
**Houses — Description of performance —
Part 2:
Structural serviceability**

Constructions d'habitation — Description des performances —

Partie 2: Aptitude au service de la structure

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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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15928-2 was prepared by Technical Committee ISO/TC 59, *Building construction*, Subcommittee SC 15, *Performance criteria for single family attached and detached dwellings*.

ISO 15928 consists of the following parts, under the general title *Houses — Description of performance*:

— *Part 1: Structural safety*

— *Part 2: Structural serviceability*

The following part is under preparation:

— *Part 3: Structural durability*

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Introduction

This part of ISO 15928 is one of a series under the general title: *Houses — Description of performance*. The objective of this series is to identify the methods used to describe the performance of houses. Each part will relate to a separate attribute. The parts specify levels of performance and they are not intended to replace national standards or regulations, but to provide a standardized framework to enable national standards and regulations to be developed in accordance with WTO requirements. The parts of ISO 15928 do not provide design methods and/or design criteria.

Based on the framework provided by ISO 15928, purchasers, regulators and standards writers in respective countries can describe their requirements in standardized performance terms. Additionally, the manufacturers/providers will be able to respond by describing the performance of their products in a similar manner. The purpose of ISO 15928 is to provide a standardized system that can be used to specify performance requirements and performance levels, or to rate houses in terms of structural serviceability.

NOTE World trade organisation (WTO) *Agreement on technical barriers to trade* (WTO 1997), Clause 2.8, states that "Whenever appropriate, members shall specify technical regulations based on product requirements in terms of performance, rather than design or descriptive characteristics".

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Houses — Description of performance —

Part 2: Structural serviceability

1 Scope

This part of ISO 15928 sets out a method for describing the structural serviceability performance of houses. This part of ISO 15928 covers user needs, provides performance descriptions, establishes parameter descriptions and outlines evaluation processes.

This part of ISO 15928 is intended for use in the evaluation of the design and construction of houses, in the international trading of houses or their sub-systems, and in developing quality systems for houses.

This part of ISO 15928 does not apply to structural safety, durability or other attributes that are covered in other parts of ISO 15928.

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2 Normative references (standards.iteh.ai)

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2394:1998, *General principles on reliability for structures*

ISO 4356:1977, *Bases for the design of structures — Deformations of buildings at the serviceability limit states*

ISO 10137:1992, *Bases for design of structures — Serviceability of buildings against vibration*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2394 and the following, apply.

3.1

house

building occupied for residential purposes, which can be separated or linked horizontally, but not linked vertically, which has its own access and does not share any space in common with another building

3.2

ground movement

displacement in any direction of the founding stratum by influences not solely dependent on the actions applied by the housing carcass

3.3

load

value of a force corresponding to an action

**3.4
parameters**

(structural serviceability) group of variables used to quantitatively describe the structural serviceability performance

NOTE Structural parameters consist of variables describing (i) magnitudes of the actions, (ii) magnitudes of structural response and (iii) other conditions that may affect the structural serviceability performance.

**3.5
gitting**

fixture, such as shelving, cupboards, equipment, etc., that is permanently fixed to the ceilings, walls, etc., of a house

**3.6
performance**

behaviour of houses related to users' needs

**3.7
equipment**

(hydraulic, mechanical electrical) device that is provided for use within a house

**3.8
component**

part of a house that can be identified

EXAMPLE Floor, wall.

NOTE Includes fixtures.

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**3.9
structural serviceability performance**

structural behaviour of a house for normal use under all expected actions that might affect the occupants and the functioning of the house

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4 Structural serviceability performance

4.1 User needs

The following characteristics of a house, for normal use and conditions, under all expected actions, should be kept within levels acceptable to the user:

- a) functioning and appearance of the house and its components;
- b) functioning of the occupants in the house;
- c) functioning of the equipment in the house;
- d) comfort of the occupants;
- e) asset value of the house.

NOTE The relative importance of each of these characteristics varies and is reflected in the performance requirements that are specified.

4.2 Performance description

The performance description is the ability of the whole house and its parts, with an appropriate degree of reliability, to perform within established parameters under all expected actions for normal use in terms of

- a) local damage, including cracking, (which can affect the efficiency and appearance of the house and its components),
- b) deformation (which can affect the efficient use or appearance of the house or the functioning of the people and equipments),
- c) vibration (which can cause discomfort or affect the activity of occupants or the functioning of equipments).

NOTE 1 The appropriate degree of reliability can be judged with due regard to the possible consequences of serviceability failure and the expense level of effort and procedures necessary to reduce those risk of failure. Aspects that are important in achieving the proper degree of reliability include choice of structural systems, design and analysis, durability design, quality control, maintenance and protective measures.

NOTE 2 Expected actions for normal use can include those arising from soil/structure interaction, probable ground movements, compatibility of connections between subsystems and the effects of openings.

NOTE 3 For the purposes of this standard, the durability of materials is not considered to have a bearing on the structural serviceability performance of the house.

4.3 Principles describing structural serviceability performance

The structural serviceability performance can be described by the structural actions on the house under normal use and the structural responses under the effect of those actions. Only actions and responses relevant to serviceability issues of concern need to be described.

NOTE For design specification, it is necessary to nominate the levels of structural actions and the acceptable limits of the structural responses corresponding to those levels of actions.

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5 Parameters for the description of performance

5.1 Parameters for describing action

5.1.1 Permanent actions

The permanent actions, other than self-weight, are described by the magnitude(s), expressed in kilonewtons, and the location(s) of the imposed load(s).

5.1.2 Imposed actions

The imposed actions are described by the representative values of one or more of the following:

- a) uniformly distributed floor or roof load, expressed in kilonewtons per square metre:
- b) concentrated floor or roof load, expressed in kilonewtons per: specified area, expressed in square metres;
- c) concentrated wall impact load, expressed in kilonewtons, applied at a specified height, expressed in metres, above the floor;
- d) uniformly distributed horizontal line load, expressed in kilonewtons per metre, applied at a specified height, expressed in meters, above the floor.

EXAMPLE A hand-rail.

NOTE ISO 2103^[1] provides minimum recommended imposed actions for different types of use and occupancy.

5.1.3 Wind actions

Wind actions are described by the representative value of the wind velocity, expressed in metres per second, under normal condition, derived from the basic wind speed, factored as appropriate to take into account local effects, terrain, shielding, topography, site altitude and the like, based on one of the following wind velocity types:

- a) 3 s gust;
- b) 1 min mean (fastest mile);
- c) 10 min mean;
- d) hourly mean.

NOTE ISO 4354 [2] provides details on the conversion of wind velocity to wind forces and the conversion between different types of wind velocity.

5.1.4 Seismic actions

Seismic actions are described by stating the representative value, under normal condition, of one of the following parameters:

- a) effective peak ground acceleration, expressed as a fraction of gravity;
- b) base shear coefficient;
- c) horizontal force applied to the structure, in kilonewtons, and its location;
- d) ground acceleration response spectrum for the site;
- e) floor acceleration response (for equipment and fittings).

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NOTE 1 Item e) relates to phenomena where equipment and/or fittings cannot be used due to the acceleration.

If either a) or b) is used, then the proportion of the imposed loads to be included in the seismic mass shall also be nominated. The representative value shall be based on a consideration of the seismic activity, the soil characteristics of the construction site and the response behaviour of the structure.

NOTE 2 ISO 3010 [3] provides additional information on seismic action on structures.

5.1.5 Snow actions

The snow actions are described by stating the representative values, under normal conditions, of the following:

- a) ground snow depth, expressed in metres, derived from the basic snow depth, factored to take into account local effects such as terrain, shielding, topography and the like;
- b) snow density, expressed in kilograms per cubic metre, i.e., the density used in converting the ground snow depth into a load;
- c) duration, in days per year.

NOTE ISO 4355 [4] provides information on the conversion of ground snow depths to roof snow loads.

5.1.6 Vibration sources

Consideration shall be given to the description of vibration sources inside and outside the house, such as that caused by machinery, vehicular traffic and human activity, if these sources affect the occupants of the house on a regular basis.

NOTE ISO 10137 ^[5] provides information on the description of vibration sources.

5.1.7 Impact sources

If these impacts are likely to occur during normal use, consideration shall be given to the description of impact sources due to human activities or the environment in terms of the following:

- a) specified in mass, expressed in kilograms;
- b) specified energy, expressed in joules;
- c) type of impact (soft or hard body impact).

EXAMPLE Accidental human body impacts due to slip, trip and fall (soft body impact) and impacts of falling objects (hard body impact).

NOTE ISO 7892 ^[6] provides information on impact test on vertical building elements.

5.1.8 Actions derived from fittings

Consideration shall be given to the description of actions resulting from fittings in terms of a load, expressed in kilonewtons, at a specific location, such as on a ceiling, on a wall or at a distance from a wall.

EXAMPLE Examples of wall-mounted fittings are cupboards and mirrors, and of ceiling-mounted fittings, lights and fans.

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NOTE Depending on the situation, an action arising from "fittings" can be categorized as, for example, the following:

- a) imposed action;
- b) vibration sources;
- c) impact sources.

5.1.9 Other actions

Consideration shall be given to the description of other actions, if these actions are likely to affect the structural serviceability of the house.

5.1.10 Combinations of actions

Consideration shall be given to the description of the combinations of the actions to account for the probability of simultaneous occurrence of two or more actions.