BRITISH STANDARD

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Testing concrete —

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

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Committees responsible for this British Standard

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 Surveyors' Society
Department of the Environment (Building Research Establishment)
Department of the Environment (PSA)
Department of the Environment (Transport and Road Research Laboratory)
Department of Transport
Electricity Supply Industry in England and Wales
Federation of Civil Engineering Contractors
Greater London Council
Institute of Concrete Technology
Institution of Civil Engineers
Institution of Highway Engineers
Institution of Municipal Engineers
Institution of Structural Engineers
Institution of Water Engineers and Scientists
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

This British Standard, having been prepared under the direction of the Cement, Gypsum, Aggregates and Quarry Products Standards Committee, was published under the authority of the Board of BSI and comes into effect on
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The following BSI references relate to the work on this standard:
Committee reference CAB/4
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Amendments issued since publication

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6099	July 1989	Indicated by a sideline in the margin

Contents

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 **3** of BS 1881-3:1970. Together with Parts 108, 109, 110, 111 and 112, this Part of BS 1881 supersedes BS 1881-3:1970, which is withdrawn.

The method is very similar to that in the 1970 edition but the distinction between curing in the laboratory and on site has been removed. This does not affect the requirements for curing no-fines cubes on site providing that these are tested at an age of 7 days or more.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 4, 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 the 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.

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

2 Definitions

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

3 Apparatus

3.1 *Mould.* The mould shall comply with the requirements of BS 1881-108 for making cubes of 150 mm nominal size.

3.2 *Cover plate.* A rigid plate, such as a baseplate, to cover each mould (see clause **6.2**). The material for this cover plate shall be such that it does not react with the concrete or the mould.

3.3 *Mould extension piece.* The mould extension piece shall comprise a square metal frame at least 25 mm high with internal dimensions that will allow the bearing plate of the tamper (**3.5**) to be placed on the concrete in the mould. It shall be fitted with two locating screws passing through lugs on the opposite sides of the frame in such a way as to enable the frame to be secured to the top of the mould, as shown in Figure 1.

NOTE The use of 25 mm × 25 mm × 6 mm angle and 4 mm diameter set screws has been found to be suitable.

3.4 *Scoop,* approximately 100 mm wide.

3.5 *Tamper.* A tamper made of metal and of robust construction. It shall consist 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 ± 25 g and the complete tamper a total mass of 4.8 kg ± 50 g.

NOTE A suitable apparatus is the 2.5 kg rammer for the standard compaction test specified in BS 1377, made of mild steel and having a mild steel bearing plate welded centrally to the bottom of the guide tube.

3.6 *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.

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

3.8 *Plasterer's steel float*

3.9 *Thermometer,* suitable for measuring maximum and minimum storage temperature.

4 Sampling

Obtain the sample of fresh no-fines concrete by the procedure given in Part 101 or Part 125 of this British Standard. Commence making the cube as soon as possible after sampling.

5 Preparing the sample

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.

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.

6 Procedure

6.1 Making test cubes. Fit the extension piece to the mould and, using the scoop, carefully place a layer of concrete, about 75 mm deep, into the mould, ensuring that the corners of the mould are properly filled; this can be done with the aid of a small trowel or spatula. Place the square bearing plate of the tamper 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 mm, ± 3 on to the concrete.Complete ten such blows on the bottom layer of concrete. Carefully fill the top half of the mould until the concrete is just above the top of the mould and slightly heaped towards the centre. Compact the top layer with ten blows of the hammer in a similar manner to the bottom layer.

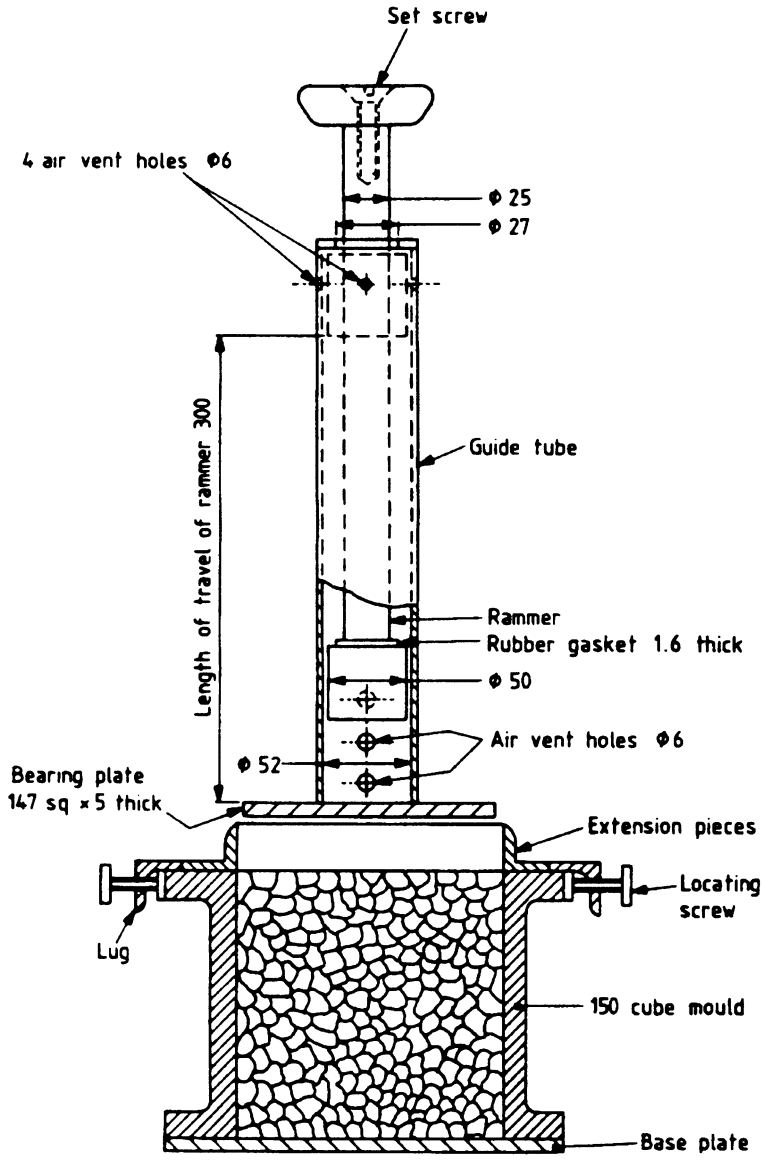

Figure 1 — Typical apparatus for making no-fines concrete test cubes

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 float, in a sawing motion, to remove surplus material and fill surface voids with individual particles where necessary. Complete the making of the cube within 10 min of the discharge of the concrete from the mixer or the delivery vehicle.

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

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 1 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 can be sealed in its mould using a cover plate.

NOTE 2 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 in nature and is present in the water systems of many buildings. Scale in pipework and chemical nutrients in the water supply may encourage growth of this organism which multiplies between 20 °C and about 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.

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

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.

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

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.

Seal the bag and store it at a temperature of 20 ± 5 °C and transport it, in the bag, to the testing laboratory before it is 5 days old. 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.

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 of continuous recording instruments.

7 Age of test cubes

Tests shall be carried out within ± 8 h of the required age up to and including 60 days and within ± 1 day above 60 days.

The ages shall be calculated from the time of addition of the water to the other materials in the concrete mix.

NOTE Preferred ages for testing are 7, 14 and 28 days, 13 and 26 weeks and 1 year.

8 Report

8.1 General. The report shall affirm that the cubes were made and cured in accordance with this Part of this British Standard. The report shall state whether or not a certificate of sampling is available. If available, a copy of the certificate shall be provided.

8.2 Information to be included in the report

8.2.1 *Mandatory information.* The following information shall be included in the test report:

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 prior to 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.

8.2.2 *Optional information.* If requested the following information shall be included in the test report:

a) time of adding the water to the other materials in the concrete mix;

b) name of project and place where concrete used;

c) name of supplier and source of concrete;

d) date and time of production of concrete or delivery to site;

e) specification of concrete mix;

f) age(s) at which cubes are to be tested.

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Publications referred to

BS 1377, *Methods of test for soil for civil engineering purposes.*
BS 1881, *Testing concrete.*
BS 1881-101, *Method of sampling fresh concrete on site.*
BS 1881-108, *Method for making test cubes.*
BS 1881-109, *Method for making test beams from fresh concrete*[1)].
BS 1881-110, *Method for making test cylinders from fresh concrete*[1)].
BS 1881-111, *Method of normal curing of test specimens (20 °C method)*[1)].
BS 1881-112, *Methods of accelerated curing of test cubes*[1)].
BS 1881-125, *Methods for mixing and sampling fresh concrete in the laboratory.*
BS 5328, *Methods for specifying concrete, including ready-mixed concrete.*

[1)] Referred to in the foreword only.

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