SLOVENSKI STANDARD
SIST EN 16809-1:2020

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Toplotnoizolacijski proizvodi za stavbe - Proizvodi, izdelani na mestu vgradnje iz nevezanih in vezanih kroglic iz ekspandiranega polistirena (EPS) - 1. del: Specifikacija za nevezane in vezane proizvode pred vgradnjo

Thermal insulation products of buildings - In-situ formed products from loose-fill expanded polystyrene (EPS) beads and bonded expanded polystyrene beads - Part 1: Specification for the bonded and loose-fill products before installation

Wärmedämmstoffe für Gebäude - An der Verwendungsstelle hergestellte Produkte aus losen expandierten Polystyrolkugeln (EPS) und gebundenen expandierten Polystyrolkugeln - Teil 1: Spezifikation für gebundene und lose Schütt- und Einblasdämmstoffe vor dem Einbau

Produits isolants thermiques destinés aux bâtiments - Produits formés sur place à partir de billes en polystyrène expansé (PSE) en vrac et de billes en polystyrène expansé liées - Partie 1 : Spécification des produits avec et sans liant avant mise en œuvre

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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 of buildings - In-situ formed products from loose-fill expanded polystyrene (EPS) beads and bonded expanded polystyrene beads - Part 1: Specification for the bonded and loose-fill products before installation

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This European Standard was approved by CEN on 23 September 2019.

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

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European foreword

This document (EN 16809-1:2019) 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of an identical text or by endorsement, at the latest by May 2020, and conflicting national standards shall be withdrawn at the latest by August 2021.

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

EN 16809-1, *Thermal insulation products for buildings — In situ formed products from loose-fill expanded polystyrene (EPS) beads and bonded expanded polystyrene beads*, consists of two parts which form a package. The first part (this document), covers the products, which are placed on the market. The second part covers the specification for the installed products. Both parts need to be used for the application of the insulation product in the end-use applications covered by EN 16809-2.

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 organisations 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document specifies the requirements for products of loose-filled expanded polystyrene (EPS) beads and bonded expanded polystyrene beads for *in situ* installation in masonry cavity walls and frame constructions.

This document is a specification for the insulation products before installation. It describes the product characteristics and includes procedures for testing, 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. The levels required for a given application are to be found in regulations or non-conflicting standards.

NOTE To avoid water penetration in masonry walls special tests adjusted to local climate could be needed.

This document does not cover factory made expanded polystyrene (EPS) insulation products and factory made or *in situ* products intended to be used for the insulation of building equipment and industrial installations.

Products with a declared thermal resistance lower than 0,25 m^2·K/W or a declared thermal conductivity greater than 0,060 W/(m·K) at 10 °C are not covered by this document.

This document does not cover products intended for airborne sound insulation and for acoustic absorption applications.

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

EN 1602, *Thermal insulating products for building applications —– Determination of the apparent density*

EN 1609, *Thermal insulating products for building applications — Determination of short term water absorption by partial immersion*

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 12939, *Thermal performance of building materials and products —– Determination of thermal resistance by means of guarded hot plate and heat flow meter methods — Thick products of high and medium thermal resistance*

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

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 13823, *Reaction to fire tests for building products — Building products excluding floorings exposed to the thermal attack by a single burning item*

EN 15715, *Thermal insulation products — Instructions for mounting and fixing for reaction to fire testing — Factory made products*

EN ISO 1182, *Reaction to fire tests for products — Non-combustibility test (ISO 1182)*

EN ISO 11925-2, *Reaction to fire tests — Ignitability of products subjected to direct impingement of flame — Part 2: Single-flame source test (ISO 11925-2)*

ISO 16269-6:2014, *Statistical interpretation of data — Part 6: determination of statistical tolerance intervals*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

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

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1.1
expanded polystyrene beads
insulation material consisting of beads manufactured from expandable polystyrene or one of its copolymers with an air filled closed cellular structure

Note 1 to entry: Beads can be made from non-infrared absorbing or infrared absorbing raw material.

3.1.2
blowing hole
hole, cut or formed, in a masonry cavity wall or frame construction, through which the EPS beads are blown

3.1.3
frame construction
walls with wood or metal studs, sloping roof with insulation between rafters, the larger surfaces covered by facings

3.1.4
settlement
decrease of installed insulation height in cavities and frame constructions with time, expressed as a percentage of the initial installed height

3.2 Symbols and abbreviations

Symbols used in this document:

$\lambda_{90/90}$	is the 90 % fractile with a confidence level of 90 % for the thermal conductivity	W/(m·K)
λ_D	is the declared thermal conductivity	W/(m·K)
λ_i	is one test result of thermal conductivity	W/(m·K)
λ_{mean}	is the mean thermal conductivity	W/(m·K)
ρ_D	is the declared density	kg/m^3
A	is the area of the test specimen	m^2
d	is the thickness of the test specimen	mm
D	is the diameter of the beads	mm
n	is the number of test results	–
$P_{90/90}$	is the 90 % fractile with a confidence level of 90 % for the thermal resistance	m^2·K/W
R_D	is the declared thermal resistance	m^2·K/W
R_i	is one test result of thermal resistance	m^2·K/W
s_λ	is the estimate of the standard deviation of the thermal conductivity	W/(m·K)
s_R	is the estimate of the standard deviation of the thermal resistance	m^2·K/W
s_ρ	is the estimate of the standard deviation of the density	kg/m^3
W_p	is the short-term water absorption	kg/m^2
Q_{nom}	is the nominal weight of the quantity delivered	kg
MU	is the symbol for the declared value for water vapour diffusion resistance factor	
S	is the symbol for the declared class for settlement	
WS	is the symbol of the declared level for short-term water absorption	

Abbreviations used in this document:

EPS	**E**xpanded **P**oly**S**tyrene
AVCP	**A**ssessment and **V**erification of **C**onstancy of **P**erformance (previously named Attestation of Conformity)
DoP	**D**eclaration **o**f **P**erformance
FPC	**F**actory **P**roduction **C**ontrol
PTD	**P**roduct **T**ype **D**etermination (previously named ITT for Initial Type Test)
RtF	**R**eaction **t**o **F**ire
ThIB	**Th**ermal **I**nsulation for **B**uildings

4 Requirements

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 on 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 conductivity – Thermal resistance

Thermal resistance and thermal conductivity shall be based upon measurements carried out in accordance with EN 12667 or EN 12939 for thick products

The thermal values shall be determined in accordance with Annex A and declared by the manufacturer, according to the following:

— the reference mean temperature shall be 10 °C;

— the measured values shall be expressed with three significant figures;

— the thermal resistance, R_D, shall always be declared. The thermal conductivity, λ_D, shall be declared where possible;

— the thermal resistance, R_D, and the thermal conductivity, λ_D, shall be given as limit values representing at least 90 % of the production determined with a confidence level of 90 %;

— the value of thermal conductivity $\lambda_{90/90}$ shall be rounded upwards to the nearest 0,001 W/(m·K) and declared in levels with steps of 0,001 W/(m·K);

— the declared thermal resistance, R_D, shall be calculated from the insulation thickness and the corresponding thermal conductivity, $\lambda_{90/90}$ (see Note below);

— The value of thermal resistance, R_D, shall be rounded downward to the nearest 0,05 m^2·K/W and declared in levels with steps of 0,05 m^2·K/W.

NOTE The declaration of the installed thermal resistance for blown EPS beads is described in EN 16809-2.

4.2.2 Density of the sale unit

The density of the material in one sale unit, measured according to EN 1602, shall not be lower than the minimum density declared by the manufacturer.

4.2.3 Expanded bead size

The bead size is measured according to EN 933-1.

NOTE 1 The bead size normally is between 1 and 10 mm.

NOTE 2 In masonry cavity wall insulation and frame insulation, the bead size depends on what is suitable for the way the beads are injected into the cavity.

4.2.4 Settlement

For bonded beads no settlement occurs.

For loose beads measuring the settlement shall be performed according to Annex G. The settlement, S, shall be declared in steps of 1 %.

NOTE Test methods to determine the settlements in masonry walls and frame constructions are currently under investigation and, therefore, when a test method is available, this document will be amended.

4.2.5 Reaction to fire of the product as placed on the market

Reaction to fire classification of the product, as placed on the market, shall be determined according to test methods given in Table B.2, in connection with EN 13501-1, the basic mounting and fixing rules given in EN 15715 and Annex D of this document.

Detailed information about the test conditions on tests on bonded or loose-fill products and the field of application of the classification as stated in the reaction to fire classification report shall be given in the manufacturer's literature.

4.2.6 Durability characteristics

4.2.6.1 General

The appropriate durability characteristics have been considered and are covered in 4.2.6.2 and 4.2.6.3.

4.2.6.2 Durability of reaction to fire of the product as placed on the market against ageing/degradation

The reaction to fire performance of EPS beads as declared by 4.2.5 "Reaction to fire of the product as placed on the market" does not change with time.

4.2.6.3 Durability of thermal resistance and thermal conductivity against ageing/degradation

The thermal conductivity of products of EPS beads as declared by 4.2.1 "Thermal conductivity – thermal resistance" does not change with time. For loose fill EPS beads products it is also covered by the settlement.

4.3 For specific applications

4.3.1 General

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

4.3.2 Adhesive

When adhesive is used to produce bonded EPS beads, the product shall fulfil the declared performance of the product.

The amount of adhesive to be used shall be declared by the manufacturer.

4.3.3 Water absorption

Short-term water absorption by partial immersion, W_p, shall be determined in accordance with EN 1609, method A, with specimen preparation in accordance with Annex E. No test result of the water absorption W_p, shall exceed 1,0 kg/m^2.

4.3.4 Water vapour diffusion resistance

Water vapour transmission properties shall be determined in accordance with EN 12086 and declared as the water vapour diffusion resistance factor μ for homogeneous products. Specimen preparation for loose fill EPS beads products shall be performed according to Annex E.

All test results of μ shall be within the range declared by the manufacturer.

Alternatively, values cited in EN ISO 10456:2007, Table 3, may be used.

4.3.5 Reaction to fire of the product in standardized assemblies simulating end-use applications

Reaction to fire classification of products in standardized assemblies simulating end-use applications shall be determined in accordance with EN 13501-1 and the mounting and fixing rules given in EN 15715.

This classification offers the opportunity to give a complementary and optional declaration on reaction to fire for standard test configurations of assemblies which include the insulation product.

The number of the selected test configuration of assembly (EN 15715:2009, Table 5) which is used in the test shall be quoted with the Euroclass.

Detailed information about the test conditions and the field of application of the classification as stated in the reaction to fire classification report shall be given in the manufacturer's literature.

4.3.6 Release of dangerous substances

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this document are placed on those markets.

In the absence of European harmonized test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

NOTE An informative database covering European and national provisions on dangerous substances is available at the Construction website on EUROPA accessed through: http://ec.europa.eu/growth/tools-databases/cp-ds

5 Test methods

5.1 Sampling

Test specimens shall be taken from the same sample with a total amount of not less than 0,15 m^3 and sufficient to cover the needed tests.

5.2 Conditioning

No special conditioning of the test specimens is needed, unless otherwise specified in the test standard or in Annex C of this document.

In case of dispute, the test specimens shall be stored at (23 ± 2) °C and (50 ± 5) % relative humidity for at least fourteen days prior to testing.

5.3 Testing

5.3.1 General

Table 1 gives the dimensions of the test specimens, the minimum number of measurements required to get one test result and any specific conditions which are necessary.

Table 1 — Test methods, test specimens and conditions

Dimensions in millimetres

Clause	Title	Test method	Test specimen		Specific conditions
			Dimensions (mm)	Number to get one test result	
4.2.1	Thermal resistance and thermal conductivity	EN 12667 or EN 12939	minimum 300 × 300 × 50	1	Measuring area: minimum (100 × 100) Sample preparation: see Annex C
4.2.2	Density	EN 1602	-	1	Sample preparation: see Annex F
4.2.3	Bead size	EN 933-1	1 ≤ D ≤ 10	1	-
4.2.4	Settlement	See Annex G			-
4.2.5	Reaction to fire of the product as placed on the market	See EN 13501-1 and EN 15715			Sample preparation: see Annex D
4.3.3	Water absorption	EN 1609	200 × 200 Height ≥ 50	4	Method A Sample preparation: see Annex E
4.3.4	Water vapour diffusion resistance	EN 12086	See EN 12086:2013, Clause 6.1	5	Set B Sample preparation: see Annex E
4.3.5	Reaction to fire of the product in standardized assemblies simulating end-use applications	See EN 13501-1 and EN 15715			-
4.3.6	Release of dangerous substances	a	-	-	-

a Not yet available.

5.3.2 Thermal resistance and thermal conductivity

Thermal conductivity shall be determined in accordance with EN 12667 and EN 12939 for thick products under the following conditions:

— at a mean temperature of (10 ± 0,3) °C;

— after conditioning in accordance with 5.2;