International Standard 3443/1

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Tolerances for building — Part 1 : Basic principles for evaluation and specification

Tolérances pour le bâtiment — Partie 1 : Principes fondamentaux pour l'évaluation et la spécification

First edition — 1979-06-15

UDC 69 : 721.01 **Ref. No. ISO 3443/1-1979 (E)**

Descriptors : buildings, construction, joints, compatibility, fits, dimensional tolerances, statistical analysis.

Price based on 2 pages

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.

International Standard ISO 3443/1 was developed by Technical Committee ISO/TC 59, *Building construction*, and was circulated to the member bodies in October 1977.

It has been approved by the member bodies of the following countries :

Australia	Hungary	Poland
Austria	Israel	Romania
Belgium	Italy	South Africa, Rep. of
Canada	Japan	Spain
Czechoslovakia	Korea, Rep. of	Sweden
Egypt, Arab Rep. of	Mexico	United Kingdom
Finland	Netherlands	USSR
France	New Zealand	
Germany, F.R.	Norway	

No member body expressed disapproval of the document.

Printed in Switzerland

Tolerances for building — Part 1 : Basic principles for evaluation and specification

1 SCOPE AND FIELD OF APPLICATION

This International Standard describes the nature of dimensional variability in building and the purposes for which it has to be quantified, and defines the factors to be taken into account in the evaluation, specification and verification of tolerances for the manufacture of building components and for site work. It applies to components and buildings generally, including those designed in accordance with the principles of modular coordination.

2 REFERENCE

ISO 2445, *Joints in building — Fundamental principles for design.*

Other standards regarding tolerances for building construction are presently being prepared.

3 GENERAL

The process of building construction presents specific problems in the field of tolerances and fits, which require detailed examination in relation to the technique of assembly, the performance requirements and the costs of the completed building. The creation under site conditions of a large-scale geometric form, involving the assembly of dimensionally variable components by means of a sequence of measuring and positioning operations, can result in substantial variations from the designed size and shape (induced deviations). Coupled with this are the inevitable dimensional variations resulting from movements and changes of size of materials, which arise from extrinsic and intrinsic physico-chemical causes (inherent deviations). The object of international standardization in the field of tolerances and fits is to provide a coherent system by means of which

a) dimensional and positional variabilities may be both analysed and allowed for in design;

b) tolerances may be communicated clearly in specification;

c) the sizes and shapes of components and buildings may be subjected to any necessary control measures during manufacture and construction.

When building components are located in relation to a continuous reference system (such as a modular grid), so that the structure is subjected to overall dimensional control, deviations of size, shape and position have to be absorbed within the jointing system. The consideration of tolerances for the manufacture of components and for the construction of buildings is therefore inseparable from the design of joints to provide the required dimensional flexibility (see ISO 2445). This does not mean that all joints must necessarily have this capability, but it is necessary for deviations to be accommodated at some point; this may be achieved at the joints between individual components, or by the provision of special joints at intervals. In addition, tolerances should be considered in relation to the structural, aesthetic, legal and direct functional consequences of dimensional variability in order to achieve the overall quality required.

Analysis of joint width variation is required for the determination of work sizes for components, so that they can be designed for use with jointing techniques of known dimensional flexibility. This applies equally to standard components and to purpose-made components. It may also be necessary to check the suitability of a standard component for use with the same or a different jointing technique in particular situations in building designs. The object in all cases is to ensure that assembly of the components is possible without unpredicted problems of fit, and that the joints achieve the required performances. If the analysis of induced deviations is based on statistical principles, a limited incidence of "misfit" is accepted in the design, the extent of which has to be decided in relation to the nature of the component and its jointing technique.

The specification of tolerances defining the limits of induced deviations that have been allowed for in the design has to be linked to methods of measurement by means of which compliance with the specification can be tested. The specification and verification of tolerances must refer to standard reference conditions for measurement, to allow for the effects of inherent deviations on actual sizes. Tolerances may conveniently be specified in grades relating to methods of construction (materials, processes and techniques) and appropriate levels of accuracy. However, it is still necessary to examine the dimensional compatibility of components used in particular situations even when their tolerances fall within the same grade, owing to the complex and unique factors governing the distribution of deviations.