INTERNATIONAL STANDARD

ISO 7078

Second edition
2020-04

Buildings and civil engineering works — Procedures for setting out, measurement and surveying — Vocabulary

Construction immobilière — Procédés pour l'implantation, le mesurage et la topométrie — Vocabulaire

Reference number
ISO 7078:2020(E)

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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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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 59, *Buildings and civil engineering works*, Subcommittee SC 2, *Terminology and harmonization of languages*.

This second edition cancels and replaces the first edition (ISO 7078:1985), which has been technically revised.

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

— removal of diagrams describing traditional practices and statistical methods;

— renumbering of all entries;

— terms previously discussed in groups now separated and presented as individual entries.

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

This document has been revised to be compatible with the series of vocabularies being produced by TC 59/SC 2 spanning across several domains within the construction sector. With the growth in the number of international construction projects and the development of the international market for construction products, there is an increasing need for an agreement on a common language across disciplines.

The practical realization of dimensional accuracy in relation to buildings and civil engineering works involves not only land surveyors and measuring technicians but also professionals engaged in the different stages of the construction process. Further, the widespread use of optical measuring instruments and associated electro-optical techniques, many of which make provision for automatic communication of information, makes smooth communication between different professions necessary. In order to promote such a communication agreement on terms and concepts used in setting out, measurement and surveying is necessary. The purpose of this document is, therefore, to provide a consistent language for use by the various professions involved in measurement in the construction industry.

International preferred terms are listed in boldface type. Where a preferred term is specific to a particular English-speaking country, e.g. the United States of America, etc., it is given below the international preferred term and is annotated with the relevant country code. Where no preferred terms are listed indicating usage in a specific geographical location, this signifies that the international preferred term is the accepted term in the English-speaking countries. A term beneath the preferred term not given in boldface type is an admitted (non-preferred) synonym. A country code is assigned to an admitted term if it is specific to a particular English-speaking country.

Buildings and civil engineering works — Procedures for setting out, measurement and surveying — Vocabulary

1 Scope

This document defines terms that are commonly used in procedures for setting out, measurement and surveying in buildings and civil engineering works.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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 http://www.electropedia.org/

NOTE ISO 6707-1 defines general terms for buildings and civil engineering works.

3.1 General terms

3.1.1
measurement
operation that has the object of determining the value of a quantity

[SOURCE: ISO 6707-1:2017, 3.5.1.22, modified — Note 1 to entry has been omitted.]

3.1.2
setting out
layout, US
laying out**,** US
establishment of marks and lines to define the position and level of the elements for the construction work so that work can proceed with reference to them

[SOURCE: ISO 6707-2:2017, 3.3.13]

3.1.3
metrology
science of *measurement* (3.1.1) and its application

Note 1 to entry: Metrology includes all theoretical and practical aspects of measurement, whatever the measurement uncertainty and field of application.

[SOURCE: ISO Guide 99:2007, 2.2]

3.1.4
geodesy
science of *measurement* (3.1.1) on or in the vicinity of the ground to determine form, dimensions and the distribution of mass and fields of gravity on the earth or parts of it

Note 1 to entry: Surveying is the science of measurements necessary to determine the locations of points (features) on or beneath the surface of the earth.

Note 2 to entry: Where measurements cover such a large part of the earth's surface that the curvature cannot be ignored, then the operations are termed geodetic surveying or measuring.

3.1.5
photogrammetry
technique of *measurement* (3.1.1) using photographs, for example aerial photographs, to determine, primarily, geometric properties such as size, location and form of objects

Note 1 to entry: Photogrammetric measurement is often used for mapping, but also has some engineering applications.

3.1.6
measurand
quantity intended to be measured

Note 1 to entry: The measurand including the *measuring system* (3.1.19) and the conditions under which the *measurement* (3.1.1) is carried out, might change the phenomenon, body, or substance such that the quantity being measured may differ from the measurand as defined. In this case, adequate *correction* (3.2.15) is necessary.

[SOURCE: ISO/IEC Guide 99:2007, 2.3, modified — EXAMPLEs and NOTEs 2 to 4 have been omitted.]

3.1.7
measuring instrument
device used for making *measurements* (3.1.1) or for *levelling* (3.6.4)

Note 1 to entry: Measuring instruments are sometimes used in conjunction with one or more supplementary devices.

3.1.8
measuring equipment
measuring instrument (3.1.7), material measure, software, *measurement standard* (3.1.14), reference material, *ancillary equipment* (3.1.9) or *auxiliary equipment* (3.1.10) used in a *measurement* (3.1.1)

Note 1 to entry: The definition is necessarily wider than that of measuring instrument since it includes all the devices used in a measurement.

[SOURCE: ISO 14978:2018, 3.5.1, modified — In the definition, "indicating" has been omitted from beginning, and "ancillary equipment" has been inserted before "auxiliary equipment"; Note 2 to entry has been omitted.]

3.1.9
ancillary equipment
equipment additional to the actual *measuring instrument* (3.1.7) used when carrying out *measurements* (3.1.1)

EXAMPLE Pegs, sighting *targets* (3.6.67) and chalk marking lines.

3.1.10
auxiliary equipment
equipment that gives aid or support to a *measuring instrument* (3.1.7)

EXAMPLE Tripod.

3.1.11
measuring tool
simple measuring device

EXAMPLE *Folding rule* (3.4.5), *measuring tape* (3.4.1), *square* (3.4.12).

3.1.12
indication
quantity value provided by a *measuring instrument* (3.1.7) or a *measuring system* (3.1.19)

Note 1 to entry: An indication may be presented in visual or acoustic form or may be transferred to another device. An indication is often given by the position of a pointer on the display for analogue outputs, a displayed or printed number for digital outputs, a code pattern for code outputs, or an assigned quantity value for material measures.

Note 2 to entry: An indication and a corresponding value of the quantity being measured are not necessarily values of quantities of the same kind.

[SOURCE: ISO/IEC Guide 99:2007, 4.1]

3.1.13
measurement result
set of quantity values being attributed to a *measurand* (3.1.6) together with other available relevant information

Note 1 to entry: A measurement result generally contains "relevant information" about the set of quantity values, such that some may be more representative of the measurand than others. This may be expressed in the form of a probability density function (PDF).

Note 2 to entry: A measurement result is generally expressed as a single measured quantity value and a measurement of uncertainty. If the measurement uncertainty is considered negligible for some purpose, the measurement result may be expressed as a single measured quantity value. In many fields, this is the common way of expressing a measurement result.

[SOURCE: ISO/IEC Guide 99:2007, 2.9, modified — NOTE 3 has been omitted.]

3.1.14
measurement standard
realization of the definition of a given quantity value and associated *measurement* (3.1.1) uncertainty, used as a reference

[SOURCE: ISO Guide 99:2007, 5.1, modified — EXAMPLEs and NOTEs have been omitted.]

3.1.15
observation
act of measuring or otherwise determining the value of a property

[SOURCE: ISO 19109:2015, 4.16]

3.1.16
reading
part of an *observation* (3.1.15) which only involves the operator's notations of values on a *scale* (3.3.1) or other methods of recording values

3.1.17
measurement error
measured quantity value minus a reference quantity value

Note 1 to entry: Measurement error should not be confused with production error or mistake.

Note 2 to entry: A "reference quantity value" is a quantity value used as a basis for comparison.

[SOURCE: ISO/IEC Guide 99:2007, 2.16, modified — NOTE 1 has been omitted; NOTE 2 has been renumbered as Note 1 to entry; new Note 2 to entry has been added.]

3.1.18
gauge
bar of steel or other suitable material of standard length, accurately made, for the purpose of checking or verification of length measuring devices

3.1.19
measuring system
set of one or more *measuring instruments* (3.1.7) and often other devices, including any reagent and supply, assembled and adapted to give information used to generate measured quantity values within specified intervals for quantities of specified kinds

Note 1 to entry: A measuring system may consist of only one measuring instrument.

[SOURCE: ISO/IEC Guide 99:2007, 3.2]

3.1.20
coordinate system
two-dimensional or three-dimensional reference system for defining the location points on a surface or in space by means of distances (rectangular/Cartesian co-ordinates) or angles (angles co-ordinates) or both (polar co-ordinates), with relation to designated angles or planes

Note 1 to entry: In land surveying, the x-axis may be in the direction of astronomic (true) north, magnetic north, for example grid north, with the y-axis towards east. The z-axis points approximately upwards (towards the zenith). In some countries, the x- and y- axes are reversed whilst in others E, N and H are used to refer to "East", "North" and "Height".

Note 2 to entry: In building surveying, a local orthogonal system is often set up with the reference axes parallel to the building axes or chosen at the convenience of the surveyor.

3.1.21
geodetic coordinate system
coordinate system (3.1.20) in which position is specified by geodetic latitude, geodetic longitude and (in the three-dimensional case) ellipsoidal *height* (3.1.24)

[SOURCE: ISO 19130-1:2018, 3.22]

3.1.22
geographic coordinates
angular coordinates (angular distances) expressed as latitude and longitude to define a point on the surface of the earth with reference to the equator and the meridian of Greenwich

3.1.23
level
value of the vertical dimension of a point above or below a defined reference

[SOURCE: ISO 6707-1:2017, 3.7.2.39]

3.1.24
height
vertical dimension above a horizontal reference *level* (3.1.23)

EXAMPLE Distance of a feature above the ground – height of a building.

[SOURCE: ISO 6707-1:2017, 3.7.2.36, modified — EXAMPLE has been added.]

3.1.25
global positioning system
GPS
instantiation of *GNSS* (3.1.26) controlled by the US Department of Defence

[SOURCE: ISO 15638-12:2014, 4.25]

3.1.26
global navigation satellite system
GNSS
system that comprises several networks of satellites that transmit radio signals containing time and distance data that can be picked up by a receiver, allowing the user to identify the location of the receiver anywhere around the world

[SOURCE: ISO 15638-16:2014, 4.23, modified — The definition has been editorially updated.]

3.1.27
differential GPS
GNSS (3.1.26) application using only observations from *GPS* (3.1.25) (Navistar satellite system) and additional reference point or reference network GPS observations

[SOURCE: ISO 9849:2017, 3.1.5.3]

3.1.28
real-time kinematic positioning
approach for a precise *global positioning system* (3.1.25), enabling the determination of a range signal that can be resolved to a precision of less than 10 cm

Note 1 to entry: Facilitated by resolving the number of cycles in which the signal is transmitted and received by the receiver.

3.1.29
differential GNSS
processing application within mobile *GNSS receivers* (3.5.27), using difference techniques of *GNSS* (3.1.26) observations and additional reference point or reference network GNSS observations

Note 1 to entry: In differential GNSS applications correction data and additional information from a known reference station are used by mobile rovers, enabling them to improve position accuracy from the 15 m nominal GNSS accuracy to about 10 cm or less.

[SOURCE: ISO 9849:2017, 3.1.52, modified — The abbreviated term "DGNSS" has been omitted.]

3.1.30
testing of measuring instruments
procedures designed to determine whether a *measuring instrument* (3.1.7) satisfies requirements in respect of one or more specified *properties* under specified conditions

3.1.31
calibration
operation that, under specified conditions, in a first step, establishes a relation between the quantity values with measurement uncertainties provided by *measurement standards* (3.1.14) and corresponding *indications* (3.1.12) with associated measurement uncertainties and, in a second step, uses this information to establish a relation for obtaining a *measurement result* (3.1.13) from an *indication* (3.1.12)

Note 1 to entry: A calibration may be expressed by a statement, calibration function, calibration diagram, calibration curve, or calibration table. In some cases, it may consist of an additive or multiplicative correction of the indication with associated measurement uncertainty.

Note 2 to entry: Calibration should not be confused with adjustment of a *measuring system* (3.1.19), often mistakenly called “self-calibration”, nor with verification of calibration.

Note 3 to entry: Often, the first step alone in the above definition is perceived as being calibration.

[SOURCE: ISO/IEC Guide 99:2007, 2.39]

3.1.32
comparator
measuring equipment (3.1.8) used in addition to a standard for *calibration* (3.1.31) of *measuring instruments* (3.1.7)

EXAMPLE 1 Comparing a *measuring tape* (3.4.1) or an *EDM* (3.5.6) with a bar standard.

EXAMPLE 2 For the determination of the accuracy of an angular scale in a *theodolite* (3.5.4).

EXAMPLE 3 In *photogrammetry* (3.1.5), for determining co-ordinates on photographs using stereocomparators.

3.2 Quality of measurement

3.2.1
true value
value which characterizes a quantity perfectly defined in the conditions that exist when that quantity is considered

Note 1 to entry: It is an ideal value which can be observed only if all causes of *measurement error* (3.1.17) are eliminated.

[SOURCE: ISO 772:2011, 7.9]

3.2.2
influence quantity
quantity that, in a direct *measurement* (3.1.1), does not affect the quantity that is actually measured, but affects the relation between the *indication* (3.1.12) and the *measurement result* (3.1.13)

EXAMPLE *Measuring tape* (3.4.1) temperature when measuring distances.

[SOURCE: ISO/IEC Guide 99:2007, modified — EXAMPLEs and NOTEs have been omitted; a new EXAMPLE has been added.]

3.2.3
measurement accuracy
accuracy of measurement
closeness of agreement between a measured quantity value and a true quantity value of a *measurand* (3.1.6)

Note 1 to entry: The concept 'measurement accuracy' is not a quantity and is not given a numerical quantity value. A *measurement* (3.1.1) is said to be more accurate when it offers a smaller *measurement error* (3.1.17)

Note 2 to entry: The term 'measurement accuracy' should not be used for measurement trueness and the term 'measurement precision' should not be used for 'measurement accuracy' which is related to both these concepts.

Note 3 to entry: 'Measurement accuracy' is sometimes understood as agreement between measured quantity values that are being attributed to the measurand.

[SOURCE: ISO/IEC Guide 99:2007, 2.13]

3.2.4
precision of measurement
closeness of agreement between independent *measurement results* (3.1.13) obtained under stipulated conditions

Note 1 to entry: The degree of precision is expressed numerically by the statistical measures of imprecision of *measurements* (3.1.1), such as *standard deviation* (3.2.22), that are inversely related to precision.

