
**Performance and assessment
requirements for design standards on
structural concrete**

*Exigences de performance et d'évaluation pour la conception des
normes relatives au béton structurel*

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information.

The committee responsible for this document is ISO/TC 71, *Concrete, reinforced concrete and pre-stressed concrete*, Subcommittee SC 4, *Performance requirements for structural concrete*.

This third edition cancels and replaces the second edition (ISO 19338:2007), of which it constitutes a minor revision. It also incorporates the Technical Corrigenda ISO 19338:2007/Cor, 1:2008 and ISO 19338:2007/Cor, 2:2009.

Introduction

Concrete is the most popular material used in the construction market. Presently, about one-third of a ton of concrete is produced each year for every human being in the world (some 2 billion tons per year).

International Standards on concrete technology can play a significant role for improving the global trade climate. International Standards in the field of concrete and its use in civil infrastructure are ever more needed as the economic development of the world continues.

ISO/TC 71/SC 4 was established to develop standards for performance requirements of structural concrete. This International Standard gives the performance and assessment requirements for design standards on concrete structures. It is an umbrella-type document with general provisions and guidelines intended to provide wide latitude of choice in terms of general requirements for performance and assessment of concrete structures. It should be used, therefore, in conjunction with sound engineering judgment.

National and regional standards are generally more prescriptive in nature than International Standards and vary somewhat from region to region.

In a document accessible at http://isotc.iso.org/livelink/livelink/Open/ISO_19338, ISO/TC 71/SC 4 has defined a procedure to assess whether a national or regional standard can be deemed to satisfy this International Standard. This separate document also gives the list of national and regional standards that so far have gone through the procedure and are deemed to satisfy this International Standard.

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Performance and assessment requirements for design standards on structural concrete

1 Scope

This International Standard provides performance and assessment requirements for design standards of structural concrete. It can be used for international harmonization of design and construction requirements.

This International Standard includes

- a) requirements, which define the required structural concrete performance,
- b) criteria, which give means for expressing the requirements, and
- c) assessment clauses, which give acceptable methods of verifying the specific criteria.

2 Normative references

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

ISO 2394, *General principles on reliability for structures*

ISO 6241, *Performance standards in building — Principles for their preparation and factors to be considered*

ISO 7162, *Performance standards in building — Contents and format of standards for evaluation of performance*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

accidental load

actions whose chance of occurrence is very small but intensity is very large compared with variable actions

3.2

action

assembly of concentrated or distributed mechanical forces acting on/in a structure (direct actions), deformations imposed on the structure or contained within it (indirect actions), or *environmental actions* (3.7)

3.3

analysis

acceptable methods of evaluating the performance index or verifying the compliance of specific criteria

Note 1 to entry: Analysis may also be called assessment.

3.4

criteria

means of expressing the performance requirements for structural concrete by specific technical values and appropriate limits

**3.5
design service life**

period for which the structure or structural element is to be used for its intended purpose with anticipated maintenance but without substantial repair being necessary

**3.6
durability**

ability of a structure or structural element to assure no deterioration that is harmful to required performance in the relevant environment

**3.7
environmental actions**

assembly of physical, chemical, or biological influences which may cause restraint effects or deterioration to the materials making up the structure, which in turn may adversely affect its serviceability, restorability, and safety

**3.8
experimental analysis**

use of physical models to determine load-carrying capacity and serviceability of prototype design

**3.9
limit state**

critical state specified using a performance index, beyond which the structure no longer satisfies the design performance requirement

**3.10
limit states design**

design procedure where actions under factored loads are used to determine structural response and where resistance at limit state conditions is made equal to or greater than the response

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**3.11
load factors**

multiplier(s) applied to load

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**3.12
maintenance**

total set of activities performed during the design service life of the structure to enable it to fulfil the performance requirements

**3.13
models**

simplified mathematical descriptions of actions simulating experimental setup, material properties, the behaviour of a structure, etc.

**3.14
partial safety factors for materials**

devisors applied to the material characteristic strength in general conformance with reliability-based design requirements

Note 1 to entry: See also *resistance factor* (3.21).

**3.15
performance evaluation**

procedure where actions at service load are used to determine structural response and limits are placed on response at service loads

**3.16
performance requirement**

definition of the required structural performance in designed concrete structures

3.17**permanent load**

self-weights of structures including permanent attachments

3.18**reliability**

ability of a structure or structural element to fulfil the specified requirements during design service life of the structure

3.19**representative value of action**

value of action used for the verification of criteria

3.20**resistance**

ability of a member to bear loads or section forces

Note 1 to entry: The resistance is also used to control response values, such as permissible crack width and deflection.

3.21**resistance factor**

multiplier applied to resistance in general conformance with reliability-based design requirements

Note 1 to entry: When applied to materials, these multipliers may also be called **material factors**. See *partial safety factors for materials* (3.14).

3.22**robustness**

ability of a structure not to be damaged by events like fire, explosions, impact, or consequences of human errors, to an extent disproportionate to the original cause

3.23**restorability**

ability of a structure or structural element to be repaired physically and economically when damaged under the effects of considered actions

3.24**safety**

ability of a structure or structural element to assure no casualty to users of, and people around, the structure, within the limits of acceptable probability

3.25**serviceability**

ability of a structure or structural elements to provide appropriate behaviour or functionality in use under the effects of considered actions at serviceability limit state

3.26**structural integrity**

ability of a structure to avoid widespread collapse when localized damage occurs

3.27**variable load**

weights of moving objects on structures, as well as any other loads whose intensity is variable, including traffic loads, wave loads, wind loads, water pressures, earth pressures, and loads induced by temperature

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