INTERNATIONAL STANDARD

ISO 1803

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Building construction — Tolerances — Expression of dimensional accuracy — Principles and terminology

Construction immobilière — Tolérances — Expression de l'exactitude dimensionelle — Principes et terminologie

Reference numbe
ISO 1803:1997(E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 1803 was prepared by Technical Committee ISO/TC 59, *Building construction,* Subcommittee SC 4, *Dimensional tolerances and measurement.*

It cancels and replaces ISO 1803-1:1985, ISO 1803-2:1986 and ISO 4464:1980.

In this edition the expression of dimensional accuracy is built up round the concept of target size. A list of basic terms, their definitions, and a list of terms relating to dimensional variability, together with their definitions, is included.

Annexes A and B of this International Standard are for information only.

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1 Scope

This International Standard describes the basic principles for the expression of dimensional deviation in building, and defines the basic terms and definitions relating to the evaluation, specification and verification of accuracy.

It is applicable to the manufacture of building components (standard or purpose made), the setting out process, erection and assembly, and the building as a whole.

Annex A gives equivalent terms in French and German. Annex B lists International Standards related to dimensions and dimensional accuracy in building.

2 General principles

The process of building construction causes specific problems in the field of the achievement of accuracy and fit which require detailed examination in relation to techniques of construction, performance and aesthetic requirements, as well as the cost of erection of the building, its intended use and the possible replacement of components during its lifetime. The construction under site conditions of a large-scale object such as a building, involving the assembly of dimensionally variable components by means of a sequence of measuring and positioning operations, can result in deviations from the designed size and shape (induced deviations). Coupled with this are the inevitable dimensional changes resulting from movements and change of size of materials in response to changes in ambient, loading and other conditions (inherent deviations).

This international Standard forms part of a coordinated set of standards by means of which

a) the expected dimensional variability may be both assessed and allowed for in design (using the probability concept if desired);

b) the dimensional needs of joints can be compared with expected variabilities so that functionally satisfactory joints can be achieved;

c) the accuracy requirements, which reflect the needs of the design, may be clearly specified for all stages of construction;

d) the sizes and shapes of components, in *in-situ* work and buildings, may be subjected to the necessary dimensional checks and compliance control procedures during manufacture, setting out and erection.

In practice, dimensional variability exists in any process of fabrication or measurement. Inaccuracies will occur at each of the stages in the building process, resulting in deviations (manufacturing deviation, setting-out deviation and erection deviation) from the desired size (target size); see figure 1. Thus, for the actual performance of a building to match the desired or target performance, the design should take account of dimensional variability using the probability concept, where appropriate. The functional requirements of the design set limits on variability (permitted deviations) in relation to which the achieved dimensions should be checked for compliance; see figure 2. Compliance procedures are not only carried out at the end of the process (which in many cases would be too late to rectify errors), but at each stage in the process of manufacture, setting out and erection.

The size of the building and its components will vary with physical conditions such as temperature and humidity. It may be necessary to specify the physical reference conditions, the time and the required measuring accuracy at which target sizes and their permitted deviations apply.

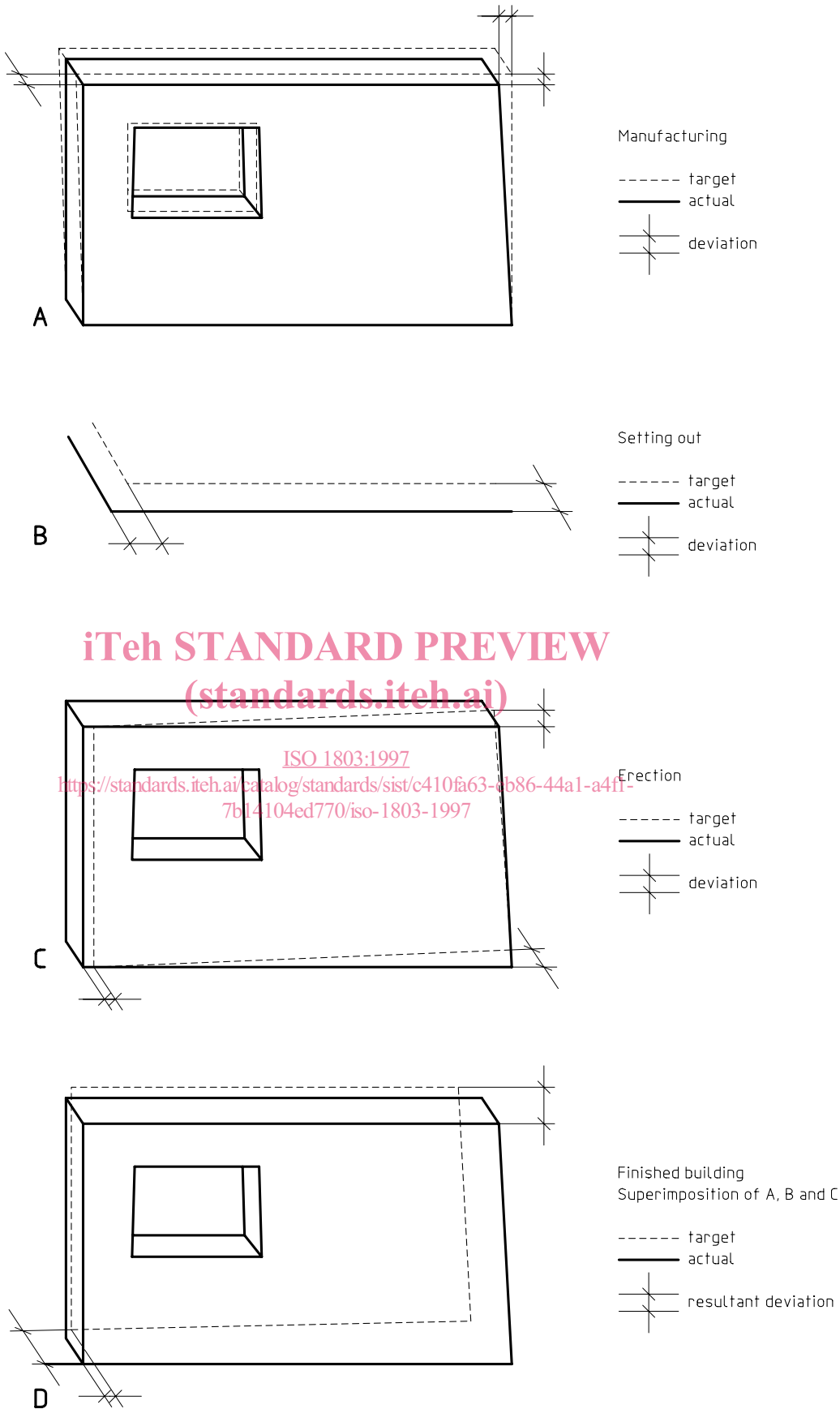

Figure 1 — Illustration of deviations in manufacturing, setting out and erection, combining to form the resultant deviation in the finished building

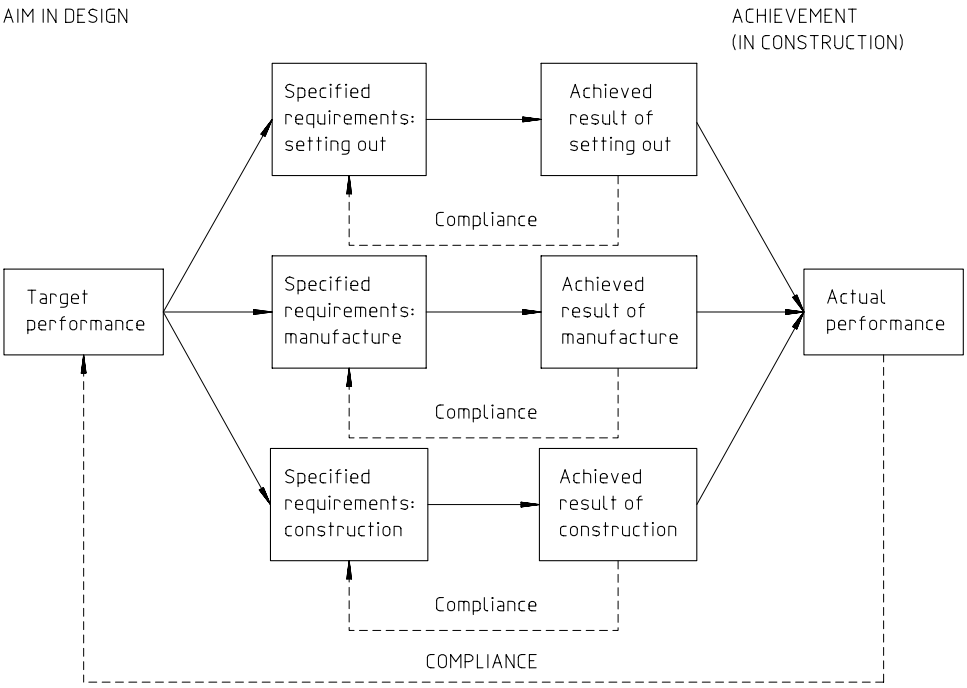

Figure 2 — Aim, achievement and compliance of the achievement with the aim

3 Basic terms and definitions

The terms and definitions given below constitute a basic vocabulary of terms used in the description and calculation of sizes, in specifications and in compliance measurements to achieve conformity with specifications in building.

3.1 dimension: Extent in a given direction or along a given line, or a given angle.

NOTE — Extent in this context is unquantified.

3.2 size: Magnitude of a dimension quantified in terms of a defined unit.

3.3 target size: A reference size used in design and in practice in order to indicate the size desired and to which the deviations, which would ideally be zero, are to be related.

NOTES

1 The term "work size" is a target size used in production to achieve the target specified size on the project drawing, and takes into account systematic deviations which can arise due to the production processes used and/or inherent deviations of the materials used.

2 If it is not necessary to specify a target size; any size can be taken as a reference size to which to relate the deviations.

3 In some countries and fields (e.g. mechanical industry), the term "nominal size" is used as reference size. In building, the term "nominal size" should only be used as a designation of the approximate magnitude of a dimension.

3.4 target angle: A reference angle used in design and in practice in order to indicate the angle desired and to which the deviations, which would ideally be zero, are to be related.

3.5 actual size: Achieved size, the value of which is obtainable by measurement.

NOTE — If necessary, the known corrections such as those for physical circumstances should be incorporated in the measurement.

3.6 upper limit of size: Maximum permitted actual size.

3.7 lower limit of size: Minimum permitted actual size.

3.8 deviation: Difference between an actual size and the corresponding target size.

NOTE — In some cases there is a need to distinguish deviations caused by physical circumstances, such as temperature, shrinkage, creep or load (inherent deviations), and those due to variability in manufacturing, setting out or erection (induced deviations).

3.9 upper permitted deviation: Difference between the upper limit of size and the corresponding target size.[1)]

3.10 lower permitted deviation: Difference between the lower limit of size and the corresponding target size.[1)]

3.11 tolerance: Difference between the upper limit of size and the lower limit of size.

NOTES
1 Tolerance is an absolute value without sign.

2 In building construction, tolerance is commonly expressed by "± permitted deviation" so that the value of the tolerance is implicit (see figure 3).

3 An example of the relationship between the key basic terms is given in figure 3.

1) The common term for the upper permitted deviation and lower permitted deviation is "permitted deviation" (PD); e.g. the PD is ± 5 mm. In special cases the PD can be asymmetrical.

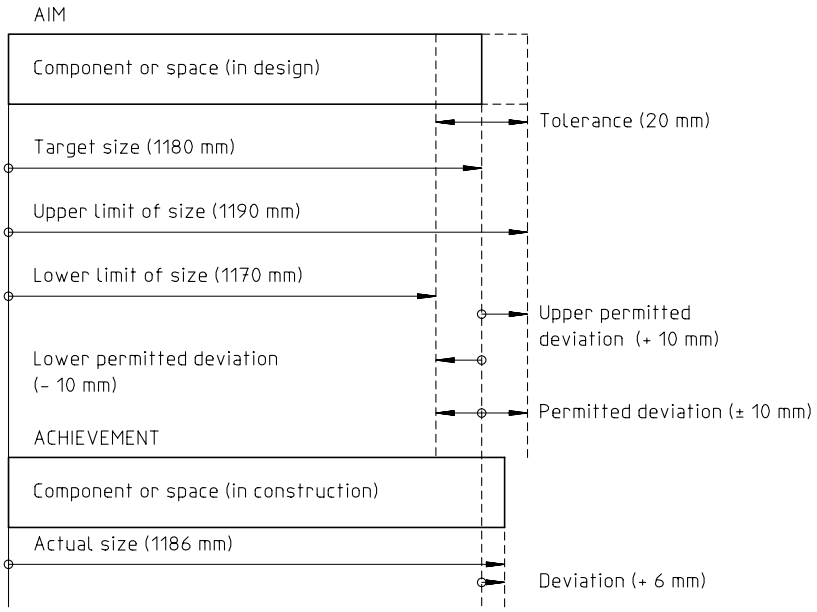

Figure 3 — Example of the relationship between key basic terms

4 Terms and definitions relating to dimensional variability

The following terms are normally used to express the relationship between actual and target sizes. For most of them, methods of measurement are described and illustrated in ISO 7976-1.

4.1 length deviation: Difference between an actual length and the corresponding target length.

4.2 angular deviation: Difference between an actual angle and the corresponding target angle.

NOTES

1 Deviations can be expressed in gons, degrees, or as perpendicular offsets over a given length.

2 A special case of angular deviation is the deviation of a direction, where a straight line is given and where its direction is the angle between this actual line and a given reference line; e g the meridian, the *X*- or N-axis, the horizontal or the vertical (plumb line).

4.3 profile deviation of a line: Plot of the differences between the actual positions of a set of specified points on a line and those on the corresponding target line.

4.3.1 straightness deviation of a line: Plot of the differences between the actual positions of a set of specified points on a line and those on a straight line between two given points on that line.

4.4 shape deviation of a surface: Plot of the differences between the actual positions of a set of specified points on a surface and those on the corresponding target surface.

4.4.1 flatness deviation of a surface: Plot of the differences between the actual positions of a set of specified points on a surface and those on the corresponding flat surface.

NOTE — Flatness deviation is usually determined along straight lines of specified lengths, placed in specified positions or at random.

4.4.2 skewness: Difference between the actual position of a corner point or a point on an edge of a surface and its corresponding target position on the plane through three other corner points or points on the edge of that surface.

4.5 position deviation of a point: Difference between the actual position of a point and the corresponding target position in relation to a specified datum.

NOTE — Position deviations are generally measured separately in both the horizontal plane and the vertical plane.

4.6 position deviation of a line: Difference in the actual position of specified points on a line and the corresponding target position points in relation to a specified datum.

4.7 verticality deviation: Horizontal difference between a specified point on a line or plane intended to be vertical and the corresponding target point on a vertical reference line or plane. (See also Note 1 in 4.2.)