

BS 1881-113:2011



BSI Standards Publication

Testing concrete – Part 113: Method for making and curing no-fines test cubes

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 6, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 1881 was published by BSI and came into effect on 30 November 2011. It was prepared by Subcommittee B/517/1, *Concrete production and testing*, under the authority of Technical Committee B/517, *Concrete and related products*. A list of organizations represented on these committees can be obtained on request to their secretary.

Supersession

This part of BS 1881 supersedes BS 1881-113:1983, which is withdrawn.

Relationship with other publications

BS 1881 contains test methods for concrete currently used in the UK which are not covered by BS EN 12350, BS EN 12390 and BS EN 12504. Reference is made to the relevant part of BS EN 12350, BS EN 12390 and BS EN 12504 where appropriate. These test methods should be used in conjunction with BS EN 206-1.

BS 1881 is published in the following parts:

- BS 1881-113, *Method for making and curing no-fines cubes*;
- BS 1881-119, *Method for determination of compressive strength using portions of beams broken in flexure (equivalent cube method)*;
- BS 1881-122, *Method for determination of water absorption*;
- BS 1881-124, *Methods for analysis of hardened concrete*;
- BS 1881-125, *Method for mixing and sampling fresh concrete in the laboratory*;
- BS 1881-128, *Method for analysis of fresh concrete*;
- BS 1881-129, *Method for the determination of density of partially compacted semi-dry fresh concrete*;
- BS 1881-130, *Method for temperature matched curing of concrete specimens*;
- BS 1881-131, *Methods for testing cement in a reference concrete*;
- BS 1881-201, *Guide to the use of non-destructive methods of test for hardened concrete*;
- BS 1881-204, *Recommendations on the use of electromagnetic covermeters*;
- BS 1881-206, *Recommendations for determination of strain in concrete*;
- BS 1881-207, *Recommendations for the assessment of concrete strength by near-to-surface tests*;
- BS 1881-208, *Recommendations for the initial surface absorption of concrete*;
- BS 1881-209, *Recommendations for the measurement of dynamic modulus of elasticity of concrete*;
- DD 216, *Determination of chloride content of fresh concrete*.

Information about this document

This is a full revision of the standard, and brings it in line with current standards.

No estimate is given for repeatability or reproducibility in this part of this British Standard.

Reference should be made to BS ISO 5725-2 for further information on the determination of repeatability and reproducibility.

Hazard warnings

Where skin is in contact with fresh concrete, skin irritations are likely to occur owing to the alkaline nature of cement. The abrasive effects of sand and aggregate in the concrete can aggravate the condition. Potential effects range from dry skin, irritant contact dermatitis, to severe burns in cases of prolonged exposure. Take precautions to avoid dry cement entering the eyes, mouth and nose when mixing mortar or concrete by wearing suitable protective clothing. Take care to prevent fresh concrete from entering boots and use working methods that do not require personnel to kneel in fresh concrete. Unlike heat burns, cement burns might not be felt until some time after contact with fresh concrete, so there might be no warning of damage occurring. 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. Barrier creams may be used to supplement protective clothing but are not an alternative means of protection.

The high humidity required in moist air curing rooms is normally produced by spraying water as a fine aerosol. The bacterium *Legionella pneumophila* is widespread and is present in the water systems of many buildings. Scale in pipework and chemical nutrients in the water supply can encourage growth of this organism which multiplies between temperatures of 20 °C and 45 °C. Inhaling infected aerosols is a known route for transmission of Legionnaires' disease. It is therefore advisable to maintain cold water supplies below 20 °C where possible and to store hot water above 60 °C. Cold water supplies may be disinfected by chlorination to at least 5 mg/L free chlorine. Regular periodic checking for the presence of *Legionella* species in industrial water supplies is a sensible precaution.

Use of this document

It has been assumed in the preparation of this part of BS 1881 that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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1 Scope

This part of BS 1881 describes a method for making and curing 150 mm test cubes of fresh no-fines concrete made with aggregate having a nominal maximum size of 40 mm or less.

2 Normative references

The following referenced documents are indispensable for the application 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.

BS 8500 (all parts), *Concrete – Complementary British Standard to BS EN 206-1*

BS EN 206-1, *Concrete – Part 1: Specification, performance, production and conformity*

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

BS EN 12390-1, *Testing hardened concrete – Part 1: Shape, dimensions and other requirements for specimens and moulds*

3 Terms and definitions

For the purposes of this part of BS 1881, the definitions given in BS 8500 (all parts), BS EN 206-1 and BS EN 12350-1 apply.

4 Apparatus

4.1 Mould, conforming to BS EN 12390-1 for making cubes of 150 mm nominal size.

4.2 Mould extension piece, comprising a square metal frame at least 25 mm high with internal dimensions that allow the bearing plate of the tamper (4.4) to be placed on the concrete in the mould, constructed in such a way as to enable the frame to be secured to the top of the mould.

4.3 Scoop, approximately 100 mm wide.

4.4 Tamper, made of metal and of robust construction, consisting of a rammer and a guide tube, secured to the base of which is a flat metal bearing plate (see Figure 1 for a typical construction). The rammer shall have a mass of 2.5 kg \pm 25 g and the complete tamper a total mass of 4.8 kg \pm 50 g.

4.5 Remixing tray, minimum dimensions 900 mm \times 900 mm \times 50 mm deep of rigid construction and made from a non-absorbent material not readily attacked by cement paste.

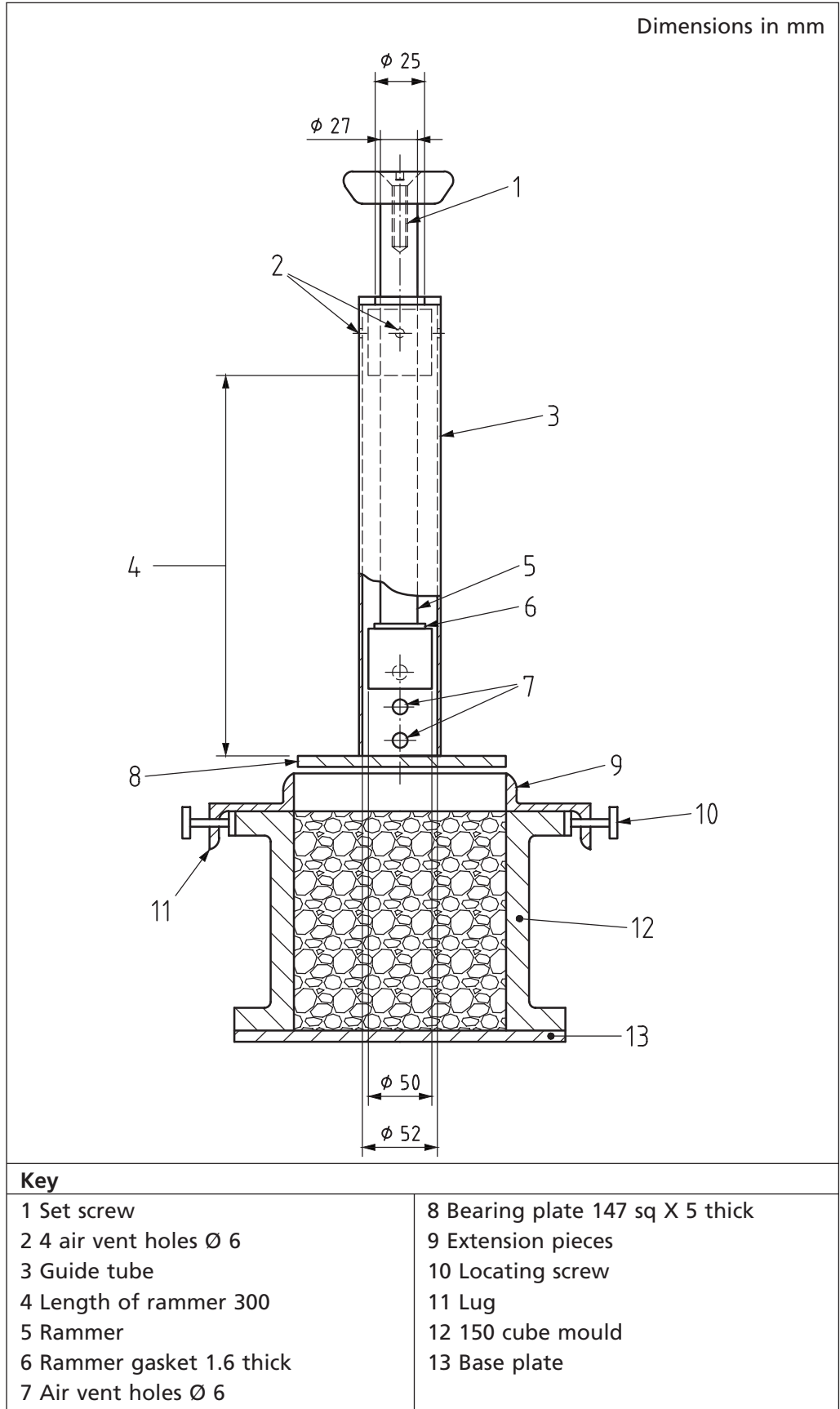
4.6 Shovel, square mouthed.

NOTE The square mouth is to ensure proper mixing of material on the remixing tray.

4.7 Steel trowel or float.

4.8 Thermometer, suitable for measuring maximum and minimum storage temperature.

Figure 1 Typical apparatus for making no-fines concrete test cubes



5 Sampling

Obtain the sample of fresh no-fines concrete by the procedure given in BS EN 12350-1. Commence making the cube as soon as possible after sampling.

6 Sample preparation

Empty the sample from the container(s) on to the remixing tray (4.5). 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 remixing 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 the portions that slide down the sides are distributed as evenly as possible and 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.

7 Procedure

7.1 Test cubes

7.1.1 Complete 7.1.2 to 7.1.6 within 10 min of the discharge of the concrete from the mixer or the delivery vehicle.

7.1.2 Fit the extension piece (4.2) to the mould (4.1) and, using the scoop (4.3), carefully place a layer of concrete, about 75 mm deep, into the mould, ensuring that the corners of the mould are properly filled.

7.1.3 Place the square bearing plate of the tamper (4.4) on top of the concrete with the axis of the tamper vertical. Raise the rammer to the top of its travel so that it just touches the top of the sleeve without slack. Allow the rammer to drop freely, through a distance of (300 ± 3) mm on to the concrete. Complete ten such blows on the bottom layer of concrete.

7.1.4 Fill the top half of the mould until the concrete is just above the top of the mould and slightly heaped towards the centre.

7.1.5 Compact the top layer with ten blows of the rammer in a similar manner to the bottom layer.

7.1.6 Remove the mould extension piece. If the surface of the concrete is above the top of the mould obtain a reasonably true face by gently scraping the surface of the concrete. Use the edge of the steel trowel or float (4.7) to remove surplus material and fill surface voids with individual particles where necessary.

7.2 Curing

7.2.1 Immediately after making the cubes store them in a place free from vibration and in conditions that prevent moisture loss. If it is necessary to move the specimens to the place of storage, move them in their moulds ensuring no loss of concrete.

7.2.2 Store the specimens either:

- a) in an atmosphere with a relative humidity of over 95 % in a moist air curing room or a cabinet; or
- b) providing that no free water can enter the cubes, under damp matting or any other suitable damp material wrapped completely with polyethylene or other impervious sheeting.

NOTE The preferred method of storage of specimens is that described in a). If a moist air curing room or a cabinet is not available each cube may be sealed in its mould using an impermeable cover.

7.2.3 Whichever method of moist air storage is used, maintain the temperature of the cubes at (20 ± 5) °C.

7.2.4 Demould the cubes within a period of 16 h to 28 h after the water was added to the mix unless this is not possible due to the concrete having inadequate strength. If this is the case, continue curing the cubes in the moist conditions for a further 24 h before demoulding.

7.2.5 Upon demoulding, mark each cube clearly and indelibly with an identification number or code.

7.2.6 Immediately after marking, thoroughly wet each cube by immersing it in water until air bubbles cease to rise. Drain the cube and immediately place it in a polyethylene bag. If necessary, protect the polyethylene bag from puncturing by first wrapping the cube in damp hessian or other suitable damp or non-absorbent material.

7.2.7 Seal the bag and store it at a temperature of (20 ± 5) °C and transport it to the testing laboratory within 5 days. At the laboratory, keep the cube in its bag, at a temperature of (20 ± 5) °C, until it is not less than 5 days and not more than 6 days old. Remove the cube from the bag and allow it to dry in the laboratory.

7.2.8 Keep a record of the daily maximum and minimum storage temperatures, these data being obtained by the use of either maximum and minimum thermometers or continuous recording instruments.

8 Report

The report shall include:

- a) date, time and place of sampling and sample identity number;
- b) time and place of making cubes;
- c) number of cubes;
- d) identification numbers or codes of cubes;
- e) maximum and minimum curing temperatures;
- f) method and length of curing before demoulding;
- g) age at removal from polyethylene bag;
- h) name of person making cubes;
- i) certificate that the cubes have been made and cured in accordance with this part of this standard; and
- j) name of project and place where concrete used.

NOTE 1 The report may also include:

- a) time of adding the water to the other materials in the concrete mix;
- b) name of supplier and source of concrete;
- c) date and time of production of concrete or delivery to site;
- d) specification of concrete; and
- e) age(s) at which cubes are to be tested.

NOTE 2 If a no-fines cube does not conform to the shape and dimension requirements given in BS EN 12390-3, the actual dimensions as measured in accordance with Annex B of BS EN 12390-3:2009 should be used in determining the loaded face of the cube when calculating compressive strength.

Bibliography

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS EN 12350, (all parts), *Testing fresh concrete*

BS EN 12504, *Testing concrete in structures*

BS ISO 5725-2, *Accuracy (trueness and precision) of measurement methods and results. Basic methods for the determination of repeatability and reproducibility of a standard measurement method.*

BS EN 12390 (all parts), *Testing hardened concrete*

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