
International Standard



6284

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Tolerances for building — Indication of tolerances on building and construction drawings

Tolérances pour le bâtiment — Indication des tolérances sur les dessins de bâtiment et de génie civil

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Foreword

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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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

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Tolerances for building — Indication of tolerances on building and construction drawings

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1 Scope and field of application

This International Standard specifies methods for the indication of tolerances on building and construction drawings.

A tolerance shall be indicated by means of permitted deviations, usually of equal value (symmetrical tolerance), but, exceptionally, of unequal value (asymmetrical tolerance). (For examples, see 5.1, figure 1.)

Values for permitted deviations shall be selected in accordance with ISO 3443.

The methods of tolerancing given in this International Standard are in accordance with the principles laid down in ISO 4464.

2 References

ISO 1101, *Technical drawings — Geometrical tolerancing — Tolerancing of form, orientation, location and run-out — Generalities, definitions, symbols, indications on drawings.*

ISO 3443/1, *Tolerances for building — Part 1: Basic principles for evaluation and specification.*

ISO 3443/2, *Tolerances for building — Part 2: Statistical basis for predicting fit between components having a normal distribution of sizes.*

ISO 3443/5, *Building construction — Tolerances for building — Part 5: Series of values to be used for specification of tolerances.*

ISO 4464, *Tolerances for building — Relationship between the different types of deviations and tolerances used for specification.*

3 General

A tolerance shall be indicated on a drawing only when there is a functional need to control dimension, orientation or form.

4 Specification of tolerances

The following methods shall be used when requirements for accuracy are to be defined by tolerances.

The specification of tolerances shall be

- a) in general, a single reference in the "Notes" column in the case of repetitive tolerances applicable to all drawings.
- b) placed with or adjacent to the caption of a figure when tolerance information applies only to that figure;
- c) for individual sizes or properties, attached to the appropriate feature. For any given detail, the tolerance information shall be shown on the drawing.

5 Indication of tolerances

5.1 Dimensional tolerances and tolerances on position

Dimensional tolerances and tolerances on position shall be indicated by the reference (or target) size and the permitted deviations. The tolerance shall be given in the same units as the reference (or target) size (normally millimetres). See figures 1 and 2.

Tolerances on position dimensions are tolerances on a size locating one item in relation to another, for example, one reference line to another, a component to a reference line or a finished floor level to a datum level.

Tolerance information which is typed on drawings should be given, for example, either in the form 890 ± 12 , or $890 (+ 12; - 12)$.

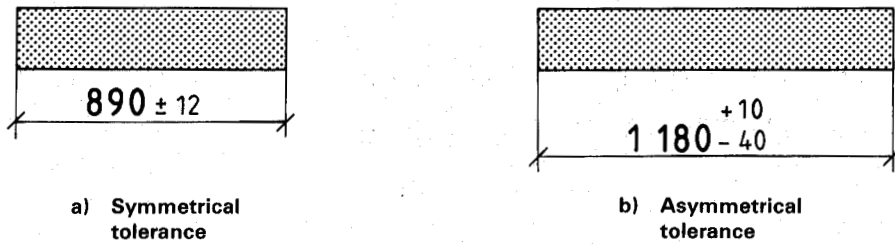


Figure 1 — Examples of dimensional tolerances

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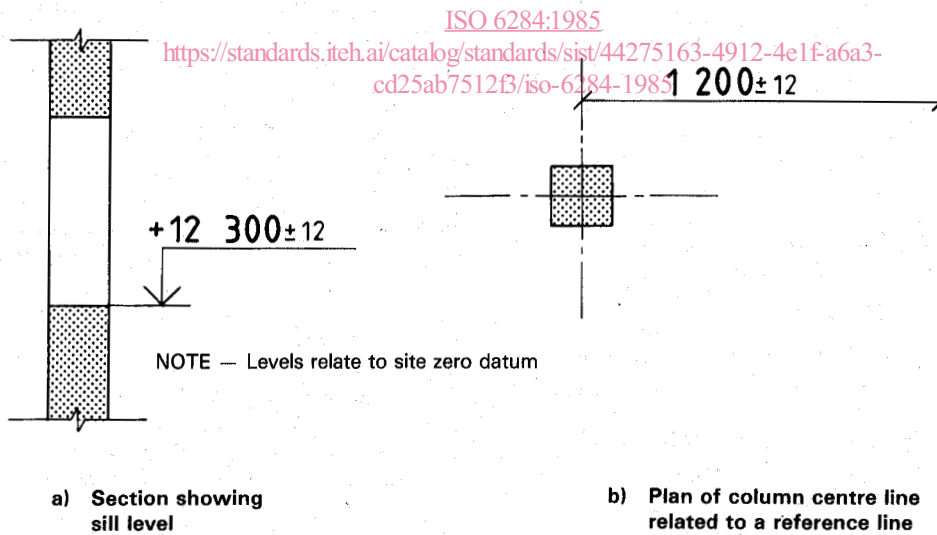


Figure 2 — Examples of tolerances on position

5.2 Tolerances on orientation and form

Tolerances on orientation and form shall be indicated using the tolerance frame (see clause 6). This is done by giving the appropriate symbol for the characteristic to be tolerated (see table 1), the permitted deviation and, where appropriate, a letter referring to the datum feature denoted by this letter.

Tolerances of this type can be shown even if no dimensional tolerance or tolerance on position (see 5.1) is specified on the drawing.

Table 1 — Symbols to be used on drawings when specifying geometrical tolerances on orientation and form

Type of tolerance	Characteristic	Symbol
Orientation	Horizontality	
	Verticality	
	Parallelism ¹⁾	
	Squareness ¹⁾	
	Angularity ¹⁾	
Form	Straightness ¹⁾	
	Flatness ¹⁾ (in general)	
	Skewness ¹⁾ (flatness in which only skewness is taken into account)	
	Circularity ²⁾	
	Cylindricity ²⁾	
	Profile of a line ²⁾	
Profile of a surface ²⁾		

1) See the description in ISO 4464.
2) See the definition in ISO 1101.

5.3 Manufacturing, setting out, erection and building tolerances (box principle)

When specifying tolerances according to the box principle, the notation given in table 2 may be used instead of the symbols given in table 1.

These tolerances shall be indicated using the tolerance frame described in clause 6.

Table 2 — Notation to be used when specifying tolerances on drawings according to the box principle

Type of tolerance	Notation
Manufacturing	M
Setting out	S
Erection	E
Building	B

6 Use of tolerance frames

6.1 General

Required tolerance information shall be indicated on drawings in a rectangular frame divided into compartments, as shown in figure 3.

The symbol given in table 1, or the notation given in table 2, shall be shown in the left hand compartment.

The tolerance value, expressed as the permitted deviation, shall be shown in the second compartment from the left, the value normally being given in millimetres. Any limiting distance over which a permitted deviation is to be applied shall be stated in this compartment following the permitted deviation [see figure 3 b)].

When a datum feature has to be identified, this shall be shown in the third compartment added to the basic tolerance frame [see figures 3 c) and 3 d)]. The letters B, E, I, M, O, S should not be used for this purpose.

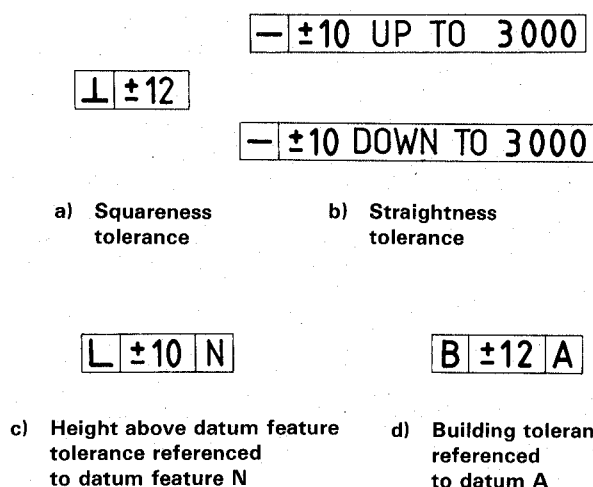


Figure 3 — Examples of the use of tolerance frames

6.2 Connection to controlled feature

6.2.1 The tolerance frame shall be connected to the controlled feature by a leader line drawn from the frame. At the controlled feature, the leader line shall terminate in an arrowhead or a dot which should be positioned as described below.

6.2.2. If the leader line is terminated in an arrowhead, the arrowhead shall be positioned as follows:

- a) on the outline of the feature or on an extension of the outline (but not at a dimension line). This applies when the tolerance refers to the line itself or to the surface represented by the line as shown in figure 4;

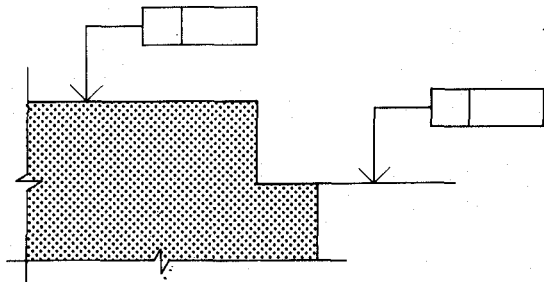


Figure 4 – Position of arrowhead when tolerance refers to line or surface

- b) on the outline or on a projection line of the feature at a dimension line. This applies when the tolerance refers only to the axis or median plane of the feature so sized as shown in figure 5;

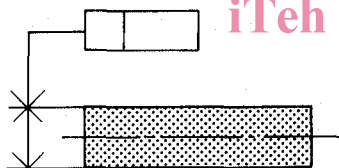


Figure 5 – Position of arrowhead when tolerance refers to axis or median plane

- c) on the axis or median plane. This applies when the tolerance refers to the common axis or median plane of features lying on that axis or median plane as shown in figure 6.

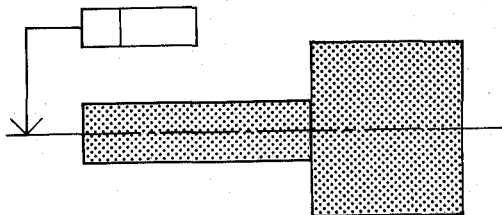


Figure 6 – Position of arrowhead when tolerance refers to common axis or median plane

6.2.3 If the tolerance applies to the surface defined by the outline of the controlled feature, the leader line shall be terminated by a dot which shall be positioned inside the outline as shown in figure 7.

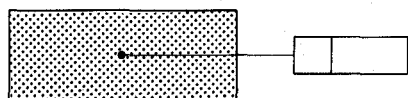


Figure 7 – Use of leader lines terminated by a dot

6.2.4 Tolerance information applicable to a restricted part, edge or area of a feature shall be indicated by a thick chain line, the position of which shall be dimensioned. The arrowhead from the tolerance frame shall touch this line as shown in figure 8.

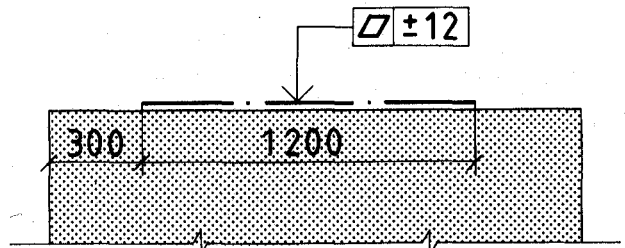


Figure 8 – Indication of tolerance applicable to a part, edge or area of a feature

6.3 Connection to datum feature

Certain types of tolerances, such as tolerances on parallelism, require a feature other than that being tolerated to be identified as a datum. Such datum features shall be indicated by a leader line from the tolerance frame terminating in an open or solid triangle located as follows (in this International Standard, solid triangles have been used throughout):

- a) on the outline of the feature or on an extension of the outline (but not at a dimension line). This applies when the datum feature is the line itself or the surface represented by the line as shown in figure 9;

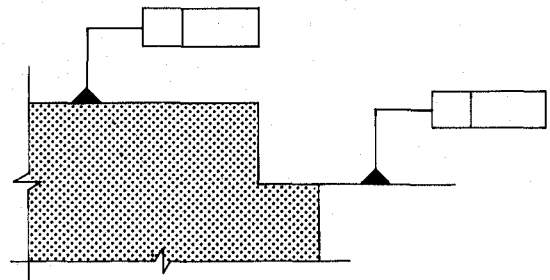


Figure 9 – Indication of datum feature on a line or surface

- b) on the projection line at the dimension line or on the axis. This applies when the datum feature is the axis or median plane of the whole component or of the part so dimensioned as shown in figure 10;

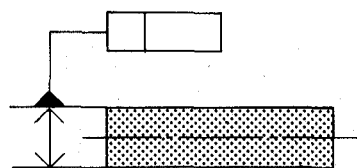


Figure 10 – Indication of datum feature on axis or median plane of component or part

c) on the common axis or median plane of two or more features as shown in figure 11;

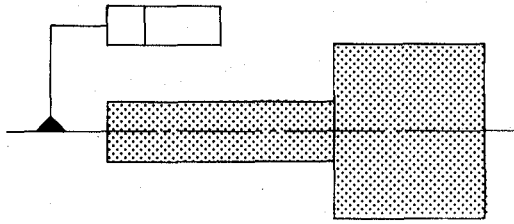


Figure 11 — Indication of datum feature on common axis or median plane of two or more features

d) inside the outline which represents the feature. This applies when the datum feature is the surface defined by the outline as shown in figure 12.

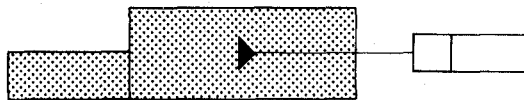


Figure 12 — Indication of datum feature which is a surface defined by an outline

If the tolerance frame cannot be connected to the datum feature in a clear and simple manner, the datum feature shall be denoted by a capital letter placed inside a frame. This letter shall be shown in the third compartment in the tolerance frame as shown in figure 13. A different letter shall be used for each datum identification. After all single letters have been used double letters shall be employed.

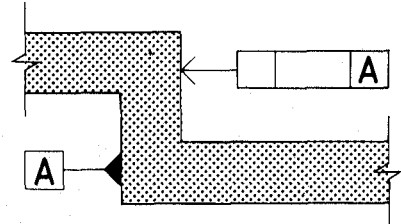


Figure 13 — Indication of datum feature where the tolerance cannot be directly connected

6.4 Interacting features of equal significance

If two or more interacting features of equal significance are to be tolerated, or if there is no reason to select one of them as the datum feature, the tolerance shall be indicated by means of leader lines terminated by an arrow touching the lines or their extensions which represent the feature. In the latter case, the leader line may also be terminated at the dimension lines. (See figure 14.)

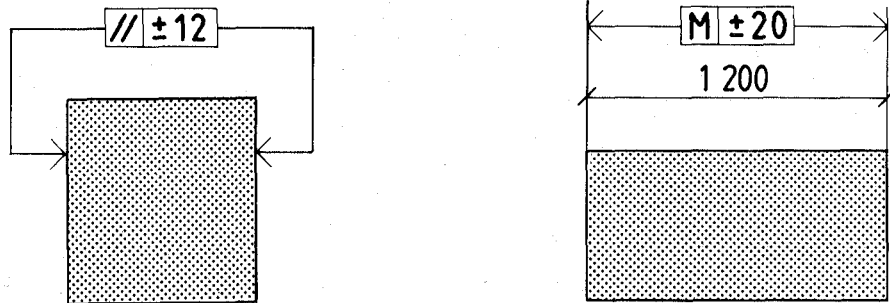


Figure 14 — Indication of tolerances in the case of interacting features of equal significance

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