SLOVENSKI STANDARD
SIST EN 13163:2009

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Toplotnoizolacijski proizvodi za stavbe - Proizvodi iz ekspandiranega polistirena (EPS) - Specifikacija

Thermal insulation products for buildings - Factory made products of expanded polystyrene (EPS) - Specification

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Wärmedämmstoffe für Gebäude - Werkmäßig hergestellte Produkte aus expandiertem Polystyrol (EPS) - Spezifikation

Produits isolants thermiques pour le bâtiment - Produits manufacturés en polystyrène expansé (EPS) - Spécification

Ta slovenski standard je istoveten z: **EN 13163:2008**

ICS:

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EUROPEAN STANDARD

NORME EUROPÉENNE

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English Version

Thermal insulation products for buildings - Factory made products of expanded polystyrene (EPS) - Specification

Produits isolants thermiques pour le bâtiment - Produits
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Wärmedämmstoffe für Gebäude - Werkmäßig hergestellte
Produkte aus expandiertem Polystyrol (EPS) - Spezifikation

This European Standard was approved by CEN on 12 October 2008.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

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 Management Centre has the same status as the official versions.

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Foreword

This document (EN 13163:2008) 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of an identical text or by endorsement, at the latest by May 2009, and conflicting national standards shall be withdrawn at the latest by May 2009.

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 EC Directive(s).

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

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 13163:2001.

This document is one of a series of standards for insulation products used in buildings, 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.

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 13162, *Thermal insulation products for buildings — Factory made mineral wool (MW) products — Specification*

EN 13163, *Thermal insulation products for buildings — Factory made products of expanded polystyrene (EPS) — Specification*

EN 13164, *Thermal insulation products for buildings — Factory made products of extruded polystyrene foam (XPS) — Specification*

EN 13165, *Thermal insulation products for buildings — Factory made rigid polyurethane foam (PUR) products — Specification*

EN 13166, *Thermal insulation products for buildings — Factory made products of phenolic foam (PF) — Specification*

EN 13167, *Thermal insulation products for buildings — Factory made cellular glass (CG) products — Specification*

EN 13168, *Thermal insulation products for buildings — Factory made wood wool (WW) products — Specification*

EN 13169, *Thermal insulation products for buildings — Factory made products of expanded perlite (EPB) — Specification*

EN 13170, *Thermal insulation products for buildings — Factory made products of expanded cork (ICB) — Specification*

EN 13171, *Thermal insulation products for buildings — Factory made wood fibre (WF) 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, 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.

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1 Scope

This European Standard specifies the requirements for factory made products of expanded polystyrene, with or without facings or coatings, which are used for the thermal insulation of buildings. The products are manufactured in the form of boards or rolls or other preformed ware.

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

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

This European Standard does not specify the required class or level of a given property to be achieved by a product to demonstrate fitness for purpose in a particular application. The classes and levels required for a given application are to be found in regulations or non-conflicting standards.

Products with a declared thermal resistance lower than 0,25 m²·K/W or a declared thermal conductivity at 10 °C greater than 0,060 W/(m·K) are not covered by this European Standard.

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 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 1605, *Thermal insulating products for building applications — Determination of deformation under specified compressive load and temperature 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 12090, *Thermal insulating products for building applications — Determination of shear 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 13172:2008, *Thermal insulating products — Evaluation of conformity*

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

EN 13793, *Thermal insulating products for building applications — Determination of behaviour under cyclic loading*

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

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 9229, *Thermal insulation — Vocabulary (ISO 9229:2007)*

EN ISO 10456, *Building materials and products — Hygrothermal properties — Tabulated design values and procedures for determining declared and design thermal values (ISO 10456:2007)*

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)*

ISO 12491, *Statistical methods for quality control of building materials and components*

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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. Other relevant definitions are to be found in EN ISO 9229.

3.1.1
expanded polystyrene (EPS)
rigid cellular plastic material, manufactured by moulding beads of expandable polystyrene or one of its copolymers, with an air filled closed cellular structure

3.1.2
expanded polystyrene block
rigid insulation product or material generally of rectangular cross section and with a thickness not significantly smaller than the width

NOTE   Blocks are supplied trimmed or untrimmed.

3.1.3
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 1   Boards may be of uniform thickness or tapered.

NOTE 2   The board edges may be of various sorts (e.g. square, half lapped, tongue and groove).

3.1.4
expanded polystyrene roll
boards or strips bonded to a flexible facing, supplied in a wound or folded form, which form a continuous insulation layer when unrolled

3.1.5
preformed ware
insulation shapes formed by cutting or grinding from blocks or boards or by shape moulding

3.1.6
level
given value, which is the upper or lower limit of a requirement; 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 levels are given by the declared value of the characteristic concerned

3.2 Symbols, units and abbreviated terms

3.2.1 Symbols and units used in this standard

$1 - \alpha$	is the prediction interval	1
b	is the width	mm
c	is the compressibility	mm
d	is the thickness	mm
δ	is the water vapour permeability	mg/(Pa·h·m)

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d_B	is the thickness under a load of 2 kPa after removal of an additional load of 48 kPa	mm
d_L	is the thickness under a load of 250 Pa	mm
d_N	is the nominal thickness of the product	mm
d_s	is the thickness of the test specimen	mm
$\Delta\varepsilon_b$	is the relative change in width	%
$\Delta\varepsilon_d$	is the relative change in thickness	%
$\Delta\varepsilon_l$	is the relative change in length	%
ε_1	is the deformation after step A in accordance with EN 1605	%
ε_2	is the deformation after step B in accordance with EN 1605	%
ε_{ct}	is the compressive creep	%
ε_t	is the total relative thickness reduction	%
E_{dyn}	is the dynamic elasticity modulus	MN/m^2
k	is a factor related to the number of test results available	1
l	is the length	mm
L	is the thickness effect parameter	1
$\lambda_{90,90}$	is the 90 % fractile with a confidence level of 90 % for the thermal conductivity	W/(m·K)
λ_D	is the declared of thermal conductivity	W/(m·K)
λ_i	is one test result of thermal conductivity	W/(m·K)
λ'_i	is one test result of thermal conductivity for which the thickness effect is not negligible	W/(m·K)
λ_{mean}	is the mean thermal conductivity	W/(m·K)
λ_{pred}	is the predicted thermal conductivity with a prediction interval of 90 %	W/(m·K)
μ	is the water vapour diffusion resistance factor	1
n	is the number of test results	1
ρ_a	is the apparent density	kg/m^3
$R_{90/90}$	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
R'_i	is one test result of thermal resistance for which the thickness effect is not negligible	m^2·K/W
R_{mean}	is the mean thermal resistance	m^2·K/W
s'	is the dynamic stiffness	MN/m^3
σ_{10}	is the compressive stress at 10 % deformation	kPa
$\sigma_{10,mean}$	is the mean compressive stress at 10 % deformation	kPa
$\sigma_{10,pred}$	is the predicted compressive stress at 10 % deformation with a prediction interval of 90 %	kPa

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σ_b	is the bending strength	kPa
σ_c	is the compressive stress	kPa
σ_{mt}	is the tensile strength perpendicular to faces	kPa
S_b	is 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	m²·K/W
t	is the testing time	d
τ	is the shear strength	kPa
W_{dV}	is the water absorption by diffusion	%
W_{lp}	is the long-term water absorption by partial immersion	kg/m²
W_{lt}	is the long-term water absorption by total immersion	%
X_0	is the initial deformation after 60 s from the beginning of the loading	mm
X_{ct}	is the compressive creep	mm
X_t	is the deformation at time t (total thickness reduction)	mm
Z	is the water vapour resistance	m²·h·Pa/mg

BS	is the symbol of the declared level for bending strength
CC (i₁/i₂/y) σ_c	is the symbol of the declared level for compressive creep*
CP	is the symbol of the declared level for compressibility
CS(10)i	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 constant normal laboratory conditions
DS(TH)	is the symbol of the declared level for dimensional stability under specified temperature and humidity
DLT	is the symbol of the declared level for dimensional stability under load and temperature conditions
L	is the symbol of the declared class for length tolerances
MUi	is the symbol of the declared water vapour*
P	is the symbol of the declared class for flatness tolerance
S	is the symbol of the declared class for squareness tolerance
SDi	is the symbol of the declared level for dynamic stiffness*
Ti	is the symbol of the declared class for thickness tolerance*
TRi	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 long term water absorption by total immersion
Zi	is the symbol of the declared water vapour resistance value*

*   "i" is the relevant class or level, "σ_c" is the compressive stress, and "y" is the number of years.

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3.2.2 Abbreviated terms used in this standard

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

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

RtF   **R**eaction **t**o **F**ire

FPC   **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 4.2, and the requirements of 4.3 as appropriate.

NOTE   Information on additional properties is given in Annex D.

One test result for a product property is the average of the measured values on the number of test specimens given in Table 13. Wherever limit values are used, they shall represent the value achieved by at least 90 % of the production with a confidence level of 90 %.

For mechanical properties no single measured value within the consecutive group used for obtaining the test result, shall be more than 10 % lower than the limit value defining the level. For non-mechanical properties a deviation from the limit value may be required and where appropriate these are expressed in the text.

4.2 For all applications

4.2.1 Thermal resistance and thermal conductivity

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 resistance and the thermal conductivity 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;

NOTE   Zeros on the left hand side are not counted as significant figures.

— for products of uniform thickness, the thermal resistance, R_D, shall always be declared. The thermal conductivity, λ_D, shall be declared where possible. Where appropriate, for products of non-uniform thickness (e.g. for sloped and tapered products) only the thermal conductivity, λ_D, shall be declared.

— the declared thermal resistance, R_D, and the declared 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 as λ_D in levels with steps of 0,001 W/(m·K);

— the declared thermal resistance, R_D, shall be calculated from the nominal thickness, d_N, and the corresponding thermal conductivity, $\lambda_{90/90}$, unless measured directly. For products for which compressibility is measured (see 4.3.13) the R_D shall be calculated using d_L instead of d_N. For the

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calculation of the declared thermal conductivity, λ_D, related to the corresponding nominal thickness, factors for the thickness effect conversions are given in Annex B;

— the value of thermal resistance, $R_{90/90}$, when calculated from the nominal thickness, d_N, and the corresponding thermal conductivity, $\lambda_{90/90}$, shall be rounded downwards to the nearest 0,05 m²·K/W, and declared as R_D in levels with steps of 0,05 m²·K/W;

— the value of $R_{90/90}$, for those products for which only the thermal resistance is measured directly, shall be rounded downwards to the nearest 0,05 m²·K/W, and declared as R_D in levels with steps of 0,05 m²·K/W.

4.2.2 Length and width

Length, l, and width, b, shall be determined in accordance with EN 822. No test result shall deviate from the nominal values by more than the tolerances given in Table 1 for the declared class.

4.2.3 Thickness

Thickness, d, shall be determined in accordance with EN 823. No test result shall deviate from the nominal thickness, d_N, by more than the tolerances given in Table 1, for the declared class.

4.2.4 Squareness

Squareness shall be determined in accordance with EN 824. The deviation from squareness on length and width, S_b, shall not exceed the tolerances given in Table 1, for the declared class.

4.2.5 Flatness

Flatness shall be determined in accordance with EN 825. The maximum deviation from flatness, S_{max}, shall not exceed the tolerances given in Table 1 for the declared class. This test shall not be performed when the tests described in 4.3.13 are used.

Table 1 — Classes of dimensional tolerances

Property	Class	Tolerances	
		Boards	Rolls
Length	L1	± 0,6 % or ± 3 mm[a]	– 1 %
	L2	± 2 mm	+ unrestricted
Width	W1	± 0,6 % or ± 3 mm[a]	± 0,6 % or ± 3 mm[a]
	W2	± 2 mm	
Thickness[b]	T1	± 2 mm	
	T2	± 1 mm	
Squareness	S1	± 5 mm/1 000 mm	
	S2	± 2 mm/1 000 mm	
Flatness[c]	P1	30 mm	
	P2	15 mm	
	P3	10 mm	
	P4	5 mm	
[a] Whichever gives the greatest numerical tolerance.			
[b] For further classes, see 4.3.13.1.			
[c] Flatness is expressed per metres run.			

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4.2.6 Dimensional stability

4.2.6.1 Dimensional stability under constant normal laboratory conditions

Dimensional stability under constant 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 constant normal laboratory conditions

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

4.2.6.2 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 for 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 4.3.2, is used for a product in a specific application.