

British Standard

## Testing concrete

Part 122. Method for determination of water absorption

Essais du béton

Partie 122. Méthode de détermination de l'absorption d'eau

Prüfverfahren für Beton

Teil 122. Bestimmung der Wasseraufnahme

### Foreword

This Part of this standard prepared under the direction of the Cement, Gypsum, Aggregates and Quarry Products Standards Committee, is a revision of clause 7 of BS 1881 : Part 5 : 1970, which has been deleted by Amendment No. 1 to that standard.

The water absorption test in this Part is basically unchanged from that in the 1970 edition. No estimate of repeatability or reproducibility is given in this Part of this British Standard. Reference should be made to BS 5497 : Part 1 for further information on the determination of repeatability and reproducibility.

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

### 1. Scope

This Part of this British Standard specifies a method for the determination of water absorption of concrete specimens cored from a structure or precast component.

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

### 2. Definitions

For the purposes of this Part of this standard the definitions given in BS 5328 apply.

### 3. Apparatus

3.1 *A balance*, capable of weighing the specimen up to 5 kg to an accuracy of 0.1 %.

3.2 *A suitable coring machine*, with a cylindrical bit having an impregnated or set diamond cutting edge for cutting a  $75 \pm 3$  mm diameter core.

NOTE. A pillar drill or portable electric drill of about 12 mm nominal size with reduction gearing can generally be adapted for this purpose.

3.3 *A well ventilated drying oven*, complying with BS 2648, except that the internal space may exceed  $0.085 \text{ m}^3$ , in which the temperature is controlled at  $105 \pm 5^\circ\text{C}$ , and such that the specimens can be placed in the oven as described in 5.1.

3.4 *A tank*, at least 125 mm deep, containing clean water maintained at a temperature of  $20 \pm 1^\circ\text{C}$ .

3.5 *A dry airtight vessel*, e.g. desiccator, of sufficient size to take the set of three specimens to be tested.

### 4. Test specimens

4.1 Preparation. For a representative sample, obtain a set of three specimens by coring from the full thickness of the concrete when this is between 32 mm and 150 mm, or by obtaining a core 75 mm long when the thickness of the specimen is greater than 150 mm. The diameter of each core shall be  $75 \pm 3$  mm. Cores shall be drilled, as far as possible, perpendicular to the surface and in such a manner as not to damage the core. Mark each core clearly with its identification mark immediately after cutting, and record the orientation of the core. Cores that have been broken out of larger samples shall have the broken ends trimmed approximately square with the axis.

NOTE. One end of each specimen should preferably be from one of the faces which would normally be exposed when the unit is in use.

**4.2 Measurement of density.** Measure the density of the specimens in accordance with BS 1881 : Part 114.

**4.3 Measurement of dimensions** Measure the dimensions of the specimen in accordance with BS 1881 : Part 114.

**4.4 Age of specimen at test.** The test for absorption shall be made when the age of the concrete is 28 days to 32 days. which means that drying of the specimens shall begin at an age of 24 days to 28 days.

NOTE. If the absorption test is carried out on concrete less than 28 days old an appreciably higher value may be obtained. Conversely, the absorption at ages greater than 28 days might be appreciably less. These variations are dependent, amongst other factors, on the rate of hydration of the cement.

## 5. Procedure

**5.1** Place the three specimens in the drying oven (3.3) so that each one is not less than 25 mm from any heating surface or from each other. Dry the three specimens in the oven for  $72 \pm 2$  h.

**5.2** Further specimens shall not be placed in the same oven during the drying process and there shall be free access of air to all surfaces of the specimens. On removal from the oven, cool each specimen for  $24 \pm 0.5$  h in the dry airtight vessel (3.5). Weigh each specimen and immediately completely immerse in the tank (3.4) with its longitudinal axis horizontal and at a depth such that there is  $25 \pm 5$  mm of water over the top of the specimen.

**5.3** leave the specimens immersed in the water for  $30 \pm 0.5$  min, unless otherwise specified. Remove each specimen, shake it to remove the bulk of the water and dry it with a cloth as rapidly as possible until all free water is removed from the surface. Weigh each specimen.

## 6. Calculation and expression of results

The measured absorption of each specimen shall be calculated as the increase in mass resulting from immersion expressed as a percentage of the mass of the dry specimen. A correction factor according to the length of the specimen shall be obtained from the curve shown in figure 1. The product of this correction factor and the measured absorption shall be known as the corrected absorption, this being the equivalent absorption of a core having a length of 75 mm. The results shall be expressed to the nearest 0.1 %.

The correction factor related to size is based on the formula

$$\text{correction factor} = \frac{\text{volume (mm}^3\text{)}}{\text{surface area (mm}^2\text{)} \times 12.5}$$

## 7. Test report

**7.1 General.** The report shall affirm that the tests were carried out in accordance with this Part of this standard. The report shall also state whether or not certificates of sampling, specimen preparation and curing are available. If available, a copy of each certificate shall be provided.

**7.2 Information to be provided by the producer of the test specimens for inclusion in the test report**

**7.2.1 Mandatory information.** The following information shall be provided by the producer of the test specimens for inclusion in the test report:

- (a) identification of the test specimen, which preferably should be marked with indelible waterproof ink;
- (b) date of production;
- (c) conditions of storage and curing;
- (d) age of concrete;
- (e) date test required;
- (f) type of density to be measured.

**7.2.2 Optional information.** If requested the following information shall be provided by the producer of the test specimens for inclusion in the test report:

- (a) building project;
- (b) part or component of the building;
- (c) details of concrete mix.

**7.3 Information to be provided by the test laboratory for inclusion in the test report** The following information shall be provided by the test laboratory for inclusion in the test report:

- (a) identification of the test specimen;
- (b) condition of specimen when received (include poor compaction and honeycombing);
- (c) date of receipt of the specimen;
- (d) dimensions of the specimen;
- (e) conditions of storage and curing until test date;
- (f) date of beginning of tests (placing in oven);
- (g) density of the specimen (as-received, saturated or oven-dried and method of determining volume);
- (h) measured absorption;
- (i) corrected absorption;
- (j) details of reinforcement (if any);
- (k) orientation of the specimen to the structure;
- (l) certificate that the test has been carried out in accordance with this Part of this standard;
- (m) other remarks.



Amendment No. 1  
published and effective from 31 July 1989  
to BS 1881 : Part 122 : 1983

Testing concrete  
Part 122. Method for determination of  
water absorption

#### Additional text

AMD 6108  
July 1989

#### Clause 3.1 A balance

Insert the following as paragraph 2:

'The balance shall be calibrated on initial commissioning and at least annually thereafter using weights of which the accuracy can be traced to the national standard of mass. The balance shall be checked after relocation or disturbance. A certificate stating the accuracy shall be obtained from the organization carrying out the check.'



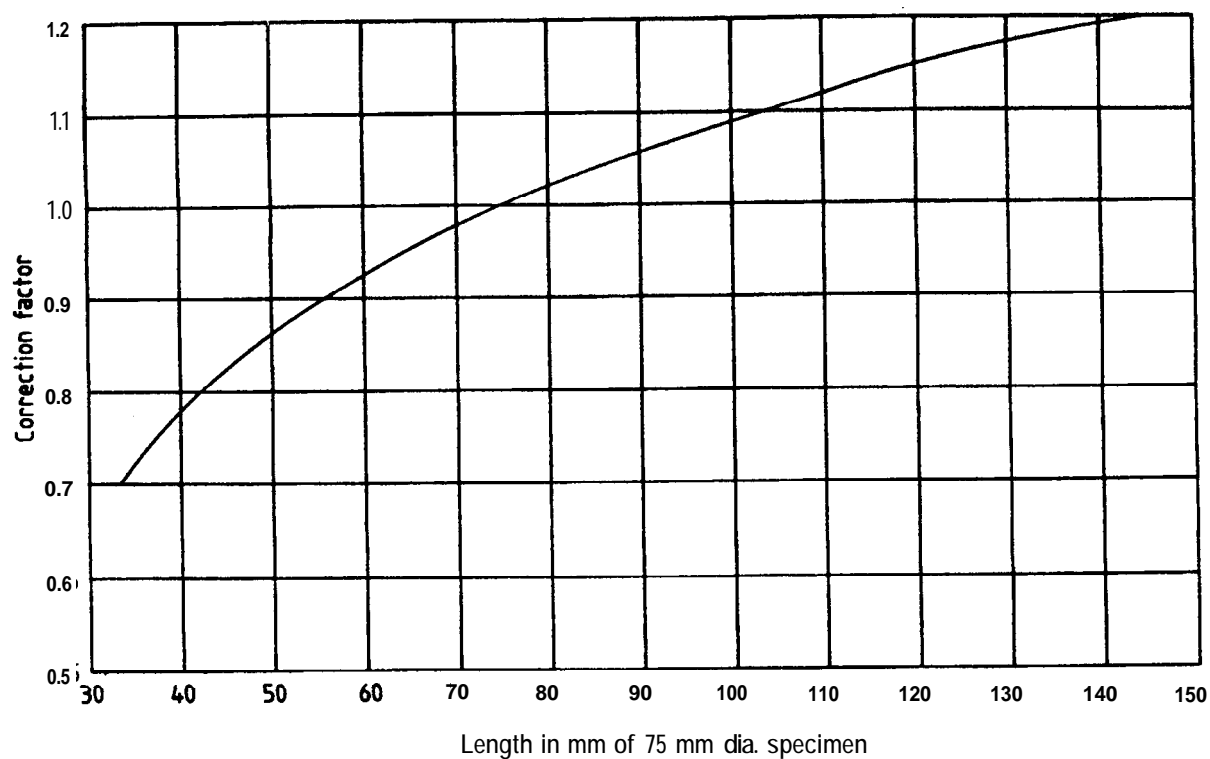
## TESTING CONCRETE

### SUMMARY OF PUBLISHED BRITISH STANDARDS

Due to the present restructuring of BS1881 *Methods of testing concrete* and BS 4408 *Recommendations for non-destructive methods of test for concrete*, the following information has been published, to help keep readers up-to-date, with the situation so far. (February 1983).

BS 1881 : Part 1 : 1970	Method of sampling fresh concrete on site Method of mixing and sampling fresh concrete in the laboratory
BS 1881 : Part 2 : 1970	Slump test Compacting factor test 'V-B' consistometer test Method for determination of weight per cubic metre of fresh concrete Method for determination of air content of fresh concrete Analysis of fresh concrete
BS 1881 : Part 3 : 1970	Making and curing test cubes Making and curing no-fines test cubes Making and curing test beams Making and curing test cylinders Method for accelerating the curing of test specimens: 1) the 55°C method 2) the 82°C method
BS 1881 : Part 5 : 1970	Method for determination of the dynamic modulus of elasticity by an electrodynamic method Method for determination of changes in length of concrete prisms (initial drying shrinkage, drying shrinkage and wetting expansion) Method for determination of initial surface absorption
BS 1881 : Part 6 : 1971	Analysis of hardened concrete
BS 1881 : Part 114 : 1983	Method for determination of density of hardened concrete
BS 1881 : Part 115 : 1983	Specification for compression testing machines for concrete
BS 1881 : Part 116 : 1983	Method for determination of compressive strength of concrete cubes
BS 1881 : Part 117 : 1983	Method for determination of tensile splitting strength
BS 1881 : Part 118 : 1983	Method for determination of flexural strength
BS 1881 : Part 119 : 1983	Method for determination of compressive strength using portions of beams broken in flexure (equivalent cube method)
BS 1881 : Part 120 : 1983	Method for determination of the compressive strength of concrete cones
BS 1881 : Part 121 : 1983	Method for determination of static modulus of elasticity in compression
BS 1881 : Part 122 : 1983	Method for determination of water absorption
BS 4408 : Part 1 : 1969	Electromagnetic cover measuring devices
BS 4408 : Part 2 : 1969	Strain gauges for concrete investigations
BS 4408 : Part 3 : 1970	Gamma radiography of concrete
BS 4408 : Part 4 : 1971	Surface hardness methods of testing concrete
BS 4408 : Part 5 : 1974	Measurement of the velocity of ultrasonic pulses in concrete.





**Figure 1. Correction factor**

#### Publications referred to

- BS 1881    Testing concrete
- Part 114. Method for determination of density of hardened concrete
- BS 2848    Performance requirements for electrically-heated laboratory drying ovens
- BS 5328    Methods for specifying concrete, including ready-mixed concrete
- BS 5497\*   Precision of test methods
- Part 1. Guide for the determination of repeatability and reproducibility for a standard test method

\*Referred to in the foreword only.

# BS 1881 : Part 122 : 1983

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 31 January 1983.

©British Standards Institution, 1983

ISBN 0 580 12959 4

British Standards Institution incorporated by Royal Charter, BSI is the independent national body for the preparation of British Standards. It is the UK member of the International Organization for Standardization and UK sponsor of the British National Committee of the International Electrotechnical Commission.

## Copyright

Users of British Standards are reminded that copyright subsists in all BSI publications. No part of this publication may be reproduced in any form without the prior permission in writing of BSI. This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols and size, type or grade designations. Enquiries should be addressed to the Publications Manager, British Standards Institution, Linford Wood,

Milton Keynes MK14 6LE. The number for telephone enquiries is 0908 320033 and for telex 825777.

## Contract requirements

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.

## Revision of British standards

British Standards are revised, when necessary, by the issue either of amendments or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions. Information on all BSI publications is in the *BSI Catalogue*, supplemented each month by *BSI News* which is available to subscribing members of the Institution and gives details of new publications, revisions, amendments and withdrawn standards. Any person who, when making use of a British Standard, encounters an inaccuracy or ambiguity, is requested to notify BSI without delay in order that the matter may be investigated and appropriate action taken.

The following BSI references relate to the work on this standard: Committee reference CAB/4 Draft for comment 80/14205 DC

## Cooperating organizations

The Cement Gypsum, Aggregates and Quarry Products Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following:

Association of Consulting Engineers  
Association of County Councils  
Association of District Councils  
Association of Metropolitan Authorities  
Autoclaved Aerated Concrete Products Association  
\*British Precast Concrete Federation Ltd.  
\*British Quarrying and Slag Federation  
British Railways Board  
\*British Ready Mixed Concrete Association  
British Steel Industry  
Cement Admixtures Association  
\*Cement and Concrete Association  
\*Chemical Makers' Federation  
Chemical Industries Association  
\*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  
\*Federation of Civil Engineering Contractors  
Gypsum Products Development Association

Institute of Quarrying  
\*Institution of Civil Engineers  
\*Institution of Highway Engineers  
\*Institution of Municipal Engineers  
Institution of Public Health Engineers  
\*Institution of Structural Engineers  
\*Institution of Water Engineers and Scientists  
\*National Federation of Building Trades Employers  
Natural Environment Research Council (Institute of Geological Science)  
\*Royal Institute of British Architects  
\*Royal Institution of Chartered Surveyors  
Sand and Ballast Hauliers and Allied Trades Alliance  
\*Sand and Gravel Association Limited  
\*Society of Chemical Industry  
Stone Federation

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the Technical Committee entrusted with the preparation of this British Standard:

British Civil Engineering Test Equipment Manufacturers' Association  
Electricity Supply Industry in England and Wales  
Greater London Council  
Institute of Concrete Technology  
Coopted member

## Amendments issued since publication

Amd. No.	Date of issue	Text affected

British Standards Institution .2 Park Street London W1 A 2BS . Telephone 01-629 9000 . Telex 266933