
**Toplotnoizolacijski in lahki polnilni proizvodi za inženirske objekte (CEA) -
Proizvodi iz ekspandiranega glinenega agregatnega proizvoda (LWA)**

Light weight fill and thermal insulation products for civil engineering applications (CEA) -
Expanded clay lightweight aggregate products (LWA)

Leichte Schütt- und Wärmedämmstoffe für bautechnische Anwendungen (CEA) -
Produkte aus Blähton-Leichtzuschlagstoffen (LWA)

Matériaux de remplissage légers et produits isolants thermiques pour les applications du
génie civil - Produits à base de granulats légers d'argile expansée

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Light weight fill and thermal insulation products for civil engineering applications (CEA) - Expanded clay lightweight aggregate products (LWA)

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 88.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 15732:2019) has been prepared by Technical Committee CEN/TC 88 “Thermal insulating materials and products”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 15732:2012.

This document has been prepared under a standardization request given to CEN/CENELEC by the European Commission and the European Free Trade Association.

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

Annexes A, B, C and D are normative. Annex E is informative.

The most significant changes compared to the previous editions include:

- a. Amending terminology and Annex ZA to be consistent with the Construction Products Regulation;
- b. Adding a specific clause on declaration of dangerous substances based a dossier approved by EC;
- c. Deleting the optional method using vacuum in Annex A;
- d. Replacement of the former clause on Evaluation of Conformity, and the normative text from the former Annex on factory Production Control, with new normative clauses on Assessment and Verification of Constancy of Performance.

No changes to existing technical classes and/or threshold levels have been made.

prEN 15732:2019 (E)**1 Scope**

This document specifies the characteristics for loose-fill expanded clay lightweight aggregate (expanded clay LWA) products for Civil Engineering Applications excluding the use as thermal insulation in and under buildings which are covered by EN 14063-1. The document covers the use of expanded clay LWA as lightweight fill and insulation materials in embankments for roads, railways and other trafficked areas and as lightweight backfill for structures.

This document also describes the product characteristics and includes procedures for testing, assessment and verification of the constancy of performance (AVCP), marking and labelling.

This document does not specify the required level of a given property to be achieved by a product to demonstrate fitness for purpose in a particular application.

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

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

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

EN 1097-6:2013, *Tests for mechanical and physical properties of aggregates – Part 6: Determination of particle density and water absorption*

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

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

EN 13055:2016, *Lightweight aggregates*

EN 13172, *Thermal insulation products – Evaluation of conformity*

EN 13286-4, *Unbound and hydraulically bound mixtures – Part 4: Test methods for laboratory reference density and water content – Vibrating hammer*

EN 13286-5, *Unbound and hydraulically bound mixtures – Part 5: Test methods for laboratory reference density and water content – Vibrating table*

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

EN 13501-1, *Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests*

EN 13820, *Thermal insulating materials for building applications – Determination of organic content*

EN 14063-1, *Thermal insulation products for buildings – In-situ formed expanded clay lightweight aggregate products – Part 1: Specification for the loose-fill products before installation*

CEN/TS 16637-3, *Construction products – Assessment of release of dangerous substances – Part 3: Horizontal up-flow percolation test*

EN ISO 9229:2007, *Thermal insulation – Vocabulary (ISO 9229:2007)*

EN ISO 10456, *Building materials and products – Hygrothermal properties – Tabulated design values and procedures for determining declared and design thermal values (ISO 10456)*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 9229:2007 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
<https://standards.iteh.ai/catalog/standards/sist/35f24ddc-8997-41e1-a636-3c1a71710000>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1.1

expanded clay

lightweight aggregate

insulation material or product composed of lightweight granular material having a cellular structure formed by expanding clay minerals by heat

3.1.2

compressibility

C

deformation at a defined load and/or by vibration

3.1.3

confined compressive strength

CS10

load where the deformation of a vibrated specimen is 10 %

3.1.4

stiffness modulus

tangent to the load-deformation curve and is related to the level of deformation

prEN 15732:2019 (E)**3.1.5****compressive creep****CC**

deformation at a constant load in a specified time

3.1.6**cyclic compression****CY**

deformation at a defined load and given number of cyclic compressive loading cycles with square wave load application

3.1.7**compaction**

mechanical compression of the installed insulation layer, expressed as a percentage of the initial untreated layer thickness

Note 1 to entry: Compression performed, e.g. by vibrator.

3.1.8**level**

result of the assessment of the performance of a construction product in relation to its essential characteristics, expressed as a numerical value

[SOURCE: CPR, Regulation (EU) No 305/2011]

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3.1.9**class**

range of levels, delimited by a minimum and a maximum value, of performance of a construction product

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[SOURCE: CPR, Regulation (EU) No 305/2011]

3.1.10**declared value**

value or range of values that a manufacturer is confident in achieving, taking into account the precision of test methods used, the variability of the production process(-es) and the product performance

3.2 Symbols, units and abbreviated terms

Symbols and units used in this document:

d	is the lower sieve size (mm)
D	is the upper sieve size (mm)
LD	is the declared value for loose bulk density (kg/m ³ or Mg/m ³)
AS	is the declared value for aggregate size (mm)
C	compressibility (%)
CS(10)	is the declared level for confined compressive strength at 10 % deformation (N/mm ²)
CS(2)	is the declared level for confined compressive strength at 2 % deformation (N/mm ²)
CC (i)	is the declared level for compressive creep at a defined (i) load (%)
CY(i/n)	is the declared deformation at a defined (i) load after a defined number (n) of cyclic

compressive loading cycles (%)

Abbreviated terms used in this document:

LWA	is Lightweight Aggregate
PTT	is Product-Type Testing
CEA	is Civil Engineering Applications
DoP	is Declaration of Performance
FPC	is Factory Production Control
AVCP	is Assessment and Verification of Constancy of Performance
CWFT	is Classification Without Further Testing

4 Product characteristics

4.1 General

Product characteristics are assessed in accordance with Subclauses 4.2 and 4.3 as appropriate. Relevant assessment methods are given in Clause 5.

4.2 For all applications

4.2.1 Loose bulk density

Loose bulk density shall be measured in accordance with EN 1097-3 and declared in steps of 5 kg/m³ (0,005 Mg/m³) up to a density of 400 kg/m³ (0,400 Mg/m³) and thereafter in steps of 10 kg/m³ (0,010 Mg/m³) and shall be in the range of $\pm 15\%$ of the declared value. The value shall be expressed in kg/m³ (Mg/m³).

NOTE The value of the density used for design purposes will be influenced by compaction and water content.

4.2.2 Aggregate size

4.2.2.1 General

Aggregate size shall be determined using a pair of sieve sizes as described in EN 13055 and the upper and lower sizes declared as product designation.

NOTE The declaration accepts the presence of some particles, which will be retained on the upper sieve (referred to as (D)) and some, which will pass the lower sieve (referred to as (d)).

4.2.2.2 Undersize

The quantity of the undersize passing the lower sieve (d) shall not exceed 15 % by mass.

4.2.2.3 Oversize

The quantity of the oversize retained on the upper sieve (D) shall not exceed 10 % by mass.

NOTE The sieve through which 100 % of the aggregates passes can be declared.

4.2.2.4 Grading

When declared, the particle size distribution shall be determined in accordance with EN 933-1 without washing and a grading declared.

prEN 15732:2019 (E)**4.2.3 Reaction to fire**

Reaction to fire shall be determined in accordance with EN 13501-1. The organic content shall be verified in accordance with EN 13820.

NOTE Expanded clay LWA as described in 3.1.1 of this document is classified, without testing, as a class A1 product in accordance with Commission Decision 96/603/EC as amended by Commission Decision 2000/605/EC under the condition that the product does not contain more than a mass or volume fraction of 1,0 % (whichever the more onerous) of homogeneously distributed organic material.

4.2.4 Durability characteristics**4.2.4.1 General**

The appropriate durability characteristics have been considered and are covered in 4.2.4.2 to 4.2.4.6.

NOTE The product is a clay mineral product thermo-processed to form a stable structure.

4.2.4.2 Durability of reaction to fire against ageing/degradation

The reaction to fire performance of expanded clay LWA does not change with time.

4.2.4.3 Durability of thermal resistance against ageing/degradation

The thermal conductivity (4.3.2) of the product does not change with time.

4.2.4.4 Durability of compressive strength against ageing/degradation

The compressive strength of expanded clay does not change with time.

4.2.4.5 Durability of resistance to dynamic loads against ageing/degradation

The resistance to dynamic loads does not change with time.

4.2.4.6 Durability against chemicals and biological attack

The expanded clay LWA is a ceramic material and is durable against chemicals and biological attack.

4.3 For specific applications**4.3.1 General**

The following characteristics can be declared if relevant for the intended use(s).

4.3.2 Thermal resistance and thermal conductivity

When declared, the thermal conductivity and thermal resistance shall be determined in accordance with EN 14063-1.

For light weight fill applications without specific thermal insulation requirements tabulated thermal values in accordance with Annex E may be used.

4.3.3 Specific heat capacity

When declared, the specific heat capacity shall be declared on the basis of EN ISO 10456.

NOTE A typical value for specific heat capacity of 1000 J/(kg K) can be used.

4.3.4 Particle density

When declared, the particle density shall be determined in accordance with EN 1097-6. Measured values shall be in the range of $\pm 15\%$ of the declared value. The value shall be expressed in kg/m^3 (Mg/m^3).

4.3.5 Water content

When declared, the water content shall be determined in accordance with EN 1097-5.

4.3.6 Water absorption

When declared, the water absorption after an immersion time of 28 days shall be determined in accordance with EN 1097-6.

NOTE Water absorption after an extended immersion time might be determined and declared. (e.g. 300 days)

4.3.7 Compressibility and confined compressive strength

When declared, the compressibility and the confined compressive strength $\text{CS}(10)$ shall be determined in accordance with EN 1097-11. A stiffness modulus shall be given as the tangent to the stress-strain relationship curve and related to the level of deformation.

NOTE The confined compressive strength at 10 % strain is not a design value, it is used as a reference value for material characterization only. For characterization of material properties the stiffness modulus and the load at a strain level at maximum 2 % ($\text{CS}(2)$) is more relevant.

4.3.8 Compressive creep

When declared, the compressive creep CC , in terms of deformation in % of the height of a vibrated sample, shall be determined in accordance with Annex C, and a value at a defined load after 24 h shall be declared.

NOTE Compressive creep after an extended time period can be determined and declared (e.g. 28 days)

4.3.9 Shear strength – static loading

When declared, the shear strength properties shall be determined in accordance with Annex A.

4.3.10 Cyclic compression

When declared, the resistance to cyclic compression CY shall be determined in accordance with Annex B. A cyclic load of 120 kPa shall be applied and the deformation after $2 \cdot 10^6$ cycles shall be determined and a value shall be declared. Other load levels and extended number of vibrating cycles might be applied. The results shall be given as deformation in % of the height of a vibrated sample related to the stress level. The method using dry samples is defined as the reference method.

4.3.11 Shear strength – cyclic loading

When declared, the resilient modulus (elastic stiffness) and resistance to permanent deformations shall be determined by cyclic triaxial tests. Cyclic triaxial testing shall be performed in accordance with EN 13286-7. The multistage loading procedure (low stress level) shall be followed.

The development of permanent deformations is highly dependent on the stress history. This should be taken into consideration when the results from the test are used.

4.3.12 Water permeability

The property is not measured because the open structure of the final product itself offers no substantial resistance to the free movement of water.