SLOVENSKI STANDARD
SIST EN 14307:2010+A1:2013

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Toplotnoizolacijski proizvodi za opremo stavb in industrijske inštalacije - Proizvodi iz ekstrudiranega polistirena (XPS) - Specifikacija

Thermal insulation products for building equipment and industrial installations - Factory made extruded polystyrene foam (XPS) products - Specification

Wärmedämmstoffe für die technische Gebäudeausrüstung und für betriebstechnische Anlagen in der Industrie - Werkmäßig hergestellte Produkte aus extrudiertem Polystyrolschaum (XPS) - Spezifikation

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Produits manufacturés en mousse de polystyrène extrudé (XPS) - Spécification

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Thermal insulation products for building equipment and industrial installations - Factory made extruded polystyrene foam (XPS) products - Specification

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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 14307:2009+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of an identical text or by endorsement, at the latest by July 2013, and conflicting national standards shall be withdrawn at the latest by July 2013.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 14307:2009.

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 six annexes:

— Annex A (normative), Factory production control

— Annex B (normative), Determination of the aged values of thermal conductivity

— Annex C (informative), Additional properties

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

This standard 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 may 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 expanded polystyrene (EPS) products — 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 extruded polystyrene foam products which are used for the thermal insulation of building equipment and industrial installations with an operating temperature in the range of approximately - 180 °C to + 75 °C.

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

The products are manufactured in the form of faced or unfaced boards, pipe sections, segments and 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 insulating systems and composite panels; the performance of systems incorporating these products is not covered.

This standard does not specify the required level of a given property that shall be achieved by a product to demonstrate fitness for purpose in a particular application. The 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 a mean temperature of 10 °C are not covered by this standard.

This standard does not cover products intended to be used for the insulation of the building structure nor for acoustical insulation.

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

EN 1605, *Thermal insulating products for building applications — Determination of deformation under specified compressive load and temperature conditions*

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 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 13501-1:2007, *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 flooring 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 15715:2009, *Thermal insulating products — Instructions for mounting and fixing for reaction to fire testing — Factory made products*

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
extruded polystyrene foam
rigid cellular plastic insulation material expanded and extruded with or without a skin from polystyrene or one of its co-polymers and that has a closed-cell structure

3.1.1.2
block
(insulation) product generally of rectangular cross-section and with a thickness not significantly smaller than the width

3.1.1.3
board
(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 may be supplied in tapered form.

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

3.1.1.5
pipe section
section
(insulation) product in the shape of a cylindrical annulus that may be split to facilitate application

3.1.1.6
production batch
definite quantity of some commodity manufactured or produced under conditions that are presumed uniform

3.1.2 Additional terms and definitions

3.1.2.1
class
combination of two levels of the same property between which the performance shall fall

3.1.2.2
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.

3.1.2.3
prefabricated ware
pieces cut, abraded or otherwise formed from a board, a block or a billet of product, e.g. elbows, T-pieces, etc.

3.1.2.4
production line
assemblage of equipment that produces products in a continuous process

3.1.2.5
production unit
assemblage of equipment that produces products in a discontinuous process

3.2 Symbols, units and abbreviated terms

3.2.1 Symbols and units used in this standard

b	is the width	mm
D_I	is the inside diameter of pipe shell	mm
d	is the thickness	mm
d_D	is the declared thickness of the product	mm
$\Delta\varepsilon_b$	is the relative change in width	mm

$\Delta\varepsilon_d$	is the relative change in thickness	mm
$\Delta\varepsilon_l$	is the relative change in length	mm
L	is the deviation from linearity for pipe shell	mm/m
l	is the length	mm
λ	is the thermal conductivity	W/(m·K)
λ_D	is the declared thermal conductivity	W/(m·K)
μ	is the water vapour diffusion resistance factor	–
S_b	is the deviation from squareness of the edge (width or length)	mm/m
S_d	is the deviation from squareness of the edge (thickness)	mm/m
S_{max}	is the deviation from flatness	mm
σ_{10}	is the compressive stress at 10 % deformation	kPa
σ_m	is the compressive strength	kPa
v	is the deviation from the squareness for pipe section	mm/m
W_p	is the short term water absorption by partial immersion	kg/m²
Z	is the water vapour resistance	m² · h · Pa/mg

CL	is the symbol of the declared level for soluble chloride ions
CS(10\Y)	is the symbol of the declared level for compressive stress or strength
DS(TH)	is the symbol of the declared value for the dimensional stability under specified temperature and humidity conditions
F	is the symbol of the declared level of soluble fluoride ions
MU	is the symbol of the declared level for water vapour diffusion resistance factor
NA	is the symbol of the declared level of soluble sodium ions
pH	is the symbol of the declared level of the pH value
SI	is the symbol of the declared level of soluble silicate ions
ST(+)	is the symbol of the declared level for maximum service temperature
ST(-)	is the symbol of the declared level for minimum service temperature
T	is the symbol of the declared class for thickness tolerances
WS	is the symbol of the declared level for short term water absorption by partial immersion
Z	is the symbol of the declared value for water vapour resistance

3.2.2 Abbreviations used in this standard

XPS is e**X**truded **P**oly**S**tyrene foam

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

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

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

SBI is **S**ingle **B**urning **I**tem

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.

NOTE 1 Information on additional properties is given in Annex C.

One test result for a product property is the average of the measured values on the number of test specimens given in Table 5.

NOTE 2 Apparent density is a useful parameter, among others, for the identification but it should not be used as a basis for the quality assessment of XPS products.

Apparent density of XPS boards and billets, if voluntary declared by the manufacturer will be determined in accordance with EN 1602, *Thermal insulating products for building applications – Determination of the apparent density.*

Apparent density of pipe sections, if voluntary declared by the manufacturer will be determined in accordance with EN 13470, *Thermal insulating products for building equipment and industrial installations – Determination of the apparent density of preformed pipe insulation*.

Products manufactured from XPS can have the same thermal and mechanical properties at different densities. For this reason, product density is not quoted as requirement in this standard.

4.2 For all applications

4.2.1 Thermal conductivity

For flat specimens, the 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 5.3.2.

In both cases, the thermal conductivity values shall be determined by the manufacturer and verified in accordance with EN ISO 13787, Subclause 5.3.1, and Annex B of this standard. They shall be declared by the manufacturer at reference mean temperatures covering the product service temperature range. The following conditions apply:

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

— the declared 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 lowest reference mean test temperature required is - 170 °C, where relevant.

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 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 of boards

The length, l, and width, b, shall be determined in accordance with EN 822, the squareness, S_b, in accordance with EN 824, and flatness, S_{max}, in accordance with EN 825. No test result shall deviate from the declared values by more than the tolerances given in Table 1.

Table 1 — Tolerances of length, width, squareness and flatness of boards

Length or width mm	Tolerances		
	Length or width mm	Squareness on length and width S_b mm/m	Flatness $S_{max.}$ mm
Less than 1 000	± 8	5	7,0
1 000 to 2 000	± 10	5	14,0
> 2 000 to 4 000	± 10	5	28,0
> 4 000	± 10	5	35,0

4.2.2.2 Thickness of boards

The thickness, d, shall be determined in accordance with EN 823. No test result shall deviate from the declared thickness, d_D, by more than the tolerances given in Table 2 for the labelled class.

Table 2 — Classes for thickness tolerances of boards

Class	Tolerances		Thickness mm
T1	– 2	+ 2	< 50
	– 2	+ 3	$50 \leq d_D \leq 120$
	– 2	+ 8	> 120
T2	– 1,5	+ 1,5	< 50
	– 1,5	+ 1,5	$50 \leq d_D \leq 120$
	– 1,5	+ 1,5	> 120
T3	– 1	+ 1	< 50
	– 1	+ 1	$50 \leq d_D \leq 120$
	– 1	+ 1	> 120

4.2.2.3 Dimensions and tolerances of pipe sections and segments

The length, l, thickness, d, inside diameter, D_i, the deviation from the squareness, v, and the deviation from the linearity, L, of pipe sections and segments shall be tested in accordance with EN 13467.

Products with a facing or natural skin shall be tested without removing them.

No test result shall deviate from the declared values by more than the tolerances given in Table 3.

Tolerances on prefabricated wares may be agreed between the parties.

Table 3 — Tolerances for pipe sections and segments

Length, l	± 10 mm
Thickness, d [a],	± 3 mm or ± 5% [b]
Inside diameter, D_i	– 0 mm / + 4 mm or + 2 % [b]
Squareness, v	± 6 mm or ± 2 % [b]
Linearity, L	± 6 mm

[a] The tolerances only apply to unfaced products. The thickness of any facing exceeding 2 mm shall be indicated in the manufacturer's literature.

[b] The greater value applies.

NOTE Smaller tolerances may be declared by a producer.

4.2.3 Dimensional stability

Dimensional stability under specified temperature and humidity conditions shall be determined in accordance with EN 1604. The test shall be carried out after storage for 48 h at (23 ± 2) °C and (90 ± 5) % relative humidity. The relative changes in length, $\Delta\varepsilon_l$, in width, $\Delta\varepsilon_b$, and in thickness, $\Delta\varepsilon_d$, shall not exceed 2 %.