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Preskušanje svežega betona - 7. del: Vsebnost zraka - Metode s pritiskom

Testing fresh concrete - Part 7: Air content - Pressure methods

Prüfung von Frischbeton - Teil 7: Luftgehalt - Druckverfahren

Essais pour béton frais - Partie 7 : Teneur en air - Méthode de la compressibilité

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ICS:

91.100.30	Beton in betonski izdelki	Concrete and concrete products

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English Version

Testing fresh concrete - Part 7: Air content - Pressure methods

Essais pour béton frais - Partie 7 : Teneur en air - Méthode de la compressibilité

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (prEN 12350-7:2017) has been prepared by Technical Committee CEN/TC 104 "Concrete and related products", the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

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

This document will supersede EN 12350-7:2009.

The results of a laboratory inter-comparison, in part funded by the EC under Measurement and Testing Programme, Contract MAT1-CT-94-0043 which investigated these two methods of measuring air content, did not find significant difference between them. However, it was found in this programme that the use of an internal vibrator to compact specimens of air entrained fresh concrete should only be done with caution, if loss of entrained air is to be avoided.

The determination of the aggregate correction value for the two methods has been included in normative Annexes A and B.

The method of calibrating the two types of apparatus has been included in normative Annexes C and D.

This standard is one of a series concerned with testing concrete.

This series EN 12350, *Testing fresh concrete*, includes the following parts:

— *Part 1: Sampling and common apparatus*

— *Part 2: Slump test*

— *Part 3: Vebe test*

— *Part 4: Degree of compactability*

— *Part 5: Flow table test*

— *Part 6: Density*

— *Part 7: Air content – Pressure methods*

— *Part 8: Self-compacting concrete – Slump-flow test*

— *Part 9: Self-compacting concrete – V-funnel test*

— *Part 10: Self-compacting concrete – L-box test*

— *Part 11: Self-compacting concrete – Sieve segregation test*

— *Part 12: Self-compacting concrete – J-ring test*

The following amendments have been made to the 2009 edition of this standard:

a) editorial revisions;

b) reference to common apparatus and specification given in EN 12350-1.

1 Scope

This European Standard describes two methods for determination of air content of compacted fresh concrete, made with normal weight or relatively dense aggregate and having a declared value of D of the coarsest fraction of aggregates actually used in the concrete (D_{max}) not greater than 63 mm.

The test is not suitable for concretes with slumps less than 10 mm.

Neither method is applicable to concretes made with lightweight aggregates, air cooled blast-furnace slag, or aggregates with high porosity, because of the magnitude of the aggregate correction factor, compared with the entrained air content of the concrete.

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.

EN 12350-1, *Testing fresh concrete - Part 1: Sampling*

EN 12350-6, *Testing fresh concrete - Part 6: Density*

3 Principles

3.1 General

There are two test methods, both of which use apparatus which employ the principle of Boyle-Mariotte's law. For the purpose of reference, the two methods are referred to as the water column method and the pressure gauge method and the apparatus as a water column meter and a pressure gauge meter.

If the concrete is sampled and tested at different locations, the procedure for filling and compacting the concrete in the air test container shall be the same irrespective of the method used.

3.2 Water column method

Water is introduced to a predetermined height above a sample of compacted concrete of known volume in a sealed air test container and a predetermined air pressure is applied over the water. The reduction in volume of the air in the concrete sample is measured by observing the amount by which the water level is lowered, the water column being calibrated in terms of percentage of air in the concrete sample.

3.3 Pressure gauge method

A known volume of air at a known pressure is merged in a sealed air test container with the unknown volume of air in the concrete sample. The dial on the pressure gauge is calibrated in terms of percentage of air for the resulting pressure.

4 Water column method

4.1 General

The apparatus listed below for the execution of this test method shall be in accordance with the specification given EN 12350-1 and as specified below.

4.2 Apparatus

4.2.1 Water column meter, (see Figure 1), consisting of:

a) **Air test container**, a cylindrical vessel of steel or other hard metal, not readily attacked by cement paste, having a nominal capacity of at least 5 l and a ratio of diameter to height of not less than 0,75 nor more than 1,25. The outer rim and upper surface of the flange and the interior surfaces of the vessel shall be machined to a smooth finish. The air test container shall be watertight and in addition it, and the cover assembly, shall be suitable for an operating pressure of approximately 0,1 MPa (N/mm^2) and be sufficiently rigid to limit the pressure expansion constant, *e* (see C.5), to not more than 0,1 % air content;

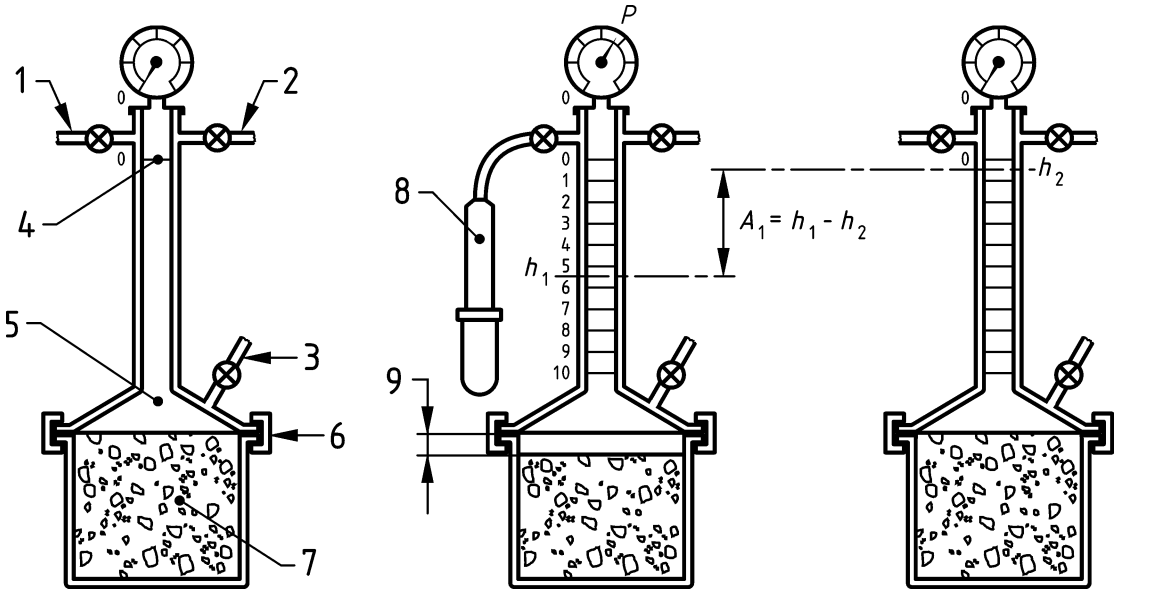
b) **Cover assembly**, a flanged rigid conical cover fitted with a standpipe. The cover shall be of steel or other hard metal not readily attacked by cement paste and shall have interior surfaces inclined at not less than 10° from the surface of the flange. The outer rim and lower surface of the flange and the sloping interior face shall be machined to a smooth finish. The cover shall have provision for being clamped to the air test container to make a pressure seal without entrapping air at the joint between the flanges of the cover and the air test container;

c) **Standpipe**, consisting of a graduated glass tube of uniform bore, or a metal tube of uniform bore with a glass gauge attached. The graduated scale shall indicate air content of 0 % to at least 8 % and preferably 10 %. The scale shall be graduated with divisions every 0,1 %, the divisions being not less than 2 mm apart. A scale in which 25 mm represents 1 % of air content is convenient;

d) **Cover**, fitted with a suitable device for venting the air chamber, a non-return air inlet valve and a small valve for bleeding off water. The applied pressure shall be indicated by a pressure gauge connected to the air chamber above the water column. The gauge shall be graduated with divisions every 0,005 MPa (N/mm^2), the divisions being not less than 2 mm apart. The gauge shall have a full scale reading of 0,2 MPa (N/mm^2);

e) **Deflecting plate or spray tube**, of a thin non-corrodible disc of not less than 100 mm diameter to minimize disturbance of the concrete when water is added to the apparatus. Alternatively a brass spray tube of appropriate diameter which may be an integral part of the cover assembly or provided separately. The spray tube shall be constructed so that when water is added to the air test container it is sprayed onto the walls of the cover in such a manner as to flow down the sides causing minimum disturbance to the concrete;

f) **Air pump**, with a lead facilitating connection to the non-return air inlet valve on the cover assembly. The meter shall be in calibration at the time of the test, using the procedure in Annex C. If the meter has been moved to a location which differs in elevation by more than 200 m from the location at which it was last calibrated, it shall be recalibrated.



a) Zero pressure

b) System operating at pressure P

c) Zero pressure release of pressure P

Key

1	Non-return valve	7	Concrete
2	Air vent or valve	8	Air pump
3	Bleed valve	9	Pressure lowered level
4	Mark	h_1	(reading at pressure P)
5	Water	h_2	(reading at zero pressure after release of pressure P)
6	Clamp		

Figure 1 — Water column method apparatus

NOTE $h_1 - h_2 = A_1$ when the air test container holds concrete as shown in Figure 1.

$h_1 - h_2 = G$ (aggregate correction factor) when the air test container holds only aggregate and water

$A_1 - G = A_c$ (air content of concrete)

4.2.2 Means of compacting the concrete, which may be one of the following:

a) Internal (poker) vibrator;

b) Vibrating table;

c) Compacting rod;

d) Compacting bar.

4.2.3 Scoop

4.2.4 Steel trowel or float

4.2.5 Remixing container or tray