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

Thermal insulation products for 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 filled products before installation

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

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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 pour les produits liés et en vrac 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 for 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 filled products before installation

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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prEN 16809-1:2014 (E)**Foreword**

This document (prEN 16809-1:2014) 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 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.

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

Thermal insulation products of buildings — In-situ formed products from loose-fill expanded polystyrene (EPS) beads and bonded expanded polystyrene beads, consists of the following parts:

- Part 1: *Specification for the bonded and loose filled products before installation* (the present document)
- Part 2: *Specification for the bonded and loose-fill products after installation*.

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1 Scope

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

This European Standard 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 might be needed.

This document does not cover factory made expanded polystyrene (EPS) insulation products or 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 $0,25 \text{ m}^2 \cdot \text{K/W}$ or a declared thermal conductivity greater than $0,060 \text{ W/(m} \cdot \text{K)}$ at $10 \text{ }^\circ\text{C}$ 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, 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.

- oSIST prEN 16809-1:2015
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- 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 1603, *Thermal insulating products for building applications - Determination of dimensional stability under constant normal laboratory conditions (23 °C/ 50 % relative humidity)*
- 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 12429, *Thermal insulating products for building applications - Conditioning to moisture equilibrium under specified temperature and humidity conditions*
- 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*

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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 15715:2009, *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 1182:2010)*

EN ISO 1716, *Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value) (ISO 1716:2010)*

EN ISO 10456:2007/AC:2009, *Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values - Technical Corrigendum 1 (ISO 10456:2007/Cor 1:2009)*

EN ISO 11925-2, *Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test (ISO 11925-2:2010)*

ISO 16269-6:2005, *Statistical interpretation of data — Part 6: Determination of statistical tolerance intervals*

3 Terms, definitions, symbols and abbreviations**3.1 Terms and definitions**

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

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

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**class**

combination of two levels of the same property between which the performance shall fall

3.1.4**coverage**

mass of insulation per unit area

3.1.5**frame construction**

walls with wood or metal studs, sloping roof with insulation between rafters

3.1.6**level**

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

3.1.7**performance chart**

table giving thickness and coverage requirements for different values of declared thermal resistance

3.1.8**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)
$\rho_{90/90}$	is the 90 % fractile with a confidence level of 90 % for the density	kg/m ³
ρ_i	is one test result of density	kg/m ³
ρ_{mean}	is the mean value of density	kg/m ³
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
n	is the number of test results	–
$R_{90/90}$	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	W/(m·K)
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	
WS	is the symbol of the declared level for short-term water absorption	

Abbreviations used in this document:

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

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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.

This document gives performance charts for two different applications:

- masonry cavity wall insulation;
- frame insulation.

One test result on a product property is the average of the measured values on the number of test specimens given in Table 2.

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 m²·K/W and declared in levels with steps of 0,05 m²·K/W.

NOTE The declaration of the installed thermal resistance for blown EPS beads is described in part 2 of this standard.

4.2.2 Weight of the sale unit

The density of the material in one sale unit shall not be lower than the nominal density.

4.2.3 Expanded bead size

The bead size measured according to EN 933-1, shall be between 2 mm and 9 mm.

NOTE The bead size should be suitable for the way the beads are injected into the cavity.

4.2.4 Settlement

For loose beads measuring the settlement shall be performed according to Annex I. The settlement shall not exceed the values given in Table 1.

Table 1 — Classes for settlement

Class	Requirement
S1	$\leq 1 \%$
S3	$\leq 3 \%$
S5	$> 3 \%$ and $\leq 5 \%$

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 European Standard 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 in accordance with EN 13501-1, Annex F and the basic mounting and fixing rules given in EN 15715.

NOTE This classification is compulsory and always included in the CE Marking label.

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.

4.2.6 Dimensional stability (standards.iteh.ai)

Dimensional stability under constant normal laboratory conditions shall be determined in accordance with EN 1603 with specimen preparation according to Annex E.

The relative changes in length, $\Delta_{\epsilon l}$ and width, $\Delta_{\epsilon b}$, shall not exceed $\pm 0,5 \%$.

4.2.7 Durability characteristics

4.2.7.1 General

The appropriate durability characteristics have been considered and are covered in 4.2.7.2, 4.2.7.3 and 4.2.7.4.

4.2.7.2 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 does not change with time.

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

The thermal conductivity of products of EPS beads as declared by 4.2.1 does not change with time.

4.2.7.4 Durability of thermal resistance against ageing/degradation

Durability of the thermal resistance is covered by the durability of the installed thickness.

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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 in the product of EPS beads, the adhesive shall fulfil the requirements for the system and 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 (for loose fill EPS beads products only) in accordance with Annex E. No test result of the water absorption W_p , shall exceed $1,0 \text{ kg/m}^2$.

4.3.4 Water vapour diffusion resistance

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

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

Alternatively, values cited in EN ISO 10456:2007/AC 2009, Table 4, may be used.

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

Reaction to fire classification of products in standardised 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, 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 standard 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 web site on EUROPA accessed through: <http://ec.europa.eu/enterprise/construction/cpd-ds/>.

4.3.7 Continuous glowing combustion

NOTE A test method is under development and the standard will be amended when this is available.

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 m³ 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 except for the determination of thermal conductivity. For determination of thermal conductivity the test specimens shall be conditioned until constant mass, according to EN 12429, in an oven at a temperature of 60 °C.

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 2 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.

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