



SLOVENSKI STANDARD
oSIST prEN 13055:2021
01-september-2021

Lahki agregati

Lightweight aggregates

Leichte Gesteinskörnungen

Granulats légers

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Ta slovenski standard je istoveten z: prEN 13055

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ICS:

91.100.15 Mineralni materiali in izdelki Mineral materials and products

oSIST prEN 13055:2021

en,fr,de

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 13055

June 2021

ICS 91.100.15

Will supersede EN 13055:2016

English Version

Lightweight aggregates

Granulats légers

Leichte Gesteinskörnungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 154.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document prEN 13055 has been prepared by Technical Committee CEN/TC 154 “Aggregates”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede the withdrawn harmonized standards:

EN 13055-1:2002, *Lightweight aggregates — Part 1: Lightweight aggregates for concrete, mortar and grout*;

EN 13055-2:2004, *Lightweight aggregates — Part 2: Lightweight aggregates for bituminous mixtures and surface treatments and for unbound and bound applications*.

This document will also supersede the non-harmonized standard:

— EN 13055:2016, *Lightweight aggregates*.

For information, EN 13055:2016 was published, but this version has failed to be cited in the OJEU.

This document has been prepared under a standardization request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Regulation(s).

For relationship with Regulation (EU) No 305/2011 on construction products (CPR), see informative Annex ZA, which is an integral part of this document.

In comparison with the previous editions (2002, 2004 and 2016), the following technical modifications have been made:

- a) Merging of the former two parts, changing the title and clarifying the scope of the standard;
- b) Reorganization, alignment and revision of terminology and text according to the Construction Product Regulation, templates for harmonized standards, AVCP clauses and Annex ZA and in line with the CEN/TC 154 approach for all aggregate product standards;
- c) All normative references are made dated references;
- d) Common terms and definitions are in accordance with prEN 17555-1:2021 *Aggregates for construction works — Part 1: Characteristics*;
- e) Previous Table 1 with sieve sized for specifying aggregate size replaced by a normative reference to EN 933-2:2020;
- f) Percentage of crushed particles is deleted as a characteristic and shall no longer be determined. (This is in accordance with the revised answer to the mandate);
- g) Deleting the clauses related to thermal conductivity;
- h) Essential characteristics without a European test method have no longer been considered;
- i) Replacement of 3 former test method annexes with normative references to separate EN test method standards;

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- j) Information from the previous annex on test frequencies for factory production control are now included in new Clause 6 on AVCP;
- k) The previous annex on source material is deleted, see Bibliography;
- l) The previous annex on chemical constituents and organic components is deleted. Text on chlorides (because it is a concrete matter), alkali aggregate reaction and sulphates is deleted.
- m) Referring certain LWA for specific applications to other aggregate standards in a normative Annex A *Standards covering other applications of LWA*;
- n) Annex B *Determination of bulk crushing resistance* includes a new procedure 3 for factory production control of material up to 63 mm;
- o) New normative Annex C on mass conversion;
- p) Deleting previous annex on *Determination of water absorption for fine LWA* as a result of the ongoing revision of prEN 1097-6:2020;

Characteristics for other aggregates are specified in the following European Standards:

- prEN 13383-1:2021, *Armourstone — Part 1: Characteristics*;
- prEN 13450-1:2021, *Aggregates for railway ballast — Part 1: Characteristics*;
- prEN 17555-1:2021, *Aggregates for construction works — Part 1: Characteristics*.

Some LWA for specific applications are covered in separate European product Standards, see normative Annex A.

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1 Scope

This document specifies the characteristics of lightweight aggregates (LWA) and LWA fillers and mixtures of them intended to be used in concrete, mortar and grout, bituminous mixtures, surface treatments and for unbound and hydraulically bound applications in construction works.

This document covers LWA and LWA fillers from mineral materials having particle densities less or equal to 2000 kg/m³ (2,000 Mg/m³) or loose bulk densities less or equal to 1200 kg/m³ (1,200 Mg/m³).

With regard to the aggregate size, this document covers LWA: fine lightweight aggregate (see 3.1.7), coarse lightweight aggregate (hereafter called coarse LWA) (see 3.1.8), all-in lightweight aggregate (hereafter called all-in LWA) (see 3.1.9) and LWA fillers (see 3.1.10).

With regard to the material source and production technique, this document covers LWA and LWA fillers:

- a) of natural origin (see 3.1.2),
- b) manufactured from natural materials (see 3.1.3),
- c) manufactured from by-products of industrial processes (see 3.1.4) or from recycled source materials (see 3.1.5), and
- d) as by-products of industrial processes (see 3.1.4).

Limits given to densities are related to some test methods which might not be applicable to some lightweight aggregates and lightweight aggregate fillers. This limitation is purely based on technical reasons and not to exclude any products from the market.

This document also specifies procedures for assessment and verification of constancy (AVCP) of performance of characteristics of LWA and LWA fillers.

This document does not cover LWA and LWA fillers of recycled aggregates from construction and demolition waste and Municipal Solid Waste Incinerator Bottom Ash (MIBA) (covered by prEN 17555-1:2021).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 932-1:1996, *Tests for general properties of aggregates — Part 1: Methods for sampling*

EN 932-2:1999, *Tests for general properties of aggregates — Part 2: Methods for reducing laboratory samples*

EN 932-5:2012¹, *Tests for general properties of aggregates — Part 5: Common equipment and calibration*

EN 933-1:2012, *Tests for geometrical properties of aggregates — Part 1: Determination of particle size distribution — Sieving method*

EN 933-2:2020, *Tests for geometrical properties of aggregates — Part 2: Determination of particle size distribution — Test sieves, nominal size of apertures*

¹ As impacted by corrigendum EN 932-5:2012/AC:2014.

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EN 933-10:2009, *Tests for geometrical properties of aggregates — Part 10: Assessment of fines — Grading of filler aggregates (air jet sieving)*

EN 1097-1:2011, *Tests for mechanical and physical properties of aggregates — Part 1: Determination of the resistance to wear (micro-Deval)*

EN 1097-2:2020, *Tests for mechanical and physical properties of aggregates — Part 2: Methods for the determination of resistance to fragmentation*

EN 1097-3:1998, *Tests for mechanical and physical properties of aggregates — Part 3: Determination of loose bulk density and voids*

EN 1097-4:2008, *Tests for mechanical and physical properties of aggregates — Part 4: Determination of the voids of dry compacted filler*

EN 1097-5:2008, *Tests for mechanical and physical properties of aggregates — Part 5: Determination of the water content by drying in a ventilated oven*

prEN 1097-6:2020, *Tests for mechanical and physical properties of aggregates — Part 6: Determination of particle density and water absorption*

prEN 1097-7:2020, *Tests for mechanical and physical properties of aggregates — Part 7: Determination of the particle density of filler — Pyknometer method*

EN 1097-8:2020, *Tests for mechanical and physical properties of aggregates — Part 8: Determination of the polished stone value*

EN 1097-9:2014, *Tests for mechanical and physical properties of aggregates — Part 9: Determination of the resistance to wear by abrasion from studded tyres — Nordic test*

EN 1097-10:2014, *Tests for mechanical and physical properties of aggregates — Part 10: Determination of water suction height*

EN 1097-11:2013, *Tests for mechanical and physical properties of aggregates — Part 11: Determination of compressibility and confined compressive strength of lightweight aggregates*

EN 1367-5:2011, *Tests for thermal and weathering properties of aggregates — Part 5: Determination of resistance to thermal shock*

EN 1367-7:2014, *Tests for thermal and weathering properties of aggregates — Part 7: Determination of resistance to freezing and thawing of Lightweight aggregates*

EN 1367-8:2014, *Tests for thermal and weathering properties of aggregates — Part 8: Determination of resistance to disintegration of Lightweight Aggregates*

EN 1744-1:2009+A1:2012, *Tests for chemical properties of aggregates — Part 1: Chemical analysis*

EN 12697-11:2020, *Bituminous mixtures — Test methods — Part 11: Determination of the affinity between aggregate and bitumen*

EN 13179-1:2013, *Tests for filler aggregate used in bituminous mixtures — Part 1: Delta ring and ball test*

EN 13286-7:2004, *Unbound and hydraulically bound mixtures — Part 7: Cyclic load triaxial test for unbound mixtures*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

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

3.1.1

lightweight aggregate

granular material of mineral origin having a particle density less or equal to (\leq) 2000 kg/m³ (2,000 Mg/m³) or a loose bulk density less or equal to (\leq) 1200 kg/m³ (1,200 Mg/m³)

3.1.2

natural lightweight aggregate

aggregate from mineral sources which has been subjected to nothing more than mechanical processing and sometimes washing

[SOURCE: prEN 17555-1:2021, 3.1.2]

3.1.3

manufactured lightweight aggregate

aggregate of mineral origin resulting from an industrial process involving thermal or other modification

[SOURCE: prEN 17555-1:2021, 3.1.3, modified — Note to entry has been deleted.]

3.1.4

by-product lightweight aggregate

aggregate of mineral origin from an industrial process which subsequently has been subjected to nothing more than mechanical processing

3.1.5

recycled source material

raw material of inorganic or mineral origin from waste sources for use in manufactured LWA

3.1.6

recycled aggregate

aggregate resulting from processing of inorganic or mineral material previously used in construction

3.1.7

fine lightweight aggregate

designation given to the smaller aggregate sizes with D less than or equal to 4 mm and d greater than or equal to 0 mm

[SOURCE: prEN 17555-1:2021, 3.1.12]

3.1.8

coarse lightweight aggregate

designation given to the larger aggregate sizes with D greater than 4 mm and less than 90 mm and d greater than or equal to 1 mm

[SOURCE: prEN 17555-1:2021, 3.1.8]

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prEN 13055:2021 (E)**3.1.9****all-in lightweight aggregate**

processed aggregate consisting of a mixture of coarse and fine aggregates with D greater than 4 mm and d equal to 0 mm

Note 1 to entry: It can be produced without separating into coarse and fine fractions or it can be produced by combining coarse and fine aggregates.

[SOURCE: prEN 17555-1:2021, 3.1.13]

3.1.10**lightweight aggregate filler**

fine lightweight aggregate, most of which passes a 0,063 mm sieve

3.1.11**grading**

particle size distribution expressed as the percentage by mass passing a specified set of sieves

[SOURCE: prEN 17555-1:2021, 3.1.6, modified — Note to entry has been deleted.]

3.1.12**aggregate size**

designation of aggregate in terms of lower (d) and upper (D) sieve sizes expressed as d/D , where d/D is less than 0,72

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Note 1 to entry: Sieve sizes are selected from those in EN 933-2:2020

Note 2 to entry: The designation accepts the presence of some particles which are retained on the upper sieve (oversize) and some particles which pass the lower sieve (undersize).

[SOURCE: prEN 17555-1:2021, 3.1.5]

3.1.13**constant mass**

successive weighings after drying and conditioning at least 1 h apart not differing by more than 0,1 %

3.2 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply.

AVCP	Assessment and Verification of Constancy of Performance
d	Lower sieve size designation in mm
D	Upper sieve size designation in mm
DoP	Declaration of Performance
FPC	Factory production control
LWA	Lightweight aggregate(s)
PSV	Polished stone value

4 Characteristics

4.1 Fineness, particle shape, size and density

4.1.1 Loose bulk density

Loose bulk density of LWA and LWA fillers shall be determined according to 5.3. Measured values shall be in the range of $\pm 15\%$ with a maximum of $\pm 100 \text{ kg/m}^3$ ($0,100 \text{ Mg/m}^3$) of the declared value. The performance shall be expressed as a level in kg/m^3 (Mg/m^3).

4.1.2 Particle density of LWA

Particle density of LWA shall be determined according to 5.4. Measured values shall be in the range of $\pm 15\%$ with a maximum of $\pm 150 \text{ kg/m}^3$ ($0,150 \text{ Mg/m}^3$) of the declared value. The performance shall be expressed as a level in kg/m^3 (Mg/m^3).

4.1.3 Particle density of LWA fillers

Particle density of LWA fillers shall be determined according to 5.5. Measured values shall be in the range of $\pm 15\%$ with a maximum of $\pm 150 \text{ kg/m}^3$ ($0,150 \text{ Mg/m}^3$) of the declared value. The performance shall be expressed as a level in kg/m^3 (Mg/m^3).

4.1.4 Aggregate size

The performance of LWA related to its aggregate size (d/D) is the quantity of aggregate passing the lower (undersize) sieve (d) and retained on the upper (oversize) sieve (D) and shall be determined respectively, as:

— the lower sized aggregate (d), and

— the upper sized aggregate (D).

The quantity of the lower sized LWA shall be determined according to 5.6. The quantity obtained shall not exceed 15% by mass.

The quantity of the upper sized LWA shall be determined according to 5.6. The quantity obtained shall not exceed 10% by mass.

The performance shall be expressed as d/D in mm/mm. The ratio d/D shall not exceed 0,72.

4.1.5 Grading

4.1.5.1 Grading of LWA

Grading of LWA shall be determined according to 5.7. The performance shall be expressed as particle size distribution.

4.1.5.2 Grading of LWA fillers

Grading of LWA fillers shall be determined according to 5.8. The performance shall be expressed as particle size distribution.

4.1.6 Particle shape

Particle shape of LWA shall be determined according to 5.9. The particle shape shall be described.