
International Standard



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**Tolerances for building —
Part 6 : General principles for approval criteria, control of
conformity with dimensional tolerance specifications and
statistical control — Method 1**

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Tolérances pour le bâtiment — Partie 6 : Principes généraux pour les critères d'acceptation, le contrôle de conformité aux spécifications de tolérance dimensionnelle et le contrôle statistique. — Méthode 1

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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.

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.

International Standard ISO 3443/6 was prepared by Technical Committee ISO/TC 59, *Building construction*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Tolerances for building — Part 6: General principles for approval criteria, control of conformity with dimensional tolerance specifications and statistical control — Method 1

0 Introduction

This part of ISO 3443 forms one of a series of International Standards concerning tolerances for building and building components.

Another more detailed method to be used when establishing approval criteria and controlling accuracy by applying statistical principles is issued as method 2 in ISO 3443/7¹⁾.

1 Scope and field of application

This part of ISO 3443 gives the general principles according to which tolerances should be specified and the approval criteria of geometrical characteristics which result from any operation made in building construction.

It applies to all types of forms, dimensions and positions within the building industry where tolerances are specified.

2 References

ISO 1803/1, *Building construction — Tolerances — Vocabulary — Part 1: General terms.*

ISO 3443/7, *Tolerances for building — Part 7: General principles for approval criteria, control of conformity with dimensional tolerance specifications and statistical control — Method 2.*²⁾

ISO 7077, *Measuring methods for building — General principles.*

3 Definitions

For the purposes of this part of ISO 3443, the following definitions apply.

3.1 characteristic: Feature for which a tolerance has been specified; it can be a dimension, an angle, the shape of a surface, etc.

3.2 unit: Object which is checked. A unit contains one or several characteristics; it can be a component, a part of a construction, etc.

NOTE — In this document, the term “item” is used as a synonym for “unit”, in harmony with ISO 2859.

3.3 lot: Definite quantity of some commodity (units) manufactured or produced under conditions which are presumed uniform.

4 Tolerances and specified requirements

Tolerance specifications give the permitted variation of size (see ISO 1803/1).

A tolerance specification should be indicated in at least one of the following ways:

- in contractual documents,
- on a drawing,
- in a national or International Standard to which reference is made,
- in other documents referred to in a contract.

1) Internationally, users are free to decide whether to use method 1 (the short method) or method 2 (the longer method).

2) At present at the stage of draft.

If no tolerance specifications are given, requirements in accordance with normal practices are assumed.

The specifications can have one of the following forms.

- a) $D \begin{smallmatrix} +A \\ -B \end{smallmatrix}$ where $A + B = T$ (see figure 1)

This means that the indicated dimension X shall fulfil the following inequalities:

$$D - B \leq X \leq D + A$$

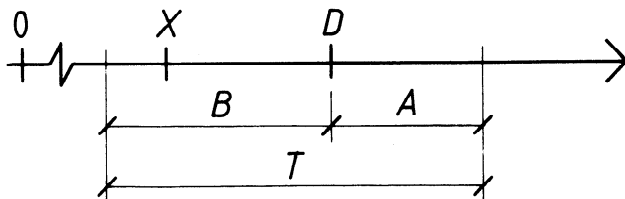


Figure 1

- b) One-sided inequalities such as $X \leq T$ (see figure 2)

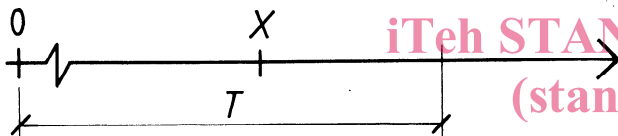


Figure 2

- c) Specification, by mathematical or linguistic expressions, of the volume or area enveloping the reference position given in the design, and within which the corresponding actual point shall lie (see ISO 1803/1) (see figure 3)

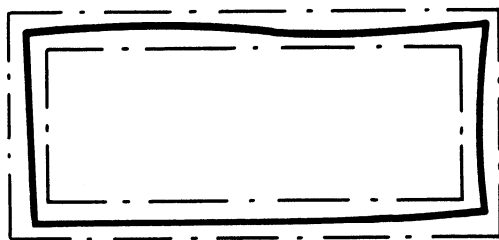


Figure 3

Tolerance specifications may include directly or indirectly the conditions under which the dimensions are to be measured. For methods and instruments to be used, see ISO 7077.

5 Expert on control procedures

An expert in carrying out control of conformity with the tolerance specifications can be designated.

This expert shall have the necessary knowledge and reliability to perform the following important operations.

a) Supervising the measurement process and recording measurements and other control data in an inspection journal.

b) The extent of the inspection shall be decided on the basis of economic and technical considerations.

6 Approval of units

6.1 Criteria

Any unit all characteristics of which are in conformity with the tolerance specification is accepted.

Any unit having one characteristic which is not in conformity with its tolerance specifications is not accepted.

6.2 Conditions for re-measuring of units

If it is shown that the result of measurements has one or more serious measuring errors, new measurements are to be made on the same unit(s).

6.3 Information about units not accepted

A unit which is not accepted shall be recorded in the inspection journal.

7 Approval of lots

7.1 Criteria

The criteria for approval of lots shall be based on the approval of individual units. The rules and procedures valid for approval or rejection of items as described in clause 6 are, therefore, also valid for such individual units in the lot as are inspected.

The characteristics to be controlled and the approval criteria of the lots should be stated in the inspection journal.

7.2 Parameters of inspection

The parameters of inspection which are used shall be based on standards or on an agreement of inspection.

When negotiating the parameters of the inspection, some defects may be designated as critical. In such cases, every item in the lot is to be inspected.

Designating defects as critical should be limited to those characteristics which are of vital importance to the building and the building process.

100 % inspection can also be worthwhile in cases of very small lots.

8 Approval by representative samples (sample inspection)

The sample inspection is intended primarily to be used for a continuing series of lots. However, when inspecting a small number of lots, the methods will still be useful for economic reasons.

For a series of lots, switching procedures are applicable. This means that the inspection and criteria for acceptance of the lots are guided by the results of the inspection of earlier lots.

In this way the inspection level is, for economic reasons, reduced when the lots submitted have a considerably lower percentage of defects than is allowed.

When the percentage of defects is close to the agreed limit, the inspection should be tightened.

When a number of lots is rejected upon tightened inspection, the sample inspection should be replaced by 100 % inspection.

The division of the overall total of units into more, and smaller, inspection lots gives better information on variations.

9 Sampling plan

The plan for the determination of acceptability by sample inspection is called a sampling plan. It contains detailed information on the formation of the lots, sample sizes and criteria for acceptance or rejection of the lots according to the measurements of the units in the samples. The sampling plan should be specified in the inspection agreement.

On the basis of the parameters specified and knowledge of the products, the expert should set up the sampling plan.

10 Acceptance and rejection of lots

Acceptability is determined by carrying out the sampling plan and comparing the measurements of the units in the samples with the demands of the sampling plan.

A lot is not accepted until it has been accepted for all characteristics for which, according to the sampling plan, control is required.

If a lot is rejected, it can, by 100 % inspection, be split up into accepted units and rejected units.

Rejected lots can also be accepted on certain conditions which are agreed upon by the parties.

If the expert suspects that the lots contains units with defects, he may at his own discretion draw more samples from accepted lots and inspect them.

All defective units that may be found in the lot, whether in planned samples or not, shall be replaced by new units, if it is not possible to repair them satisfactorily.

11 Accuracy requirements on measurements

The specification of the method of measurement shall include an error analysis and the accuracy demands of the instruments and operation.

12 Reference conditions

When measuring at a different time and under different physical conditions than those specified, it is necessary to make a conversion to the reference conditions given in the tolerance specification, taking into account for instance change of temperature, shrinkage and elastic and plastic deformations.

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