SLOVENSKI STANDARD
SIST EN 14309:2010+A1:2013

01-maj-2013

Toplotnoizolacijski proizvodi za opremo stavb in industrijske inštalacije - Proizvodi iz ekspandiranega polistirena (EPS) - Specifikacija

Thermal insulation products for building equipment and industrial installations - Factory made products of expanded polystyrene (EPS) - Specification

Wärmedämmstoffe für die technische Gebäudeausrüstung und für betriebstechnische Anlagen in der Industrie - Werkmäßig hergestellte Produkte aus expandiertem Polystyrol (EPS) - Spezifikation

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Produits manufacturés en polystyrène expansé (PSE) - Spécification

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This European Standard was approved by CEN on 29 September 2009 and includes Amendment 1 approved by CEN on 11 November 2012.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Foreword

This document (EN 14309:2009+A1:2013) 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of an identical text or by endorsement, at the latest by July 2013, and conflicting national standards shall be withdrawn at the latest by July 2013.

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 supersedes EN 14309:2009.

This document includes Amendment 1 approved by CEN on 2012-11-11.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟨A1⟩ ⟨A1⟩.

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 89/106/EEC.

For relationship with EU Directive 89/106/EEC, see informative Annex ZA, which is an integral part of this document.

Locally responsible authorities and contracting entities, who are bound by EU Directives to specify their requirements using European harmonized product standards, are allowed to demand additional properties outside the provisions of this standard if this is technically necessary because of prevailing operational conditions of the building equipment or the industrial installation projected or because of safety regulations.

This European Standard contains five Annexes:

— Annex A (normative), Factory production control

— Annex B (normative), Product classification

— Annex C (normative), Determination of minimum service temperature

— Annex D (informative), Additional properties

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

This document includes a bibliography.

This European Standard is one of a series of standards for insulation products used in building equipment and industrial installations, but this standard can be used in other areas, where appropriate.

In pursuance of Resolution BT 20/1993 revised, CEN/TC 88 have proposed defining the standards listed below as a European package of standards, setting 21 months after availability as the date of withdrawal (dow) of national standards which conflict with the European Standards of this package.

The package of standards comprises the following group of interrelated standards for the specifications of factory made thermal insulation products, all of which come within the scope of CEN/TC 88:

EN 14303, *Thermal insulation products for building equipment and industrial installations — Factory made mineral wool (MW) products — Specification*

EN 14304, *Thermal insulation products for building equipment and industrial installations — Factory made flexible elastomeric foam (FEF) products — Specification*

EN 14305, *Thermal insulation products for building equipment and industrial installations — Factory made cellular glass (CG) products — Specification*

EN 14306, *Thermal insulation products for building equipment and industrial installations — Factory made calcium silicate (CS) products — Specification*

EN 14307,*Thermal insulation products for building equipment and industrial installations — Factory made extruded polystyrene foam (XPS) products — Specification*

EN 14308, *Thermal insulation products for building equipment and industrial installations — Factory made rigid polyurethane foam (PUR) and polyisocyanurate foam (PIR) products — Specification*

EN 14309, *Thermal insulation products for building equipment and industrial installations — Factory made products of expanded polystyrene (EPS) — Specification*

EN 14313, *Thermal insulation products for building equipment and industrial installations — Factory made polyethylene foam (PEF) products — Specification*

EN 14314, *Thermal insulation products for building equipment and industrial installations — Factory made phenolic foam (PF) products — Specification*

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies the requirements for factory made products of expanded polystyrene which are used for the thermal insulation of building equipment and industrial installations with an operating temperature range of approximately - 180 °C to + 80 °C. Modified expanded polystyrene polymers with a higher temperature resistance are also covered by this standard.

NOTE Below an operating temperature of - 50 °C, special tests regarding the suitability of the product in the intended application are advised (e.g. liquefaction of oxygen). Manufacturers' advice should be heeded in all cases.

The products are manufactured in the form of faced or unfaced boards, rolls, lags, pipe sections or other prefabricated ware.

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

Products covered by this standard are also used in prefabricated thermal insulation systems and composite panels; the performance of systems incorporating these products is not covered.

This standard does not specify the required level or class of a given property that shall be achieved by a product to demonstrate fitness for purpose in a particular application. The classes and levels required for a given application can be found in regulations and invitations to tender.

Products with a declared thermal conductivity greater than 0,060 W/(m·K) at 10 °C are not covered by this standard.

This standard does not cover products for in situ insulation (for loose fill or poured insulation) or products for the insulation of the building structure.

2 Normative references

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 822, *Thermal insulating products for building applications — Determination of length and width*

EN 823, *Thermal insulating products for building applications — Determination of thickness*

EN 824, *Thermal insulating products for building applications — Determination of squareness*

EN 825, *Thermal insulating products for building applications — Determination of flatness*

EN 826, *Thermal insulating products for building applications — Determination of compression behaviour*

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 1604, *Thermal insulating products for building applications — Determination of dimensional stability under specified temperature and humidity conditions*

EN 1606, *Thermal insulating products for building applications — Determination of compressive creep*

EN 1607, *Thermal insulating products for building applications — Determination of tensile strength perpendicular to faces*

EN 12085, *Thermal insulating products for building applications — Determination of linear dimensions of test specimens*

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

EN 12087, *Thermal insulating products for building applications — Determination of long term water absorption by immersion*

EN 12088, *Thermal insulating products for building applications — Determination of long term water absorption by diffusion*

EN 12089, *Thermal insulating products for building applications — Determination of bending behaviour*

EN 12091, *Thermal insulating products for building applications — Determination of freeze-thaw resistance*

EN 12431, *Thermal insulating products for building applications — Determination of thickness for floating floor insulating products*

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 insulating products — Evaluation of conformity*

EN 13467, *Thermal insulating products for building equipment and industrial installations — Determination of dimensions, squareness and linearity of preformed pipe insulation*

EN 13468, *Thermal insulating products for building equipment and industrial installations — Determination of trace quantities of water soluble chloride, fluoride, silicate, and sodium ions and pH*

EN 13469, *Thermal insulating products for building equipment and industrial installations — Determination of water vapour transmission properties of preformed pipe insulation*

EN 13470, *Thermal insulating products for building equipment and industrial installations — Determination of the apparent density of preformed pipe insulation*

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

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

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

EN 14707, *Thermal insulating products for building equipment and industrial installations — Determination of maximum service temperature of preformed pipe insulation*

EN 15715:2009, *Thermal insulation products — Instructions for mounting and fixing for reaction to fire testing — Factory made products*

EN 29052-1, *Acoustics — Determination of dynamic stiffness — Part 1: Materials used under floating floors in dwellings*

EN ISO 1182, *Reaction to fire tests for building products — Non-combustibility test (ISO 1182:2002)*

EN ISO 1716, *Reaction to fire tests for building products — Determination of the heat of combustion (ISO 1716:2002)*

EN ISO 8497, *Thermal insulation — Determination of steady-state thermal transmission properties of thermal insulation for circular pipes (ISO 8497:1994)*

EN ISO 11925-2, *Reaction to fire tests — Ignitability of building products subjected to direct impingement of flame — Part 2: Single flame source-test (ISO 11925-2:2002)*

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

3 Terms, definitions, symbols, units and abbreviated terms

3.1 Terms and definitions

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

3.1.1 Terms and definitions as given in EN ISO 9229:2007

3.1.1.1
pipe section
(insulation) product in the shape of a cylindrical annulus which may be split to facilitate application

3.1.1.2
board
slab
(insulation) rigid or semi-rigid product of rectangular shape and cross-section in which the thickness is uniform and substantially smaller than the other dimensions

NOTE Boards are usually thinner than slabs. They may also be delivered in tapered form.

3.1.1.3
roll
(insulation) product supplied in the form of a wound cylinder

3.1.1.4
lag
segment
rigid or semi-rigid insulation product for application on large diameter cylindrical or spherical equipment

3.1.2 Additional terms and definitions

3.1.2.1
expanded polystyrene (EPS)
rigid cellular plastics insulation material, manufactured by moulding beads of expandable polystyrene or one of its copolymers and which has a closed cellular structure filled with air

3.1.2.2
expanded polystyrene block
rigid insulation product or material generally of rectangular cross section and with a thickness not significantly smaller than the width. Blocks are supplied trimmed or untrimmed

3.1.2.3
expanded polystyrene board
rigid insulation product (cut, moulded or continuously foamed) of rectangular shape and cross section in which the thickness is significantly smaller than the other dimensions

NOTE Boards can be of uniform thickness or tapered. The board edges can be of various sorts (e.g. square, half lapped, tongue and groove).

3.1.2.4
level
given value, which is the upper or lower limit of a requirement

NOTE The level is given by the declared value of the characteristic concerned

3.1.2.5
class
combination of two levels of the same property between which the performance shall fall.

3.1.2.6
production line
assemblage of equipment that produces products using a continuous process

3.1.2.7
production unit
assemblage of equipment that produces products using a discontinuous process

NOTE For ITT and FPC, units using the same process in one factory are considered together (as one production line).

3.1.2.8
prefabricated ware
pieces cut, abraded or otherwise formed from a board or block of product e.g. elbows, T-pieces etc.

3.1.2.9
product
material, element or component about which information is required. Refers to a construction product, as defined in the Construction Products Directive, from an individual producer

3.2 Symbols, units and abbreviated terms

3.2.1 Symbols and units used in this standard

α	is the confidence level	–
b	is the width	mm
d	is the thickness	mm
D_i	is the inside diameter	mm
D	is the water vapour permeability	mg/(m·h·Pa)
d_D	is the declared thickness of a product	mm
$\Delta\varepsilon_b$	is the relative change in width	%
$\Delta\varepsilon_l$	is the relative change in length	%
$\Delta\varepsilon_d$	is the relative change in thickness	%
E_{dyn}	is the dynamic elasticity modulus	MN/m^2
k	is a factor related to the number of test results available	-
l	is the length	mm

L	is the deviation from linearity	mm
$\lambda_{90,\,90}$	is the thermal conductivity of 90 % fractile and 90 % confidence level	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 value of the measured thermal conductivity	W/(m·K)
μ	is the water vapour diffusion resistance factor	–
p	is the fractile value (quantile)	–
ρ_a	is the apparent density	kg/m^3
s'	is the dynamic stiffness	MN/m^3
σ_{10}	is the compressive stress at 10 % deformation	kPa
σ_b	is the bending strength	kPa
σ_{mt}	is the tensile strength perpendicular to faces	kPa
S_b	s the deviation from squareness	mm/m
s_λ	is the estimate of the standard deviation of the thermal conductivity	W/(m·K)
S_{max}	is the deviation from flatness	mm
s_R	is the estimate of the standard deviation of the thermal resistance	(m^2·K)/W
τ	is the shear strength	kPa
v	is the deviation of squareness	mm
W_{dV}	is the water absorption by diffusion	vol.-%
W_{lt}	is the long-term water absorption by total immersion	vol.-%
W_{lp}	is the long-term water absorption by partial immersion	kg/m^2
X_0	is the initial deformation (after 60 s from the beginning of the loading)	mm
X_{ct}	is the absolute compressive creep	mm or %
X_t	is the deformation at time t	mm
Z	is the water vapour resistance	(m^2·h·Pa)/mg
BS	is the symbol of the declared level for bending strength	
CC(i_1/i_2/y)σ_c	is the symbol of the declared level for compressive creep	
CL	is the symbol of the declared level for water soluble chloride ions	
CS(10)	is the symbol of the declared level for compressive stress at 10 % deformation	
DS(N)	is the symbol of the declared class for dimensional stability under normal laboratory conditions	

DS(T\L) is the symbol of the declared level for dimensional stability under load and temperature

F is the symbol of the declared level of water soluble fluoride ions

L is the symbol of the declared class for length tolerances

MU is the symbol for the declared water vapour diffusion factor

NA is the symbol of the declared level of water soluble sodium ions

P is the symbol of the declared class for flatness tolerance

pH is the symbol of the declared level for the pH-value

S is the symbol of the declared class for squareness tolerance

SI is the symbol of the declared level of water soluble silicate ions

ST(+) is the symbol of the declared level of maximum service temperature

ST(–) is the symbol of the declared level of minimum service temperature

T is the symbol of the declared class for thickness tolerance

TR is the symbol of the declared level for tensile strength perpendicular to faces

W is the symbol of the declared class for width tolerance

WD(V) is the symbol of the declared level for water absorption by diffusion

WL(T) is the symbol of the declared level for water absorption by total immersion

WS is the symbol of the declared level for short term water absorption

Z is the symbol of the declared water vapour resistance value

3.2.2 Abbreviated terms used in this standard

EPS is **E**xpanded **P**oly**S**tyrene

ITT is **I**nitial **T**ype **T**est

ML is **M**anufacturer's **L**iterature

FPC is **F**actory **P**roduction **C**ontrol

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 Subclause 4.2, and the requirements of Subclause 4.3 as appropriate.

NOTE Information on additional properties is given in Annex E.

One test result on a product property is the average of the measured values on the number of test specimens given in Table 12.

4.2 For all applications

4.2.1 Thermal conductivity

For flat specimens, thermal conductivity shall be based upon measurements carried out in accordance with EN 12667 or EN 12939 for thick products. For cylindrical specimens EN ISO 8497 shall be used as specified in Subclause 5.3.2.

In both cases, 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 measuring standards mentioned above covering the product service temperature range. The following conditions apply:

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

— the declared thermal conductivity curve shall be given as a limit curve, defined in EN ISO 13787;

— the value of the declared 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 0,000 1 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 Determinations of the declared thermal conductivity of pipe sections, following EN ISO 8497, having joints in the metering area, include the effects of these joints as defined in EN ISO 23993.

4.2.2 Dimensions and tolerances

4.2.2.1 Linear dimensions

The length, l, width, b, and thickness, d, of flat products shall be determined in accordance with EN 822 and EN 823.

The length, l, thickness, d, and inside diameter, D_i, of pipe sections, segments and prefabricated ware shall be determined in accordance with EN 13467.

No test result shall deviate from the declared values by more than the tolerances given in Table 1 for the labelled class.

Table 1 — Dimensional tolerances

Form of delivery	Length	Width	Thickness	Inside diameter	Squareness
Board	± 0,6 % or ± 3 mm [a]	± 0,6 % or ± 3 mm [a]	± 2 mm		± 5 mm/m
Pipe section or segment, prefabricated ware	± 0,6 % or ± 3 mm [a]		± 2 mm	+ 2 % or +3 mm	± 3 mm/m
[a] Whichever gives the greatest numerical tolerance.					

4.2.2.2 Squareness

Deviation of squareness, S_b, of boards shall be determined in accordance with EN 824. Deviation of squareness of pipe sections shall be determined in accordance with EN 13467. No test result shall exceed the corresponding tolerance given in Table 1.

4.2.2.3 Flatness

Flatness shall be determined in accordance with EN 825 for boards. The deviation from flatness, S_{max}, shall not exceed 3 mm.

4.2.2.4 Pipe section linearity

Linearity shall be determined in accordance with EN 13467 for pipe sections and segments. The deviation from linearity, L, shall not exceed 3 mm.

4.2.3 Dimensional stability

4.2.3.1 Dimensional stability under normal laboratory conditions

Dimensional stability under normal laboratory conditions (23 °C, 50 % relative humidity) shall be determined in accordance with EN 1603.The relative changes in length, $\Delta\varepsilon_l$, and width, $\Delta\varepsilon_b$, shall not exceed the values given in Table 2 for the declared class.

Table 2 — Classes of dimensional stability under normal laboratory conditions

Classes	Requirement %
DS(N) 5	± 0,5
DS(N) 2	± 0,2

4.2.3.2 Dimensional stability under specified temperature and humidity conditions

Dimensional stability under specified temperature and humidity conditions shall be determined in accordance with EN 1604. The test shall be carried out after storage of 48 h at (23 ± 2) °C and (90 ± 5) % relative humidity. The relative changes in length, $\Delta\varepsilon_l$, width, $\Delta\varepsilon_b$ and thickness, $\Delta\varepsilon_d$, shall not exceed 1 %. The test shall not be performed when the more severe test, described in Subclause 4.3.2, is used for a product in a specific application.

4.2.4 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 and the basic mounting and fixing rules given in EN 15715:2009.

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

EN 13501-1:2007, Table 1, is applicable to products applied to flat surfaces or to curved surfaces with a diameter greater than 300 mm.

If a flat product which has a classification according to EN 13501-1 is used in a linear application it does not require further classification.

EN 13501-1:2007, Table 3, is applicable for products applied on linear objects or with a diameter below or equal 300 mm.

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