International Standard

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Second edition

Concrete —

Part 1: Methods of specifying and guidance for the specifier

Béton —

Partie 1: Méthodes de spécification et lignes directrices pour le spécificateur

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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 document 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).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 71, *Concrete, reinforced concrete and pre-stressed concrete*, Subcommittee SC 3, *Concrete production and execution of concrete.*

This second edition cancels and replaces the first edition (ISO 22965-1:2007), which has been technically revised.

The main changes are as follows:

— addition of references reflecting relevant new developments (i.e. the ISO 13315 series);

— addition of exposure classes (see Annex A), in order to reflect the diversity of environments in which structures are located;

— alignment with the class of slump with ISO 1920-2 (see Annex A).

A list of all parts in the ISO 22965 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document is intended for nations that have no national concrete standard. It sets out a framework of principles for nations revising their national standards. This document can also be applied to specific projects where a project specification supplements the standards in lieu of a national annex applicable at the place of use.

This document is applied under various climatic and geographical conditions, various levels of protection and under different established regional traditions and experience. Consequently, this document includes classes for concrete with different properties to cover the most frequent and typical situations. For certain uses of concrete, additional or deviating rules can be necessary. The national provisions, preferably given in a national annex to this document, or the project specification can specify any additional or deviating requirements.

Some ISO member bodies have developed local tests and criteria for performance-based specifications. This document does not exclude the continuation and development of such practices valid in the place of use of the concrete as an alternative to the prescriptive approach. These requirements must be specified in the national annex or national complementary provisions. The Model Code for Service Limit Design (MC-SLD) was published as ISO 16204 in 2012.

This document incorporates rules for the use of constituents that are covered by International Standards. For materials for which International Standards have not yet been published, the standards cited in the national annex (often the regional or national standards) apply (see 5.1). In particular, documents in current use for by-products of industrial processes, recycled materials, etc. are based on local experience. Until international specifications for these materials are available, this document does not provide rules for their use, but instead refers to the national annex.

This document defines the two parties involved in the ordering and the supply of concrete, which are hereinafter referred to as specifier and supplier. In practice, there can be several parties specifying requirements at various stages of the design and construction process, e.g. the client, the designer, the quantity surveyor, the constructor and the concreting subcontractor. Each is expected to pass the specified requirements, together with any additional requirements, to the next party in the chain until they reach the supplier. In the terms of this document, this final compilation of requirements is known as the “concrete specification”. In some cases, the specifier and the supplier are the same party (e.g. a constructor doing design, production and execution). In the case of ready-mixed concrete, the purchaser is the specifier.

This document also gives rules for the exchange of information between the parties. Contractual matters are not covered by this document. Other International Standards for specific products, e. g. pre-cast products, or for processes within the field of the scope of this document, can require or permit deviations from this document.

Concrete —

Part 1:
Methods of specifying and guidance for the specifier

1 Scope

This document specifies requirements for the specification of concrete and gives guidelines for the exchange of information between the specifier and supplier. Annex A gives general guidance on specification. More specific guidance on specification related to the local conditions can be given in a national annex.

This document applies to concrete for structures cast in situ, pre-cast structures and structural pre-cast products for buildings and civil engineering structures. The concrete can be mixed on site, ready-mixed concrete or produced in a plant for pre-cast concrete products.

This document applies to concrete compacted to retain no appreciable amount of entrapped air other than entrained air and to normal-weight, heavy-weight, and light-weight concrete.

This document does not apply to:

— concrete with a maximum aggregate size equal to or less than 4 mm or 5 mm (mortar);

— aerated concrete;

— foamed concrete;

— concrete with an open structure ("no-fine aggregate" concrete);

— concrete with a density less than 800 kg/m^3;

— refractory concrete.

This document does not cover health and safety requirements for the protection of workers during production and delivery of concrete.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 22965-2, *Concrete — Part 2: Specification of constituent materials, production of concrete and conformance of concrete*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
addition
finely divided or ground material used in *concrete* (3.7) to improve certain properties or to achieve special properties

Note 1 to entry: This document deals with two types of additions:

— nearly inert additions (type I);

— pozzolanic or latent hydraulic additions (type II).

3.2
admixture
material added during the mixing process of *concrete* (3.7) in small quantities relative to the mass of cement to modify the properties of *fresh concrete* (3.14) or *hardened concrete* (3.15)

3.3
aggregate
granular mineral material suitable for use in *concrete* (3.7)

Note 1 to entry: Aggregates can be natural, artificial, or recycled from material previously used in construction, e.g., recycled concrete aggregate.

3.4
batch
quantity of *fresh concrete* (3.14) produced in one cycle of operations of a mixer, or the quantity discharged during 1 min from a continuous mixer or quantity of *concrete* (3.7) transported in a vehicle

Note 1 to entry: For testing to be performed at site, the concrete transported as one load in a vehicle can be considered as one batch.

3.5
cement
<hydraulic binder> finely ground inorganic material that, when mixed with water, forms a paste that sets and hardens by means of hydration reactions and processes and that, after hardening, retains its strength and stability even under water

3.6
characteristic strength
value of strength below which 5 % of the population of all possible strength determinations of the volume of *concrete* (3.7) under consideration are expected to fall

3.7
concrete
material formed by mixing *cement* (3.5), coarse and fine *aggregate* (3.3) and water, with or without the incorporation of *admixtures* (3.2) and *additions* (3.1), which develops its properties by hydration of the *cement* (3.5)

Note 1 to entry: International Standards for aggregate can define aggregates larger than 4 mm or 5 mm as coarse. In concrete for general-purpose use, the coarse aggregate should normally have a maximum aggregate size of at least 16 mm.

3.8
conformance test
test performed to verify that the *concrete* (3.7) conforms to some aspect of the *specification* (3.28)

3.9
delivery
process of handing over the *fresh concrete* (3.14) by the *producer* (3.23)

3.10
designed concrete
concrete (3.7) for which the minimum *characteristic strength* (3.6), other required properties and additional characteristics are specified to the *supplier* (3.31) who is responsible for providing a *concrete* (3.7) conforming to the specified minimum *characteristic strength* (3.6), any other specified properties and any specified additional characteristics

3.11
entrained air
microscopic air bubbles, typically between 10 µm and 300 µm in diameter and spherical or nearly so, intentionally incorporated in *concrete* (3.7) during mixing, usually by use of a surface-active agent

3.12
entrapped air
air voids in *concrete* (3.7) that are not purposely entrained

3.13
environmental actions
chemical and physical actions to which the *concrete* (3.7) is exposed that result in effects on the *concrete* (3.7) or reinforcement or embedded metal that are not considered as loads in structural design

3.14
fresh concrete
fully mixed concrete that is still capable of being compacted by the intended method

3.15
hardened concrete
concrete that is in a solid state and which has developed a certain strength

3.16
heavy-weight concrete
concrete having an oven-dry density greater than 2 600 kg/m^3

3.17
identity test
test to determine whether the concrete represented by one or more *batches* (3.4) comes from a conforming population

3.18
light-weight aggregate
aggregate (3.3) of mineral origin having an oven-dry particle density ≦ 2 000 kg/m^3 or in case oven-dry particle density cannot be measured, a loose oven-dry bulk density ≦ 1 200 kg/m^3

3.19
light-weight concrete
concrete (3.7) having an oven-dry density of not less than 800 kg/m^3 and not more than 2 000 kg/m^3

Note 1 to entry: It is produced using light-weight aggregate for all or part of the total aggregate.

3.20
maximum aggregate size
largest aggregate size used in the *concrete* (3.7)

Note 1 to entry: The requirements for aggregate size in standards often allow a small percentage to be retained on the upper sieve size.

3.21
pre-cast concrete product
concrete product cast and cured in a place other than the final location of use

3.22
prescribed concrete
concrete (3.7) for which the composition of the concrete and the constituents to be used are specified to the *supplier* (3.31) who is responsible for providing a concrete with the specified composition

3.23
producer
person or body producing *fresh concrete* (3.14)

Note 1 to entry: This document uses the terms "producer" and "supplier" in order to be able to distinguish between the technical and commercial sides. In the case of ready-mixed concrete, the practices can vary between countries, but in most cases, the producer and the supplier are the same.

3.24
ready-mixed concrete
concrete delivered in a fresh state to the *site* (3.25) by a *supplier* (3.31) to a *specifier* (3.29) who is the purchaser

3.25
site
area where the construction work is undertaken, including any land immediately adjacent to the construction specifically used for the purpose of setting up a batching plant

3.26
site-mixed concrete
concrete (3.7) produced on the *site* (3.25)

3.27
specific suitability
suitable for use in the specified concrete

3.28
specification
all documented technical requirements necessary to produce and deliver the *concrete* (3.7)

3.29
specifier
person or body specifying *fresh concrete* (3.14) for the execution of a construction or a component

3.30
standardized prescribed concrete
concrete (3.7) for which the composition is given in a standard valid in the place of use of the *concrete* (3.7)

3.31
supplier
person or body supplying *ready-mixed concrete* (3.24)

3.32
user
person or body using *fresh concrete* (3.14)

3.33
water/cement ratio
ratio of the effective water content to *cement* (3.5) content by mass in the *fresh concrete* (3.14)

Note 1 to entry: Effective water content is the difference between the total water present in the fresh concrete and the water absorbed by the aggregates.

Note 2 to entry: Total water content is the added water plus water already contained in the aggregates and on the surface of the aggregates plus water in the admixtures and in additions used in the form of a slurry and water resulting from any added ice or steam heating.