

Testing aggregates

Part 2. Methods of determination of density

Corrected and reprinted, March 1999

Correction

Page 3 In 5.4.4 2nd para., the second word “apparent” should be deleted.

ICS 91.100.15

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee B/502, Aggregates, upon which the following bodies were represented:

- Aggregate Concrete Block Association
- Association of Consulting Engineers
- Association of Lightweight Aggregate Manufacturers
- British Aggregate Construction Materials Industries
- British Cement Association
- British Civil Engineering Test Equipment Manufacturers' Association
- British Geological Sciences
- British Iron and Steel Producers' Association
- British Precast Concrete Federation Ltd.
- British Ready Mixed Concrete Association
- County Surveyors' Society
- Department of the Environment
- Department of the Environment (Building Research Establishment)
- Department of Transport
- Department of Transport (Transport Research Laboratory)
- Electricity Association
- Institute of Concrete Technology
- Institution of Civil Engineers
- Institution of Highways and Transportation
- Institution of Structural Engineers
- Local Authority Organizations
- Sand and Gravel Association Limited
- Society of Chemical Industry

The following bodies were also represented in the drafting of this standard, through subcommittees and panels:

- Department of Trade and Industry (National Measurement Accreditation Service)
- Department of Transport (Highways Agency)

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Summary of pages

The following table identifies the current issue of each page. Issue 1 indicates that a page has been introduced for the first time by amendment. Subsequent issue numbers indicate an updated page. Vertical sidelining on replacement pages indicates the most recent changes (amendment, addition, deletion).

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b	blank	12	original
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1	original	Inside back cover	original
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Foreword

This Part of BS 812 has been prepared by Technical Committee B/502. This edition introduces technical changes but does not reflect a full review or revision of the standard. Work on testing procedures for aggregates is being carried out in Europe under the auspices of CEN/TC 154, Aggregates. The methods described in this Part of BS 812 are included in the programme of work of CEN/TC 154 and will be superseded by European Standards which will be published in due course.

This standard supersedes BS 812 : Part 2 : 1975, which is withdrawn.

In this edition, for health and safety reasons, the use of toluene has been replaced by the use of kerosene in the method for the determination of bulk density of filler. The tests described in this Part are now based on particle density rather than relative density and, because the determination of moisture content of aggregates, formerly included in this Part, is now covered by BS 812 : Part 109, the title of the 1975 edition, *Methods for determination of physical properties* is no longer appropriate and has been amended to reflect the revised content. The opportunity has also been taken to update references to other Parts of BS 812 that have been published following the 1975 revision of this Part. BS 812 comprises the following Parts:

Part 100	<i>General requirements for apparatus and calibration</i>
Part 101	<i>Guide to sampling and testing aggregates</i>
Part 102	<i>Methods for sampling</i>
Part 103	<i>Methods for determination of particle size distribution</i>
Part 104	<i>Method for qualitative and quantitative petrographic examination of aggregates</i>
Part 105	<i>Methods for determination of particle shape</i>
Part 106	<i>Method for determination of shell content in coarse aggregate</i>
Part 109	<i>Methods for determination of moisture content</i>
Part 111	<i>Methods for determination of ten per cent fines values (TFV)</i>
Part 112	<i>Methods for determination of aggregate impact value (AIV)</i>
Part 113	<i>Method for determination of aggregate abrasion value (AVV)</i>
Part 114	<i>Method for determination of the polished-stone value</i>
Part 117	<i>Method for determination of water-soluble chloride salts</i>
Part 118	<i>Methods for determination of sulphate content</i>
Part 119	<i>Method for determination of acid-soluble material in fine aggregate</i>
Part 120	<i>Method for testing and classifying drying shrinkage of aggregates in concrete</i>
Part 121	<i>Method for determination of soundness</i>
Part 124	<i>Method for determination of frost-heave</i>

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.

Methods

1 Scope

This Part of BS 812 describes methods for the determination of the particle density, water absorption, bulk density, voids and bulking of aggregates and of the particle density, bulk density and voids of filler.

Some of the tests are intended for use in obtaining assurance that material complies with British Standard or other requirements, for research, production control or assessment of variation. However, other methods are not intended for assurance testing and their suitability for other purposes is defined.

NOTE. The density terms used are defined in clause 2 of BS 812 : Part 100 : 1990.

2 References

2.1 Normative references

This Part of BS 812 incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on the inside back cover. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the cited publication apply to this Part of BS 812 only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

2.2 Informative references

This Part of BS 812 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Reporting

3.1 General

The report shall affirm that the tests were done in accordance with this standard. Any departure from the specified test procedure shall be described with reasons for the departure and, if possible, estimates of its effect on the test results. The report shall also include details of any special processing of the sample, other than that required by the test methods, carried out in the laboratory, e.g. crushing to provide larger quantities of smaller sizes or the separation of constituents from an as-dug gravel.

3.2 Certificate of sampling

The report shall affirm that a certificate of sampling was received with the sample and shall declare all the information given on the certificate. If a certificate was not received this shall be stated in the report.

4 Significance of results

The distribution of the results of any test on any material stems from a number of contributing factors. In assessing the significance of the results the repeatability and reproducibility of the test should be recognized. Estimates of these are given in annex A and should be used in assessing test results.

5 Determination of particle densities and water absorption

5.1 General

Three main methods are described for aggregates, a wire basket method for aggregates larger than 10 mm, a gas jar method for aggregates between 40 mm and 5 mm and a pycnometer or gas jar method for aggregates 10 mm nominal size and smaller. A buoyancy method using a bucket, as described in BS 1881, is allowed as an alternative for aggregates between 40 mm and 5 mm nominal size.

The method for filler is by use of a density bottle.

As with any porous material the value obtained for the particle density of an aggregate depends on the details of the method of test. Furthermore, different sizes of the same aggregate often have different values of particle density and absorption. Therefore, when comparing different aggregates it is essential that the test be made on samples sensibly of the same grading.

The wire basket method for aggregates larger than 10 mm is not suitable for testing friable aggregates which may break down during the test, and therefore the gas jar method for aggregates between 40 mm and 5 mm should be used for such material.

5.2 Sampling

The sample for these tests shall be taken in accordance with BS 812 : Part 102.

5.3 Method for aggregates all larger than 10 mm

5.3.1 Apparatus

NOTE. All apparatus described should conform to the general requirements of BS 812 : Part 100.

5.3.1.1 Balance, of capacity not less than 3 kg, accurate to 0.5 g, and of such a type and size as to permit the basket containing the sample to be suspended from the beam and weighed in water.

5.3.1.2 Well ventilated oven, thermostatically controlled to maintain a temperature of $105^{\circ}\text{C} \pm 5^{\circ}\text{C}$.