BS 1881 : Part 125: 1986

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British Standard

Testing concrete

Part 125. Methods for mixing and sampling fresh concrete in the laboratory

Essais du béton
Partie 125. Methodes de mélange et d'éhantillonnage du béton frais en laboratoire

Prüfung von Beton
Teil 125. Verfahren zum Mischen und zur Probenahme von Frischbeton im Labor

British Standards Institution

Foreword

This Part of BS 1881, prepared under the direction of the Cement, Gypsum, Aggregates and Quarry Products Standards Committee, is a revision of clause 3 of BS 1881 : Part 1 : 1970, the latter being withdrawn.

This Part describes the preparation and batching of the individual materials and the mixing and sampling of concrete in the laboratory. It complements BS 1881 : Part 101, which covers the sampling of concrete on site.

It is recognized that a wide range of concrete mixes has to be prepared in the laboratory so provision is made for modifications to the standard procedure and their detailed reporting (see 8.2.1(e)). However, this Part of BS 1881 is not intended to cover special concrete mixes prepared for research, where the mixing procedure is determined by the properties of. the constituents or of the resulting concrete that are being studied.

The preparation of concrete mixes for standard tests on water for concrete, cement or admixtures is described in BS 3148, BS 4550 and BS 5075 respectively.

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

Contents

Methods

1 Scope

This Part of BS 1881 describes basic methods for the preparation of materials and the batching, mixing and sampling of fresh concrete in the laboratory where accurate controls of the quantities of materials and of test conditions are possible. The procedures are appropriate when assessing the suitability of materials or determining suitable mix proportions for concrete for general use on site.

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

2 Definitions

For the purpose of this Part of BS 1881 the definitions given in BS 5328 and BS 6100 apply.

3 Apparatus

3.1 Mixer, rotating pan or tilting drum concrete type of capacity sufficient to mix batches large enough to provide samples for the tests to be carried out (see table 1 of BS 1881 : Part 101 : 1983).

3.2 Scoop, made from non-corrodible metal at least 0.8 mm thick and having the dimensions shown in figure 1 of BS 1881 : Part 101 : 1983.

4 Constituent materials

4.1 Sampling

If bulk samples are supplied, take subsamples for the test portions in accordance with the relevant British Standard, ensuring that the materials used in each batch of concrete are representative of the! bulk materials. Where required, samples shall be accompanied by a certificate of sampling in accordance with the relevant British Standard. Otherwise, use the materials in the proportions supplied or specified for the mix.

4.2 Cement, ground granulated blastfurnace slag and pulverized-fuel ash

Upon their arrival at the laboratory, store the materials in separate airtight containers of appropriate size in a dry place. Before use, thoroughly stir each separate material, either using a hand tool or in a suitable mixer, in such a manner as to ensure the greatest possible uniformity, taking care to avoid the intrusion of foreign matter or loss of material.

4.3 Aggregate

The aggregates shall be in one of the following conditions:

(a) oven-dry as described in BS 812 : Part 2";

(b) air dried at 20 ± 5 °C;

(c) saturated surface-dry as described in BS 812 : Part 2';

(d) saturated by soaking in water for at least 24 h.

When necessary, determine the moisture content (as a percentage of the oven dry mass) of the aggregates by an appropriate method given in BS 812 : Part 2".

The aggregates for each concrete batch may be used either in separate size fractions or with an all-in grading.

4.4 Temperature

Allow all materials to reach a temperature of 20 ± 5 °C before mixing the concrete.

5 Batching

The quantity of concrete in each batch shall be at least 10 % more than that required for the proposed tests.

For each concrete batch, weigh the cement, any ground granulated blastfurnace slag or pulverized-fuel ash and the water to an accuracy of 0.5 % or better and the aggregate to an accuracy of 1 %.

NOTE. When preparing concrete to have a given property, such as workability or air content. it may be necessary to prepare and test trial mixes of varying composition to establish the required mix quantities.

If an admixture is to be incorporated, measure the amount to within 5 % of the specified dosage and follow the manufacturer's instructions for use.

6 Mixing

6.1 General

Mix the concrete in a room having an ambient temperature of 20 ± 5 °C and a relative humidity of not less than 50 %.

If the aggregate is dry (4.3(a) or 4.3(b)), before adding other materials allow it to soak with some of the mixing water, while avoiding loss of water by evaporation, to enable it to take up most of the water it will ultimately absorb.

When admixtures are required, add them with the second portion of the mixing water, except when using admixtures that need to be added shortly before using the concrete, if dry aggregate has been allowed to soak.

Mix the concrete, preferably by machine or alternatively by hand, in such a manner as to avoid loss of water or other materials.

NOTE. Different methods of mixing may lead to different results.

6.2 Machine mixing

6.2.1 General. The size of the batch shall be between 50 % and 90 % of the rated capacity of the mixer (3.1) to avoid both incomplete mixing and spillage.

Before using the mixer, clean off any fresh concrete remaining from a previous batch, Ensure that no free water

• BS 812 : Part 2 : 1975 is under revision and the relevant clauses will be replaced by BS 812 : Parts 107 and 109.

remains in a pan mixer but if it is dry wipe it with a damp cloth. When using a tilting drum mixer, mix it in a small preliminary batch, of similar proportions to the main batch, immediately before the main batch in order to coat the mixer.

6.2.2 *Pan mixer*

6.2.2.1 *Using dry aggregates.* Add an all-in aggregate as one amount. If separate fine and coarse aggregates are used, add in order about half the coarse aggregate, the fine aggregate and the remaining coarse aggregate by spreading them evenly over the pan and then start the mixer and run it for 15 s to 30 s. Continue mixing and add about half the water during the next 15 s. After mixing for a total of 2 min to 3 min, stop the mixer and leave the contents covered for 5 min to 15 min.

Add the cement and any ground granulated blastfurnace slag, pulverized-fuel ash, pigment or other powder by spreading them in an even layer over the aggregate. Start the mixer and mix for 30 s. Stop the mixer and immediately clean off any material adhering to the mixer blades into the pan. Without delay, recommence mixing and add the remaining mixing water over the next 30 s. Continue mixing after all the materials have been added for at least 2 min and not more than 3 min.

After completion of mixing in a pan mixer without a discharging gate, turn the concrete over in the pan a few times using a hand tool to ensure uniformity before sampling.

6.2.2.2 Using saturated aggregates. If an all-in aggregate is used, add about half before the other materials and the remainder after them. If separate fine and coarse aggregates are used, add in order about half the coarse aggregate, the fine aggregate, the cement and any ground granulated blastfurnace slag, pulverized-fuel ash, pigment or other powder and the remaining coarse aggregate by spreading them evenly over the pan and then start the mixer and add all the water during the first 30 s of mixing. Continue mixing after all the materials have been added for at least 2 min and not more than 3 min.

After completion of mixing in a pan mixer without a discharging gate, turn the concrete over in the pan a few times using a hand tool to ensure uniformity before sampling.

6.2.3 *Drum mixer*

6.2.3.1 Using dry aggregates. Add an all-in aggregate as one amount. If separate fine and coarse aggregates are used, add in order about half the coarse aggregate, the fine aggregate and the remaining coarse aggregate and then start the mixer and run it for 15 s to 30 s. Continue mixing and add about half the water during the next 15 s. After mixing for a total of 2 min to 3 min, stop the mixer and leave the contents covered for 5 min to 15 min.

Add the cement and any ground granulated blastfurnace slag, pulverized-fuel ash, pigment or other powder on top of the aggregate. Start the mixer and mix for 30 s. Over the next 30 s add the remaining water and continue mixing after all the materials have been added for at least 2 min and not more than 3 min.

After completion of mixing, discharge the concrete onto a clean non-absorbent surface and turn it over using a hand tool to ensure uniformity before sampling,

6.2.3.2 Using saturated aggregates. If an all-in aggregate is used, add about half before the other materials and the remainder after them. If separate fine and coarse aggregates are used, add in order about half the coarse aggregate, the fine aggregate, the cement and any ground granulated blastfurnace slag, pulverized-fuel ash, pigment or other powder and the remaining coarse aggregate. Start the mixer and add all the water during the first 30 s of mixing. Continue mixing after all the materials have been added for at least 2 min and not more than 3 min.

After completion of mixing, discharge the concrete onto a clean non-absorbent surface and turn it over using a hand tool to ensure uniformity before sampling,

6.3 Hand-mixing

6.3.1 *General.* Mix the concrete batch on a non-absorbent surface using a shovel, trowel or similar tool.

6.3.2 Using dry aggregates. Add an all-in aggregate as one amount. If separate fine and coarse aggregates are used, add in order about half the coarse aggregate, the fine aggregate and the remaining coarse aggregate. Gradually add approximately one-fifth of the water, sufficient to dampen the aggregate, and mix until uniform. Allow to stand for 5 min to 15 min.

Then add the cement and any ground granulated blastfurnace slag, pulverized-fuel ash, pigment or other powder mixing all the materials until uniform. Continue mixing and gradually add the remaining water. After adding all the water, mix the whole batch for at least 3 min or until the concrete appears homogeneous.

6.3.3 Using saturated aggregates. If an all-in aggregate is used, add about half of it before the other materials and the remainder after them. If separate fine and coarse aggregates are used, add in order about half the coarse aggregate, the fine aggregate, the cement and any ground granulated blastfurnace slag, pulverized-fuel ash, pigment or other powder and the remaining coarse aggregate. Mix all the materials until uniform. Continue mixing and gradually add the remaining water. After adding all the water, mix the whole batch for at least 3 min or until the concrete appears homogeneous.

7 Sampling and testing the concrete

Start the sampling and testing of the concrete as soon as possible after completion of mixing, without the remixing specified in BS 1881 : Parts 102, 103, 104, 105, 106, 107, 108, 109, 110 and 113 for concrete sampled on site. The size of sample required for different tests is given in table 1 of BS 1881 : Part 101 : 1983. Carry out the required operations during a period of not more than 1 h from the addition of the water to the cement.

For each test on the fresh concrete, and for making any specimens for hardened concrete tests, use the scoop (3.2)

to obtain suitable amounts of concrete from the concrete batch heaped together either in the mixer or on a non-absorbent surface, ensuring that each sample is representative of the concrete batch. When not sampled immediately, protect the fresh concrete against gaining or losing water.

NOTE. Provided that care is taken to ensure that no water or other material is lost, the concrete used in workability and density tests may be remixed with the remainder of the batch before making any specimens for testing hardened concrete. The period of remixing should be as short as possible vet sufficient to produce a homogeneous mass.

8 Report

8 General

This report shall state that preparation of materials, batching, mixing and sampling were carried out in accordance with this Part of BS 1881 unless modifications to the basic methods have been made, in which case these shall be reported in full. The report shall state whether or not certificates of sampling for the materials are available. If available, copies of the certificates shall be provided.

8.2 Information to be included in the test report

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

(a) date, time and place of mixing and batch identity number;

(b) description of materials, including moisture content and condition of the aggregates, as in 4.3(a), (b), (c) or (d);

(c) specification of concrete mix (quantities or proportions) and any other requirements, e.g. workability;

(d) method of mixing, type and rated capacity of mixer with time of starting and details of the procedure followed;

(e) any modifications from the basic methods;

(f) list of samples taken and specimens made.

8.2.2 Additional information. Where appropriate, the following shall also be included in the test report:

(a) results of any tests on the fresh concrete;

(b) actual quantities or proportions of materials batched;

(c) any observations on the appearance of the fresh concrete, e.g. segregation and bleeding.

Publications referred to

BS 812	Testing aggregates
	Part 2 Methods for determination of physical properties
	Part 107* Methods for determination of relative densities and water absorption
	Part 109* Methods for determination of moisture content
BS 1881	Testing concrete
	Part 101 Method of sampling fresh concrete on site
	Part 102 Method for determination of slump
	Part 103 Method for determination of compacting factor
	Part 104 Method for determination of Vebe time
	Part 105 Method for determination of flow
	Part 106 Methods for determination of air content of fresh concrete
	Part 107 Method for determination of density of compacted fresh concrete
	Part 108 Method for making test cubes from fresh concrete
	Part 109 Method for making test beams from fresh concrete
	Part 110 Method for making test cylinders from fresh concrete
	Part 113 Method for making and curing no-fines test cubes
BS 3148	Methods of test for water for making concrete (including notes on the suitability of the water)
BS 4550t	Methods of testing cement
BS 5075t	Concrete admixtures
BS 5328	Methods for specifying concrete, including ready-mixed concrete
BS 6100	Glossary of building and civil engineering terms

. In preparation.

t Referred to in the foreword only.

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The preparation of this 8ritish Standard was entrusted by the Cement, Gypsum, Aggregates and Quarry Products Standards Committee (CAB/-) to Technical Committee CAB/4 upon which the following bodies were represented:

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British Civil Engineering Test Equipment Manufacturers' Association
British Precast Concrete Federation
British Ready Mixed Concrete Association
Building Employers' Confederation
Cement Admixtures Association
Cement Makers' Federation
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Revised text

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July 1989

Clause 6.1 General

In paragraph 4, line 2, delete 'by hand' and substitute 'using a hand tool'.

At the end of this clause insert the following.

'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.'

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