

Testing concrete —

Part 106: Methods for determination of air content of fresh concrete

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This British Standard was published under the direction of the Cement, Gypsum, Aggregates and Quarry Products Standards Committee CAB/-. Its preparation was entrusted to Technical Committee CAB/4 upon which the following bodies were represented:

- British Aggregate Construction Materials Industries
- British Precast Concrete Federation Ltd.
- British Ready Mixed Concrete Association
- Cement Admixtures Association
- Cement and Concrete Association
- Cement Makers' Federation
- Concrete Society Limited
- County Surveyor's Society
- Department of the Environment (PSA)
- Department of the Environment (Building Research Establishment)
- Department of the Environment (Transport and Road Research Laboratory)
- Department of Transport
- Electricity Supply Industry in England and Wales
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- National Federation of Building Trades Employers
- Royal Institute of British Architects
- Royal Institution of Chartered Surveyors
- Sand and Gravel Association Limited
- Society of Chemical Industry

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- British Civil Engineering Test Equipment Manufacturers' Association
- Coopted members

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Foreword

This Part of this British Standard, prepared under the direction of the Cement, Gypsum, Aggregates and Quarry Products Standards Committee, is a revision of clause 6 of BS 1881-2:1970. This revision includes two methods of measuring the total air content, one of which is a revision of the method included in the 1970 edition.

Testing in accordance with both methods given in this Part of this standard will comply with ISO 4848. Together with Parts 102, 103, 104 and 107, this Part of BS 1881 supersedes BS 1881-2:1970, which is withdrawn.

No estimate of repeatability or reproducibility is given in this Part of this British Standard. Reference should be made to BS 5497-1 for further information on the determination of repeatability and reproducibility.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of this British Standard describes two methods for determination of air content of compacted fresh concrete, made with normal weight or relatively dense aggregate having a nominal maximum size of 40 mm or less. Neither of the methods is applicable to aerated concrete, very stiff concrete which cannot be compacted by vibration alone nor to concrete made with lightweight aggregates, air cooled blast-furnace slag or aggregates of high porosity.

NOTE The titles of publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of this British Standard, the definitions given in BS 5328 and BS 1881-101 apply.

3 Sampling

Obtain the sample of fresh concrete by the procedure given in BS 1881-101 or BS 1881-125. Commence the determination of air content as soon as possible after sampling.

4 Preparing the sample for test

4.1 Apparatus

4.1.1 Sampling tray, minimum dimensions 900 mm × 900 mm × 50 mm deep of rigid construction and made from a non-absorbent material not readily attacked by cement paste.

4.1.2 Square mouthed shovel, size 2 in accordance with BS 3388.

4.2 Procedure. Empty the sample from the container(s) on to the sampling tray. Ensure that no more than a light covering of slurry is left adhering to the container(s).

Thoroughly mix the sample by shovelling it to form a cone on the sampling tray and turning this over with the shovel to form a new cone, the operation being carried out three times. When forming the cones deposit each shovelful of the material on the apex of the cone so that the portions which slide down the sides are distributed as evenly as possible and so that the centre of the cone is not displaced. Flatten the third cone by repeated vertical insertion of the shovel across the apex of the cone, lifting the shovel clear of the concrete after each insertion.

NOTE The following modifications to the mixing procedures may be necessary when preparing samples of very high workability concrete (e.g. superplasticized concrete) for test.

a) *Sampling tray.* The vertical lips on the edges of the tray may have to be larger to contain the sample without spillage during mixing.

b) *Mixing the sample.* The coning procedure is not suitable for very high workability concrete and the following alternative method of mixing is recommended. Having poured the concrete on to the sampling tray, use the shovel to turn the concrete from the outside toward the centre, working progressively once round all sides of the sampling tray.

CAUTION. When cement is mixed with water, alkali is released. Take precautions to avoid dry cement entering the eyes, mouth and nose when 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.

5 Method A

5.1 General. In this method, the operational principle consists of introducing water to a predetermined height above a sample of concrete of known volume and the application of a predetermined air pressure over the water. The reduction in volume of the air in the concrete sample is measured by observing the amount the water level is lowered under the applied pressure, the latter amount being calibrated in terms of percentage of air in the concrete sample.

5.2 Apparatus

5.2.1 General. The apparatus, one form of which is shown diagrammatically in Figure 1, consists of the following.

5.2.2 Container. A flanged 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 100 kN/m² and be sufficiently rigid to limit the pressure expansion constant, *D*, (see 5.3.4) to not more than 0.1 % air content.

5.2.3 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.