

BS EN 932-5:2012

Incorporating corrigenda May 2014 and August 2014



BSI Standards Publication

Tests for general properties of aggregates

Part 5: Common equipment and calibration

bsi.

...making excellence a habit.
AVA Documents™
Document Sharing Hub

National foreword

This British Standard is the UK implementation of EN 932-5:2012, incorporating corrigendum May 2014. It supersedes BS EN 932-5:2000 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/502, Aggregates.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2014.
Published by BSI Standards Limited 2014

ISBN 978 0 580 86991 4

ICS 91.100.15

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 April 2012.

Amendments/corrigenda issued since publication

Date	Text affected
31 August 2014	Implementation of CEN corrigendum May 2014: Key inserted for Figure A.1
31 August 2014	Implementation of CEN correction notice 4 June 2014: updated Key in Figure A.1

English Version

Tests for general properties of aggregates - Part 5: Common equipment and calibration

Essais pour déterminer les propriétés générales des granulats - Partie 5: Equipements communs et étalonnage

Prüfverfahren für allgemeine Eigenschaften von Gesteinskörnungen - Teil 5: Allgemeine Prüfeinrichtungen und Kalibrierung

This European Standard was approved by CEN on 30 December 2011.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	5
4 Common equipment	5
4.1 Tolerances	5
4.1.1 Manufacturing tolerances	5
4.1.2 Working tolerances.....	6
4.2 Measuring instruments	6
4.2.1 General.....	6
4.2.2 Balances and weights	6
4.2.3 Thermometers	7
4.2.4 Dimensional measurement instruments	7
4.2.5 Timers	8
4.2.6 Volumetric glassware.....	8
4.2.7 Density hydrometers	8
4.3 Other instruments.....	8
4.3.1 Ovens	8
4.3.2 Constant temperature bath.....	8
4.3.3 Test sieves and bar sieves	8
4.3.4 Moulds and drums	8
4.3.5 Sieve shakers.....	9
4.3.6 Desiccators and desiccator cabinets	9
4.3.7 Bottle shakers and rollers.....	9
4.3.8 Heaters.....	9
4.3.9 Rotating machinery	9
4.3.10 Vibrating machinery	9
4.3.11 Pressure or vacuum	9
5 Calibration and checking	9
5.1 Calibration of reference standards and reference instruments.....	9
5.1.1 Laboratory reference standards.....	9
5.1.2 Specifications for reference standards and reference instruments.....	10
5.2 Calibration and checking of test equipment.....	11
5.2.1 Traceability	11
5.2.2 External and in-house calibration	11
5.2.3 Calibration and checking of measuring instruments.....	12
5.2.4 Checking of other instruments.....	14
6 Reagents.....	17
6.1 Distilled water.....	17
6.2 Chemical reagents	18
Annex A (normative) Method for the performance check of sieves	19
Annex B (normative) Procedure for the manual checking of perforated plate test sieve openings.....	22
B.1 Equipment for checking the openings of plate test sieves	22
B.2 Calibration of sieve check gauges.....	22
B.3 Test procedure	22
Annex C (informative) Balance recommendation for various standard test methods.....	24
Bibliography	25

Foreword

This document (EN 932-5:2012) has been prepared by Technical Committee CEN/TC 154 “Aggregates”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2012, and conflicting national standards shall be withdrawn at the latest by August 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 932-5:1999.

This standard forms part of a series of standards for general properties of aggregates. Test methods for other properties of aggregates are covered by the following European Standards:

EN 933, *Tests for geometrical properties of aggregates*;

EN 1097, *Tests for mechanical and physical properties of aggregates*;

EN 1367, *Tests for thermal and weathering properties of aggregates*;

EN 1744, *Tests for chemical properties of aggregates*;

EN 13179, *Tests for filler aggregate used in bituminous mixtures*.

The other parts of EN 932, Tests for general properties of aggregates are:

- *Part 1: Methods for sampling*;
- *Part 2: Methods for reducing laboratory samples*;
- *Part 3: Procedure and terminology for simplified petrographic description*;
- *Part 6: Definitions of repeatability and reproducibility*.

In the bibliography, reference is made to the International Organization for Legal Metrology (OIML) classification, which this standard has adopted for the purposes of establishing a frequency of calibration for balance weights.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies general requirements for common equipment, calibration and checking procedures and reagents for the testing of the properties of aggregates.

In the case of checking, other procedures than the ones described in this standard may be used provided that appropriate working relationships with the corresponding methods described in this standard have been established. In case of dispute, the checking methods described in this standard shall be used.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 933-1, *Tests for geometrical properties of aggregates — Part 1: Determination of particle size distribution — Sieving method*

EN 933-2, *Tests for geometrical properties of aggregates — Part 2: Determination of particle size distribution — Test sieves, nominal size of apertures*

EN 933-3, *Tests for geometrical properties of aggregates — Part 3: Determination of particle shape — Flakiness index*

EN 933-8, *Tests for geometrical properties of aggregates — Part 8: Assessment of fines — Sand equivalent test*

EN ISO 3650, *Geometrical product specifications (GPS) — Length standards — Gauge blocks (ISO 3650:1998)*

ISO 384, *Laboratory glassware — Principles of design and construction of volumetric glassware*

ISO 386, *Liquid-in-glass laboratory thermometers — Principles of design, construction and use*

ISO 649-1, *Laboratory glassware — Density hydrometers for general purposes — Part 1: Specification*

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

ISO 3310-2, *Test sieves — Technical requirements and testing — Part 2: Test sieves of perforated metal plate*

ISO 4788, *Laboratory glassware — Graduated measuring cylinders*

ISO 6353-2, *Reagents for chemical analysis — Part 2: Specifications — First series*

ISO 6353-3, *Reagents for chemical analysis — Part 3: Specifications — Second series*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

calibration

operation that, under specified conditions, in a first step, establishes a relation between the quantity values with measurement uncertainties provided by measurement standards and corresponding indications with associated measurement uncertainties and, in a second step, uses this information to establish a relation for obtaining a measurement result from an indication.

Note 1 to entry: A calibration may be expressed by a statement, calibration function, calibration diagram, calibration curve, or calibration table. In some cases, it may consist of an additive or multiplicative correction of the indication with associated measurement uncertainty.

Note 2 to entry: For more information, see VIM – International vocabulary of basic and general terms in metrology (available on <http://www.bipm.org/>).

3.2

checking

operation of assuring either:

- that the results of measurements of a property (such as length, mass, temperature or time) at selected values made by a measuring instrument, or a set of them, have not deviated from that which was measured when the equipment was last calibrated within a pre-defined tolerance; or
- that a property (such as rotation speed, vibration frequency) of an item, or a set of items, of equipment complies with the relevant requirements for that equipment.

3.3

verification scale interval (e) for balances

value, expressed in units of mass, used for the classification and verification of a balance

3.4

actual scale interval (d)

value, expressed as:

- the difference between the values corresponding to two consecutive scale marks, for analogue indication, or
- the difference between two consecutive indicated values, for digital indication.

3.5

tolerance

maximum permissible deviation from the nominal value of a measurable characteristic

Note 1 to entry: In the present standard, tolerances may be expressed either as an absolute quantity without sign or as a percentage of the nominal value of a measurable characteristic.

4 Common equipment

4.1 Tolerances

4.1.1 Manufacturing tolerances

NOTE By convention, the tolerances (or limits) indicated in the aggregate test standards are manufacturing tolerances (or limits), if not otherwise stated.

4.1.1.1 Linear dimensions

Where a dimension is specified with manufacturing tolerances or limits, it shall be an essential dimension.

NOTE Dimensions stated without tolerances are given for guidance.

4.1.1.2 Mass

Where mass is specified, the manufacturing tolerance shall be $\pm 1\%$ of the specified mass unless otherwise stated.

4.1.2 Working tolerances

Working tolerances apply to equipment (e.g. apparatus) after being subjected to wear in use, and shall be not more than twice the manufacturing tolerance unless otherwise specified.

4.2 Measuring instruments

4.2.1 General

Measuring instruments shall have greater measurement accuracy than the corresponding tolerance defined in the test method.

NOTE Unless stated otherwise, the measurement accuracy of the instrument used should be at least five times better than the corresponding tolerance.

4.2.2 Balances and weights

Balances and weights shall be calibrated. Calibration and checking of balances and weights shall comply with 5.2.3.2 and 5.2.3.3 respectively.

NOTE 1 Balances can incorporate an analogue or a digital display.

The balance (and weights if required) selected for a weighing shall enable the mass to be determined to the accuracy required by the test method. If calibration determines that the balance is not suitable for use across its full working range, it shall be labelled to show the upper and lower limits of usable capacity.

NOTE 2 Examples of categories of balances are given in Table 1. Annex C relates these categories to most aggregate standard test methods.

Table 1 — Examples of categories of balances, their accuracy classes and corresponding tolerances for intermediate checks

Balance accuracy class	Balance category	Verification scale interval e (g)	Actual scale interval d (g)	Tolerance for intermediate checks (g)	Minimum capacity (g)	Maximum capacity (kg)
I (special)	1	0,001	0,0001 ^a	0,0005	0,01 ^a	-
II (high)	2	0,01	0,001 ^a	0,003	0,02 ^a	1
	3	0,1	0,01 ^a	0,03	0,5 ^a	10
	4	1	0,1 ^a	0,3	5 ^a	100
III (medium)	5	1	1	2	20	10
	6	2	2	4	40	20
	7	200	200	400	4000	2000
NOTE This table is based on OIML (2006).						
^a Balances fitted with an auxiliary indicating device.						

4.2.3 Thermometers

Thermometers shall be selected as appropriate to the test method. Actual scale interval shall not be greater than half of the required accuracy.

For liquid-in-glass thermometers the form of graduations shall be as specified in ISO 386. The calibration of thermometers shall comply with 5.2.3.4.

4.2.4 Dimensional measurement instruments

4.2.4.1 Steel rules

Steel rules shall have scale divisions at least every 1 mm and shall be checked in accordance with 5.2.3.5.

4.2.4.2 Callipers

Digital, dial and vernier callipers for internal and external measurements shall have an actual scale interval of 0,1 mm or better and shall be calibrated in accordance with 5.2.3.5.

4.2.4.3 Micrometers

Micrometer measuring devices shall have an actual scale interval of 0,01 mm or better, or 0,002 mm or better, depending upon the accuracy specified in the test method. Calibration shall be in accordance with 5.2.3.5.

4.2.4.4 Dial gauges

Dial gauges shall have an actual scale interval of 0,01 mm or better, or 0,002 mm or better, depending upon the accuracy and range of scale required by the test method. Dial gauges shall be calibrated in accordance with 5.2.3.5.