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Draft for Development

Volumetric method for determination of compacting factor of fresh concrete

Projet à développer

Méthode volumétrique de détermination du degré de compactibilité du béton frais

Entwurf zur weiteren Ausarbeitung

Volumetrisches Verfahren zur Bestimmung des Verdichtungs-faktors von Frischbeton

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This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature because there has been little experience of the method it describes. It is recommended that the method of test should be used together with that described in BS 1881 : Part 103 so that experience may be gained on the relative merits of the two methods and so that results yielded by the two methods may be compared. Those who use the volumetric method for determining the compacting factor are urged to write to BSI giving their experience in applying this publication. Constructive proposals for improvement will be welcomed as will any information about the precision of the method given.

Foreword

This Draft for Development has been prepared under the direction of the Cement, Gypsum, Aggregates and Quarry Products Standards Committee. BS 1881 : Part 103 describes the standard method of determining the compacting factor of fresh concrete from the masses of equal volumes of partially and fully compacted concrete. This Draft for Development describes an alternative method* in which the compacting factor is determined from the reduction in volume which occurs when a defined volume of partially compacted concrete is fully compacted.

The method described in the draft does not require the use of scales or a balance and can be completed in less time than the standard test. Errors may, possibly, be introduced by the need to compact a 285 mm or 305 mm depth of concrete in one layer instead of the six layers required in the standard method.

For comparative purposes, the methods described in BS 1881 : Part 103 and in this Draft for Development can

A review of this Draft for Development will be carried out not later than two years after its publication. Notification of the start of the review period together with a request for the submission of comments from the users of this Draft for Development will be made in an announcement in the appropriate issue of *BSI News*. Observations which it is felt should receive attention before the official call for comments will be welcomed.

According to the replies received, the responsible BSI Committee will then judge whether the method described in this Draft for Development is satisfactory and can be included in BS 1881 : Part 103 as an alternative, or what other action should be taken if the interim guidance has proved to be not practicable or not useful.

be combined into a single procedure:

- (a) the determination of the mass of the partially compacted concrete (in accordance with BS 1881 : Part 103);
- (b) the compaction of the partially compacted concrete already in the cylinder and the measurement of the distance of the concrete surface from the top of the cylinder (in accordance with this Draft for Development);
- (c) the determination of the mass of concrete compacted into the cylinder in six layers of approximately equal depth (in accordance with BS 1881 : Part 103).

The masses measured in (a) and (c) will enable the compacting factor to be determined in accordance with BS 1881 : Part 103 whilst the distance measured in (b) will enable the compacting factor to be determined in accordance with this Draft for Development.

This test is not suitable for concrete having a measured compacting factor less than 0.70 or more than 0.98.

*TAM C.T. Compacting factor: a new test. *Concrete*, 10, No. 6, May 1976, pp27 and 30.

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Volumetric method for determination of compacting factor of fresh concrete

1. Scope

This Draft for Development describes the volumetric method for the determination of the compacting factor of concrete of low, medium and high workability. The method applies to plain and air-entrained concrete, made with lightweight, normal weight or heavy aggregates, having a nominal maximum size of 40 mm or less, but not to aerated concrete, no-fines concrete and concrete which cannot be compacted by vibration alone.

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

2. Definitions

For the purposes of this Draft for Development, the definitions given in BS 1881 : Part 101 and BS 5328 apply.

3. Apparatus

3.1 Compacting factor apparatus. Compacting factor apparatus consisting of two conical hoppers mounted above a cylinder; its essential dimensions are shown in table 1 and figure 1.

The hoppers and cylinder shall be of rigid construction made of metal not readily attacked by cement paste. The interior surfaces shall be smooth and free from projections such as protruding rivets and shall be free from dents. The rim of the cylinder shall be machined to a plane surface at right angles to its axis. The lower ends of the hoppers shall have tightly fitting hinged trap doors, made of rigid non-corrodible metal plate, 3 mm thick. The doors shall have quick release catches which allow them to swing rapidly to a position at which they are caught by retaining catches which hold them clear of concrete falling through the bottom of the hopper.

The frame in which the hoppers and cylinder are mounted shall be of rigid construction and shall firmly locate them in the relative positions indicated in table 1. The cylinder shall be easily detachable from the frame.

3.2 Steel floats. Two plasterer's steel floats.

3.3 Scoop, as described in 3.1 of BS 1881 : Part 101 : 1983.

3.4 Sampling tray, 1.2 m x 1.2 m x 50 mm deep made from minimum 1.6 mm thick non-corrodible metal.

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

3.6 Tamping rod, made out of straight steel bar of circular cross section, 16 mm diameter, 600 mm long with both ends hemispherical.

3.7 Compacting bar or vibrating hammer or table.

A compacting bar made out of steel bar weighing 1.8 kg, 380 mm long and having a ramming face 25 mm square, or a suitable vibrating hammer or table.

3.8 Rule, graduated in one of the following ways:

(a) from 0 mm to 300 mm at 1 mm intervals, the zero point being at one end of the rule;

(b) for use with the preferred form of apparatus (see table 1) expressing the compacting factor directly from 1.00 to 0.65, in increments of 0.005, by means of graduation marks spaced at intervals of 1.425 mm, the value of 1.00 being flush with one end of the rule, the total length of the rule being about 300 mm and clearly marked 'preferred apparatus';

(c) for use with the alternative form of apparatus (see table 1) expressing the compacting factor directly from 1.0 to 0.65, in increments of 0.005, by means of graduation marks spaced at intervals of 1.525 mm, the value of 1.00 being flush with one end of the rule, the total length of the rule being about 300 mm and clearly marked 'alternative apparatus'.

4. Sampling

Obtain the sample of fresh concrete by the procedure given in BS 1881 : Part 101. Commence the determination of compacting factor as soon as possible after sampling.

5. Preparing the sample for test

Empty the sample from the container(s) onto 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.