
**Toplotnoizolacijski proizvodi za opremo stavb in industrijske inštalacije -
Proizvodi iz ekspaniranega perlita (EP), oblikovani na mestu vgradnje - 1. del:
Specifikacija za vezane in razsute proizvode pred vgradnjo**

Thermal insulation products for building equipment and industrial installations - In-situ thermal insulation formed from expanded perlite (EP) products - Part 1: Specification for bonded and loose-fill products before installation

Wärmedämmstoffe für die Haustechnik und für betriebstechnische Anlagen - An der Verwendungsstelle hergestellte (Wärmedämmung mit Produkten aus expandiertem Perlite (EP) - Teil 1: Spezifikation für gebundene und Schüttprodukte vor dem Einbau

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Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Isolation thermique formée en place à base de granulats légers de Perlite expansée (EP) - Partie 1: Spécification de produits liés et en vrac avant mise en oeuvre

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ICS:

91.100.60	Materiali za toplotno in zvočno izolacijo	Thermal and sound insulating materials
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Thermal insulation products for building equipment and industrial installations - In-situ thermal insulation formed from expanded perlite (EP) products - Part 1: Specification for bonded and loose-fill products before installation

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Isolation thermique formée en place à base de granulats légers de Perlite expansée (EP) - Partie 1: Spécification de produits liés et en vrac avant mise en oeuvre

Wärmedämmstoffe für die technische Gebäudeausrüstung und für betriebstechnische Anlagen in der Industrie - An der Verwendungsstelle hergestellte Wärmedämmung mit Produkten aus expandiertem Perlit (EP) - Teil 1: Spezifikation für gebundene und Schüttprodukte vor dem Einbau

This European Standard was approved by CEN on 6 May 2010.

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EN 15599-1:2010 (E)**Foreword**

This document (EN 15599-1:2010) has been prepared by Technical Committee CEN/TC 88 "Thermal insulating materials and products", the secretariat of which is held by DIN.

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 January 2011, and conflicting national standards shall be withdrawn at the latest by January 2011.

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 has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This European Standard consists of two parts which form a package. The first part, which is the harmonised part satisfying the mandate, the CPD and is the basis for the CE marking, covers the products, which are placed on the market. The second part, which is the non-harmonised part, covers the specification for the installed products.

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This document contains five Annexes: **(standards.iteh.ai)**

Annex A (normative) - Factory production control

Annex B (normative) - Preparation of test specimens to measure thermal conductivity

Annex C (normative) - Special conditions to be used for the determination of organic content

Annex D (normative) - Determination of maximum service temperature

Annex ZA (informative) - Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

This European Standard is one of a series for polyurethane/polyisocyanurate, expanded perlite and exfoliated vermiculite in-situ formed insulation products used in building equipment and industrial installations, but this standard may be used in other areas where appropriate. EN 14316-1 covers the use of expanded perlite in buildings.

The reduction in energy used and emissions produced during the installed life of insulation products exceeds by far the energy used and emissions made during the production and disposal processes.

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 and the United Kingdom.

1 Scope

This European Standard specifies the requirements for expanded perlite products which are used for the thermal insulation of building equipment and industrial installations with an operating temperature in the range of approximately $-270\text{ }^{\circ}\text{C}$ to $+650\text{ }^{\circ}\text{C}$.

This European Standard specifies the requirements for the four types of expanded perlite products Perlite Aggregate (EPA), Coated Perlite (EPC), Hydrophobic Perlite (EPH) and Premixed Perlite (EPM), containing less than 1 % by mass organic material as determined by Annex C.

This European Standard is a specification for the insulation products before installation.

This European Standard describes the product characteristics and includes procedures for testing, evaluation of conformity, marking and labelling.

This European Standard 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. The levels required for a given application are to be found in regulations or non-conflicting standards.

This European Standard does not cover factory made insulation products of formed shapes and boards made with expanded perlite, and does not cover products intended to be used for the insulation of buildings.

The products covered by this standard are not intended to be used primarily for airborne sound insulation or sound absorption applications although they may improve the performance of the installation in these respects when installed for their primary insulation intended use.

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2 Normative references

SIST EN 15599-1:2011

The following referenced documents are indispensable for the application 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 933-1, *Tests for geometrical properties of aggregates — Part 1: Determination of particle size distribution — Sieving method*

EN 993-14, *Methods of test for dense shaped refractory products — Part 14: Determination of thermal conductivity by the hot-wire (cross-array) method*

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

EN 12086, *Thermal insulating products for building applications — Determination of water vapour transmission properties*

EN 12667, *Thermal performance of building materials and products — Determination of thermal resistance by means of guarded hot plate and heat flow meter methods — Products of high and medium thermal resistance*

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*

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EN 13172, *Thermal insulating products — Evaluation of conformity*

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

EN 14706, *Thermal insulating products for building equipment and industrial installations — Determination of maximum service temperature*

EN ISO 13787, *Thermal insulation products for building equipment and industrial installations — Determination of declared thermal conductivity (ISO 13787:2003)*

3 Terms and definitions, Symbols and Abbreviations**3.1 Terms and Definitions**

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

3.1.1**expanded perlite**

lightweight granular (insulation) material manufactured from naturally occurring volcanic rock expanded by heat to form a cellular structure

[EN ISO 9229]

3.1.2**perlite aggregate**

expanded perlite with no treatment or surface coating, used as a loose insulation in cavities

3.1.3**coated perlite**

expanded perlite which has a coating

3.1.4**hydrophobic perlite**

expanded perlite which is treated to give specific hydrophobic properties and used where moisture or water repellency is required

3.1.5**premixed perlite**

expanded perlite premixed with binders to form bonded materials in end use applications

3.1.6**level**

given value which is the upper or lower limit of requirement, where the level is given by the declared value of the characteristic concerned

3.1.7**class**

combination of two levels of the same property between which the performance shall fall, where the level is given by the declared value of the characteristic concerned

3.2 Symbols and Abbreviations

3.2.1 Symbols used in this standard

λ_D is the declared thermal conductivity W/(m·K)
 μ is the water vapour diffusion resistance factor

CR is the symbol of the declared value for crushing resistance
 LD is the symbol of the declared value for loose bulk density
 PS is the symbol of the declared particle size
 ST(+) is the symbol of the declared maximum service temperature
 ST(-) is the symbol of the declared minimum service temperature

3.2.2 Abbreviations used in this standard

EP is expanded perlite as defined in 3.1.1
 EPA is perlite aggregate as defined in 3.1.2
 EPC is coated perlite as defined in 3.1.2
 EPH is hydrophobic perlite as defined in 3.1.2
 EPM is premixed perlite as defined in 3.1.2
 ITT is initial type testing.

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4 Requirements

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4.1 General

Product properties shall be assessed in accordance with Clause 5.

To comply with this standard, products shall meet the requirements of 4.2, and the requirements of 4.3 as appropriate.

One test result for a product property is the average of the measured values on the number of test specimens given in Table 1.

4.2 For all applications

4.2.1 Thermal resistance and thermal conductivity

Thermal conductivity shall be based upon measurements carried out in accordance with EN 12667 (limited to 110 °C) or EN 993-14 (this test is calibrated against EN 12667).

In each case the thermal conductivity values shall be determined by the manufacturer and verified in accordance with EN ISO 13787. They shall be declared by the manufacturer according to the above specified measurement standards covering the product service temperature range. The following conditions apply:

- measured values shall be expressed with three significant figures;
- declared thermal conductivity curve shall be given as a limit curve, defined in EN ISO 13787;

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— values of the thermal conductivity, λ_D , shall be rounded upwards to the nearest 0,001 W/(m · K).

The declared equation/limit curve is the "declared reference" with three significant figures, that is to 0,0001 W/(m·K) for λ values below 0,1 W/(m·K) and in 0,001 W/(m·K) for λ values above 0,1 W/(m·K). This shall be used as a reference for the verification of the declaration.

When thermal conductivity is declared as a table derived from the equation, rounding upwards to the next 0,001 W/(m·K) has to be done for the full range of the thermal conductivity.

NOTE The declaration of the declared installed thermal resistance for an installed EP product is made in EN 15599-2)

4.2.2 Loose bulk density

Loose bulk density shall be determined in accordance with EN 1097-3. However, the container should be filled using a flat bottomed scoop held centrally over the container without touching it, and be no more than 50 mm above the rim. The value shall be expressed as kg/m³ and declared by the manufacturer in steps of 1 kg/m³.

The loose bulk density shall be in the range of ± 15 % of the manufacturer's declared value.

NOTE Most expanded perlite products are in the range 30 kg/m³ to 180 kg/m³.

4.2.3 Particle size**4.2.3.1 Particle size distribution**

Particle size distribution shall be determined in accordance with EN 933-1 without washing and expressed as a percentage by mass, and shall be in accordance with the manufacturer's declared limits.

4.2.3.2 Size designation

The particle size shall be designated by two sieve sizes between which the main proportion of the material lies and any undersize or oversize shall comply with 4.2.3.3 and 4.2.3.4.

The size in mm shall be selected from those specified in EN 13055-2.

NOTE The particle size will normally be in the range 0 mm to 16 mm.

4.2.3.3 Undersize

The content of the undersize shall not exceed 15 % by mass.

4.2.3.4 Oversize

The content of oversize shall not exceed 10 % by mass.

4.2.4 Reaction to fire

This property is not measured since expanded perlite products described by this standard are classified without testing as class A1 products.

NOTE 1 The products are classified without testing as class A1 products in accordance with commission decision 96/603/EC as amended by decision 2000/605/EC.

NOTE 2 Products with an organic content greater than 1 % are outside the scope of this standard.

If required the organic content shall be determined according to the procedure given in Annex C.

4.2.5 Durability characteristics

4.2.5.1 General

The appropriate durability characteristics have been considered and are covered in 4.2.5.2, 4.2.5.3 and 4.2.5.4.

4.2.5.2 Durability of reaction to fire against ageing/degradation

The fire performance of expanded perlite does not change with time (see 4.2.4).

4.2.5.3 Durability of thermal resistance against ageing/degradation

The thermal conductivity (4.2.1) of the product does not change with time.

4.2.5.4 Durability of compression strength against ageing/degradation

The compressive strength of expanded perlite does not change with time. Expanded perlite is a stable cellular structure.

4.2.5.5 Durability of thermal resistance against high temperature

The thermal conductivity of expanded perlite products does not change with time at any specific temperature within the service temperature range. This is covered by 4.3.2 maximum service temperature (dimensional stability).

4.3 For specific applications

4.3.1 General

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If there is no requirement for a property described in 4.3 for a product in use, then the property does not need to be determined and declared by the manufacturer.

4.3.2 Maximum service temperature

The maximum service temperature, ST(+), shall be determined in accordance with Annex D for loose-fill products.

NOTE EN 14706 may be used for bonded products formed in end use application.

The maximum service temperature, ST(+), shall be declared in °C in levels with steps of 50 °C.

4.3.3 Minimum service temperature

The minimum service temperature, ST(-), is not determined. Expanded perlite is stable below 0 °C.

NOTE If a test is considered necessary this should be agreed between the parties.

4.3.4 Crushing resistance

In load bearing applications the crushing resistance shall be determined in accordance with EN 13055-1 and expressed in N/mm².

NOTE Crushing resistance is a measure of the strength of the material but it does not necessarily relate directly to load bearing capacity.