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Bases for the design of structures — Deformations of buildings at the serviceability limit states

Bases du calcul des constructions — Déformations des bâtiments à l'état limite d'utilisation

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

International Standard ISO 4356 was developed by Technical Committee ISO/TC 98, *Bases for design of structures*, and was circulated to the member bodies in July 1976.

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

Austria	India	Romania
Brazil	Israel	South Africa, Rep. of
Canada	Korea, Rep. of	Spain
Chile	Mexico	Sweden
Czechoslovakia	New Zealand	Turkey
France	Norway	United Kingdom
Germany	Poland	
Hungary	Portugal	

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Australia
Belgium
Denmark
U.S.S.R.

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Bases for the design of structures — Deformations of buildings at the serviceability limit states

0 INTRODUCTION

Deformations call for much thought on the part of the designer, and there is more than one way of dealing with some of them.

The underlying aim of the document is to assist the designer to identify those aspects of deformation that affect the suitability of a building for the purposes for which it was intended, and to set up certain criteria by which the performance of the building in this respect can be assessed. In addition, numerical values for some of these criteria are suggested in order to give some guidance where this might be desired. National standards may adopt different numerical values if conditions so require.

The recommendations for criteria of deformation, and the suggestions for limiting values are presented in annex D (tables 1 and 2).

The methods used by the designer to try to ensure that the building complies with these criteria are not, in themselves, a matter for this International Standard. Nevertheless, in view of the wide range of acceptable values of some of the criteria, and in view also of the difficulties in estimating deformations, it is believed that both the designer and the controlling authority would welcome some guidance towards uniformity in specification and in the required degree of compliance, particularly as the economics of modern building designs are increasingly controlled by deformation and maintenance during use with the designer's overall responsibility being precisely defined. Some proposals are therefore made in regard to the methods that national standards should lay down for controlling the assessment of deformations.

1 SCOPE

This International Standard establishes the basic principles that should be adopted when setting up national standards, regulations and recommendations for the deformation of buildings at the limit states of serviceability.

2 FIELD OF APPLICATION

2.1 Types of building considered

This International Standard refers to the deformations at the serviceability limit states of buildings such as dwellings, offices, public buildings, and factories.

It does not refer to the deformations of bridges, roads, masts, underground works, non-residential farm buildings, or special-purpose buildings such as atomic power stations or industrial plant. Some of the general principles on which this International Standard is based may nevertheless serve as a guide when the deformations of such other structures are being considered.

2.2 Adjacent buildings

Whilst it is undesirable that the deformations of a building should damage adjacent buildings, or inconvenience their occupants or other members of the public, such matters are normally the subject of legislation and are not appropriate to this International Standard. Nevertheless, attention may here be drawn to the fact that the provision of movement joints between adjacent buildings and the avoidance of interference with neighbouring foundations are normal good building practice.

3 CAUSES OF DEFORMATIONS

Deformations are caused by major ground movements, by differential settlement of foundations, by environmental and occupational loads, by pre-stressing forces and by movements of building materials due to creep and change in temperature, moisture content and chemical composition.

4 DEFORMATIONS — EFFECTS AND REMEDIES

Besides possibly affecting the strength or stability of a structure, deformations may affect serviceability by causing damage to adjacent parts of the building, by disturbing or harming personnel, or by preventing proper use of the building.

In many such cases the designer may be able to avoid troublesome effects either by removing the original cause, or by taking suitable precautions in the processes of design and construction to permit some or all of the deformation to occur freely, before or after completion of the building, masking the remainder by suitable constructional or decorative treatment. This course of action has the advantage that it avoids the problem of precisely estimating the magnitudes of causes and their effects. It can be adopted when the deformations, and the constructional measures taken, do not conflict with other requirements of the design. Some troubles that may be dealt with in this way are listed in annex A.