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Aggregates for concrete — Test methods for mechanical and physical properties —

Part 1: Determination of bulk density, particle density, particle mass-per-volume and water absorption

Granulats pour béton — Méthodes d'essai relatives aux propriétés mécaniques et physiques —

Partie 1: Détermination de la masse volumique apparente, de la masse volumique des particules, de la masse volumique réelle et de l'absorption d'eau

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Foreword

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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).

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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 1, *Test methods for concrete*.

This edition of ISO 20290-1, together with ISO 20290-2 and ISO 20290-3, cancels and replaces ISO 6274:1982, ISO 6782:1982, ISO 6783:1982 and ISO 7033:1987, which have been technically revised.

A list of all parts in the ISO 20290 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.

Aggregates for concrete — Test methods for mechanical and physical properties —

Part 1: Determination of bulk density, particle density, particle mass-per-volume and water absorption

1 Scope

This document describes procedures for determining certain properties of aggregates for use in concrete for the determination of the loose or compacted bulk density, the determination of particle density and water absorption using the hydrostatic balance method and the determination of the particle mass-per-volume and water absorption using the Pycnometer method.

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 565, *Test sieves — Metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings*

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
bulk density
ratio obtained by dividing the mass of a sample of aggregate filling a specified container by the known volume of the container, expressed in units of mass per unit volume, i.e. kilograms per cubic (1) meter (kg/m^3)

Note 1 to entry: In some countries, the phrases "unit mass", "unit weight" and "density" are used instead.

3.2
particle density
ratio obtained by dividing the mass of a sample of aggregate particles by the volume, including both permeable and impermeable pores within the particles (but not including the voids between the particles)

Note 1 to entry: It is expressed as a mass per unit volume, i.e. kilograms per cubic meter (kg/m^3).

3.3
oven dry density
ratio obtained by dividing the mass of a sample of aggregate particles heated in an oven until reaching a constant mass by the volume including both permeable and impermeable pores within the particles (but not including the voids between the particles)

3.4
saturated surface dry density
ratio obtained by dividing the mass of a sample of aggregate particles and water contained in its permeable voids by the volume including both permeable and impermeable pores within the particles (but not including the voids between the particles)

3.5
water absorption
increase in mass of an aggregate sample due to water penetration into the pores of the dry aggregate particles (to exclude water adhering to the outside surface of the particles) during a prescribed period of time

Note 1 to entry: It is expressed as a percentage of the dry mass.

3.6
constant mass
mass determined after successive weighings at least 1 h apart not differing by more than 0,1 %

4 Determination of bulk density

4.1 Principle

The determination of the loose or compacted bulk density of dry or moist aggregates (normal or lightweight) for concrete is defined by weighing of the aggregate sample using a constant volume container.

4.2 Apparatus and materials

4.2.1 Cylindrical container, with a smooth inside, fitted with handles and with dimensions approximately like those given in Table 1.

The container shall be watertight, corrosion resistant, and sufficiently rigid to retain its dimensions despite rough usage. The top rim shall be smooth, planar to within 0,25 mm and parallel to the base to within 0,5°. The ratio of the height of the container to its diameter shall be within the range 0,5 to 1,5.

Table 1 — Minimum capacity of container depending on aggregate size

Maximum size of aggregate mm	Capacity l
4	1
8	2,5
16	5
31,5	15
63	30
Note Other sizes of aggregates maybe different as valid in the place of use.	

4.2.2 Balance, accurate to 0,2 % of the mass of the material to be weighed.