

---

---

**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*

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 7078:2020](https://standards.iteh.ai/catalog/standards/sist/5c54b68f-d6c7-4dd8-8c80-c73735de993c/iso-7078-2020)

[https://standards.iteh.ai/catalog/standards/sist/5c54b68f-d6c7-4dd8-8c80-  
c73735de993c/iso-7078-2020](https://standards.iteh.ai/catalog/standards/sist/5c54b68f-d6c7-4dd8-8c80-c73735de993c/iso-7078-2020)



## iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 7078:2020

<https://standards.iteh.ai/catalog/standards/sist/5c54b68f-d6c7-4dd8-8c80-c73735de993c/iso-7078-2020>



### **COPYRIGHT PROTECTED DOCUMENT**

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

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](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

<b>Contents</b>		Page
<b>Foreword</b> .....		<b>iv</b>
<b>Introduction</b> .....		<b>v</b>
<b>1 Scope</b> .....		<b>1</b>
<b>2 Normative references</b> .....		<b>1</b>
<b>3 Terms and definitions</b> .....		<b>1</b>
3.1 General terms.....		1
3.2 Quality of measurement.....		6
3.3 Scales.....		10
3.4 Measuring tools.....		12
3.5 Measuring instruments and their parts.....		15
3.6 Methods of measuring.....		19
<b>Bibliography</b> .....		<b>29</b>
<b>INDEX</b> .....		<b>30</b>

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 7078:2020](https://standards.iteh.ai/catalog/standards/sist/5c54b68f-d6c7-4dd8-8c80-c73735de993c/iso-7078-2020)

<https://standards.iteh.ai/catalog/standards/sist/5c54b68f-d6c7-4dd8-8c80-c73735de993c/iso-7078-2020>

## 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](http://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](http://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](http://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](http://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.

(standards.iteh.ai)

[ISO 7078:2020](https://standards.iteh.ai/catalog/standards/sist/5c54b68f-d6c7-4dd8-8c80-c73735de993c/iso-7078-2020)

<https://standards.iteh.ai/catalog/standards/sist/5c54b68f-d6c7-4dd8-8c80-c73735de993c/iso-7078-2020>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

ISO 7078:2020

<https://standards.iteh.ai/catalog/standards/sist/5c54b68f-d6c7-4dd8-8c80-c73735de993c/iso-7078-2020>

# 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.

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

**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)

ISO 7078:2020  
<https://standards.iteh.ai/catalog/standards/sist/5c54b68f-d6c7-4dd8-8c80-7d8334027167/iso-7078-2020>

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.]

<https://standards.iteh.ai/catalog/standards/sist/5c54b68f-d6c7-4dd8-8c80-c73735de993c/iso-7078-2020>

### 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.

**3.2.5****accuracy class**

class of *measuring instruments* (3.1.7) or *measuring systems* (3.1.19) that meet stated metrological requirements that are intended to keep *measurement errors* (3.1.17) or instrumental *measurement* (3.1.1) uncertainties within specified limits under specified operating conditions

Note 1 to entry: An accuracy class is usually denoted by a number or symbol adopted by convention.

Note 2 to entry: Accuracy class applies to material measures.

[SOURCE: ISO/IEC Guide 99:2007, 4.25]

**3.2.6****repeatability of results of measurement**

closeness of the agreement between the results of successive *measurements* (3.1.1) of the same *measurand* (3.1.6) carried out under the same conditions of measurement

Note 1 to entry: These conditions are called repeatability conditions.

Note 2 to entry: Repeatability conditions include: the same measurement procedure; the same observer; the same *measuring instrument* (3.1.7), used under the same conditions; the same location; repetition over a short period of time.

Note 3 to entry: Repeatability may be expressed quantitatively in terms of the dispersion characteristics of the results.

[SOURCE: ISO/IEC Guide 98-3:2008, B.2.15]

**3.2.7****reproducibility condition of measurement**

condition of *measurement* (3.1.1), out of a set of conditions that includes different locations, operators, *measuring systems* (3.1.19), and replicate measurements on the same or similar objects

Note 1 to entry: The different measuring systems may use different measurement procedures.

Note 2 to entry: A specification should give the conditions changed and unchanged, to the extent practical.

[SOURCE: ISO/IEC Guide 99:2007, 2.24]

**3.2.8****systematic measurement error**

component of *measurement error* (3.1.17) that in replicate *measurements* (3.1.1) remains constant or varies in a predictable way when the conditions change

Note 1 to entry: A reference quantity value for a systematic reference error is a true quantity value, or a measured quantity value of a *measurement standard* (3.1.14) of negligible measurement uncertainty, or a conventional quantity value.

Note 2 to entry: Systematic measurement error, and its causes, can be known or unknown. A *correction* (3.2.15) can be applied to compensate for a known systematic measurement error.

Note 3 to entry: Systematic measurement error equals measurement error minus random measurement error.

[SOURCE: ISO/IEC Guide 99:2007, 2.17]

**3.2.9****random error**

result of a *measurement* (3.1.1) minus the mean that would result from an infinite number of measurements of the same *measurand* (3.1.6) carried out under repeatability conditions

Note 1 to entry: Random error is equal to error minus *systematic measurement error* (3.2.8).

Note 2 to entry: Because only a finite number of measurements can be made, it is possible to determine only an estimate of random error.