

Testing fresh concrete —

Part 7: Air content — Pressure methods

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British Standard

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National foreword

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The UK participation in its preparation was entrusted by Technical Committee B/517, Concrete, to Subcommittee B/517/1, Production and testing, which has the responsibility to:

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- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 16, an inside back cover and a back cover.

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This European Standard was approved by CEN on 1 November 1999.

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC104, Concrete (performance, production, placing and compliance criteria), the Secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2000, and conflicting national standards shall be withdrawn at the latest by December 2003.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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

A draft for this standard was published in 1996 for CEN enquiry as prEN 12395. It was one of a series of individually numbered test methods for fresh or hardened concrete. For convenience it has now been decided to combine these separate draft standards into two new standards with separate parts for each method, as follows:

- Testing fresh concrete (EN 12350);
- Testing hardened concrete (EN 12390);
- Testing concrete in structures (EN 12504).

This series EN 12350 includes the following parts where the brackets give the numbers under which particular test methods were published for CEN enquiry:

EN 12350 Testing fresh concrete

Part 1: Sampling (former prEN 12378:1996);
Part 2: Slump test (former prEN 12382:1996);
Part 3: Vebe test (former prEN 12350:1996);
Part 4: Degree of compactability (former prEN 12357:1996);
Part 5: Flow table test (former prEN 12358:1996);
Part 6: Density (former prEN 12383:1996);
Part 7: Air content – Pressure methods (former prEN 12395:1996).

The standard is based on the draft International Standard ISO 4848, *Concrete – Determination of air content of freshly mixed concrete – Pressure method: First edition – 1980-03-15*. Like the ISO standard it specifies two types of meters for carrying out the test, the water column meter and the pressure gauge meter.

The results of a recent 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.

Caution When cement is mixed with water, alkali is released. Take precautions to avoid dry cement entering the eyes, mouth and nose whilst mixing concrete. Prevent skin contact with wet cement or concrete by wearing suitable protective clothing. If cement or concrete enters the eye, immediately wash it out thoroughly with clean water and seek medical treatment without delay. Wash wet concrete off the skin immediately.

1 Scope

This standard describes two methods for determination of air content of compacted fresh concrete, made with normal weight or relatively dense aggregate of maximum size 63 mm.

NOTE: 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

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 12350-1:1999

Testing fresh concrete – Part 1: Sampling.

EN 12350-6:1999

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.

3.2 Water column method

Water is introduced to a predetermined height above a sample of compacted concrete of known volume in a sealed 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 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 Apparatus

4.1.1 **Water column meter**, an example of which is shown in Figure 1, consisting of:

- a) **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 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 A.8), 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 container to make a pressure seal without entrapping air at the joint between the flanges of the cover and the container;