BS EN 1367-8:2014

BSI Standards Publication

Tests for thermal and weathering properties of aggregates

Part 8: Determination of resistance to disintegration of Lightweight Aggregates

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee B/502/6, Test methods.

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

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Tests for thermal and weathering properties of aggregates - Part 8: Determination of resistance to disintegration of Lightweight Aggregates

Essais pour déterminer les propriétés thermiques et l'altérabilité des granulats - Partie 8: Détermination de la résistance à la désintégration des granulats légers

Prüfverfahren für thermische Eigenschaften und Verwitterungsbeständigkeit von Gesteinskörnungen - Teil 8: Bestimmung des Widerstandes von leichten Gesteinskörnungen gegen Zerfall

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Contents

Page

Foreword

This document (EN 1367-8:2014) 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of an identical text or by endorsement, at the latest by October 2014, and conflicting national standards shall be withdrawn at the latest by October 2014.

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.

EN 1367 "Tests for thermal and weathering properties of aggregates" consists of the following parts:

— *Part 1: Determination of resistance to freezing and thawing*

— *Part 2: Magnesium sulfate test*

— *Part 3: Boiling test for “Sonnenbrand Basalt”*

— *Part 4: Determination of drying shrinkage*

— *Part 5: Determination of resistance to thermal shock*

— *Part 6: Determination of resistance to freezing and thawing in the presence of salt (NaCl)*

— *Part 7: Determination of resistance to freezing and thawing of Lightweight Aggregates*

— *Part 8: Determination of resistance to disintegration of Lightweight Aggregates* (the present document)

Test methods for other properties of aggregates are covered by parts of the following European Standards:

— EN 932, *Tests for general properties of aggregates*

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

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

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

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

NOTE This document supersedes the test method described in EN 13055–1:2002, Annex B.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, 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 the reference test method used for type testing, and in case of dispute, for determining the resistance to disintegration of lightweight aggregates (LWA) in accordance with EN 13055. For other purposes, in particular for factory production control, other methods may be used provided that an appropriate working relationship with the reference method has been established The test is applicable to LWA with particle size no lower than 4 mm and up to a maximum size of 32 mm.

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 932-1, *Tests for general properties of aggregates - Part 1: Methods for sampling*

EN 932-2, *Tests for general properties of aggregates - Part 2: Methods for reducing laboratory samples*

EN 932-5, *Tests for general properties of aggregates - Part 5: Common equipment and calibration*

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

EN 13055-1, *Lightweight aggregates - Part 1: Lightweight aggregates for concrete, mortar and grout*

EN 13055-2, *Lightweight aggregates - Part 2: Lightweight aggregates for bituminous mixtures and surface treatments and for unbound and bound applications*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13055-1, EN 13055-2 and the following apply.

3.1
test specimen
sample used in single determination when a test method requires more than one determination of a property

3.2
constant mass
mass determined by successive weighings performed 1 h apart and not differing by more than 0,1 %

Note 1 to entry: In many cases constant mass can be achieved after a test portion has been dried for a pre-determined period in a specified oven at (110 ± 5) °C. Test laboratories can determine the time required to achieve constant mass for specific types and sizes of sample dependent upon the drying capacity of the oven used.

4 Principle

Lightweight aggregates soaked in water are exposed to high pressure and temperature to measure the resistance to disintegration.

5 Apparatus and materials

5.1 All apparatus, unless otherwise stated, shall conform to the general requirements of EN 932-5.

5.2 Thermostatically controlled saturated steam autoclave, of suitable capacity and capable of raising the test specimens from ambient temperature to (215 ± 5) °C in (60 ± 5) min and maintaining this temperature for (180 ± 10) min, at a pressure of (2 ± 0,2) MPa.

In addition, the autoclave shall be capable of allowing the test specimens to cool to (30 ± 10) °C in (90 ± 10) min.

5.3 Test sieves, in accordance with EN 933-2.

5.4 Balance, capable of weighing test specimens up to 400 g with an accuracy of ± 0,04 g and test specimens above 400 g with an accuracy of 0,1 g.

5.5 Thermostatically controlled ventilated drying oven, capable of maintaining a temperature of (110 ± 5) °C.

5.6 Two metal containers, suitable for holding the lightweight aggregate in the autoclave.

5.7 Water, distilled or deionised.

5.8 Grid, of a suitable size and aperture to prevent the lightweight aggregates floating out of the container and to prevent any loss of whole aggregates.

6 Sampling

Sampling and sample reduction shall be carried out in accordance with EN 932-1 and EN 932-2.

7 Test specimens

7.1 General

Two individual test specimens shall be used. The test specimens shall be obtained in accordance with EN 932-2 by sample reduction. Particles of oversize (>*D*) and undersize (<*d*) shall be removed.

7.2 Size of test specimens

The quantities for each of the two individual test specimens shall be chosen according to the upper size of the aggregates as shown in Table 1. Deviations of ± 5 % in the volume of the test specimens are permissible.

Table 1 — Test specimen volumes required

Maximum aggregate size (mm)	**Approximate volume of the test specimen** (l)
8	0,5
16	1,0
32	1,5

7.3 Preparation of test specimens

Wash the test specimens on the lower (*d*) test sieve. Dry the test specimens to constant mass. Allow to cool to ambient temperature and weigh immediately (M_1, see Clause 9).

Weighing shall be carried out to the following accuracies:

- Test specimens up to 400 g: to ± 0,04 g.
- Test specimens above 400 g: to ± 0,1 g.

8 Procedure

8.1 Soaking

Soak the two test specimens in distilled or deionised water at ambient temperature for (72 ± 1) h, ensuring that the water covers the test specimens by at least 10 mm. In order to prevent the test specimens floating, the specimens are kept submerged by a grid as specified in 5.8. Remove the lightweight aggregate from the distilled or deionised water and allow the specimens to drain on a sieve with a maximum size of 2 mm for about 15 min.

8.2 Exposure to high pressure and temperature

Place each drained test specimen in the metal container specified in 5.6 and place in the autoclave.

Raise the autoclave to a pressure of (2 ± 0,2) MPa and a temperature of (215 ± 5) °C in (90 ± 5) min, and maintain this pressure and temperature for (180 ± 5) min. Allow to cool to (30 ± 10) °C in (90 ± 5) min.

Transfer the containers and contents to the oven and dry at (110 ± 5) °C to constant mass and allow to cool. Weigh each test specimen (M_1).

Carefully screen each of the test specimens on a sieve having an aperture size that is half the lower size sieve used to prepare the test specimen (e.g. in case of the 8 mm to 16 mm fraction, use a test sieve of 4 mm aperture size).

Weigh the material passing through this sieve for each test specimen (M_2, see Clause 9).

9 Calculation and expression of results

Calculate the loss in mass (Z_i) of each test specimen in accordance with the following formula:

$$Z_i = [M_2/M_1] \times 100$$

where

Z_i is the percentage loss in mass of the test specimen;

M_1 is the dry mass of the test specimen after autoclave testing and before sieving, in grams;

M_2 is the dry mass of the test specimen after autoclave testing, that is passing the specified sieve, in grams.

Express Z_i to the nearest 0,01 %.

Calculate Z as the mean of the two individual test results to the nearest 0,1 %.

10 Test report

10.1 Mandatory data

The test report shall include the following information:

- reference to this European Standard;
- identification of the test sample, including identification of the source, aggregate size and date of sampling;
- sample reception date if different from sampling date;
- identification of the laboratory;
- percentage of mass loss after autoclave testing Z, expressed to the nearest 0,1 %;
- deviations from the reference method, if any.

10.2 Optional data

The test report can include the following information:

- date of test;
- reference to the chosen sampling procedure;
- reference to the chosen sample reduction procedure;
- percentage of the mass loss after autoclave testing of the individual test specimens Z_i, expressed to the nearest 0,01 %.

Bibliography

[1] EN 1097-5, *Tests for mechanical and physical properties of aggregates - Part 5: Determination of the water content by drying in a ventilated oven*

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