified in documentation associated with the interchange.

2.4 Format

2.4.1 Elements shall be combined in a point location string in the sequence :

a) latitude;

b) longitude;

c) altitude, if represented.

2.4.2 The designator "+" or "−" pertaining to any number shall be placed in the character position preceding that number.

2.4.3 The number of digits for latitude, longitude and altitude shall indicate the precision of available data.

2.4.4 Latitude and longitude for a specific point should be expressed in the same format style and to the same precision.

2.4.5 There shall be no separator between the elements for latitude, longitude and altitude.

NOTE — The use of designators "+" and "−" preceding the numeric part of each element permits the recognition of the start of each element and the termination of the previous one.

2.4.6 The point location string shall be terminated. The terminator character shall be a solidus (/), unless otherwise specified in the documentation associated with interchange.

3 Examples

Examples of point location strings complying with this International Standard are given below;

a) to f) contain only latitude and longitude, g) to n) also contain altitude.

a)	degrees	+40−075/
b)	degrees and decimal degrees	+40.20361−075.00417/
c)	degrees and minutes	+4012−07500/
d)	degrees, minutes and decimal minutes	+4012.22−07500.25/
e)	degrees, minutes and seconds	+401213−0750015/
f)	degrees, minutes, seconds and decimal seconds	+401213.1−0750015.1/
g)	degrees	+40−075+350/
h)	degrees and decimal degrees	+40.20361−075.00417+350.517/
j)	degrees and minutes	+4012−07500−169.2/
k)	degrees, minutes and decimal minutes	+4012.22−07500.25−169.2/
m)	degrees, minutes and seconds	+401213−0750015+2.79/
n)	degrees, minutes, seconds and decimal seconds	+401213.1−0750015.1+2.79/

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