SLOVENSKI STANDARD
SIST EN 13163:2002

01-marec-2002

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

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

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

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

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Ta slovenski standard je istoveten z: **EN 13163:2001**

ICS:

91.100.60	Materiali za toplotno in zvoļno izolacijo	Thermal and sound insulating materials

SIST EN 13163:2002 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13163

May 2001

ICS 91.100.60

English version

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

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

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

This European Standard was approved by CEN on 16 April 2001.

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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 Management Centre has the same status as the official versions.

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

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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by November 2001, and conflicting national standards shall be withdrawn at the latest by March 2003.

This European Standard 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(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this standard.

This European Standard contains five annexes:

Annex A (normative)	Determination of the declared values of thermal resistance and thermal conductivity
Annex B (normative)	Factory production control
Annex C (normative)	Product classification
Annex D (informative)	Additional properties
Annex ZA (informative)	Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

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This European Standard is one of a series of standards for insulation products used in buildings, but this standard may be used in other areas where appropriate.

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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 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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.

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

Products covered by this 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.

The 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.

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

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2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to, or revisions of, any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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.*

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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.*

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prEN ISO 1182, *Reaction to fire tests for building products - Non-combinability test (ISO/DIS 1182:1998).*

prEN ISO 1716, *Reaction to fire tests for building products – Determination of calorific value (ISO/DIS 1716:1998).*

prEN ISO 9229, *Thermal insulation – Definitions of terms (ISO/DIS 9229:1997).*

prEN ISO 11925-2, *Reaction to fire tests for building products – Part 2: Ignitability when subjected to direct impingement of flame (ISO/DIS 11925-2:1998).*

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.*

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

prEN 12667, *Thermal performance of building material 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 13172:2001, *Thermal insulating products – Evaluation of conformity.*

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

prEN 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.*

3 Terms, definitions, symbols, units and abbreviated terms

3.1 Terms and definitions

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For the purpose of this standard, the following terms and definitions apply. Other relevant definitions are to be found in prEN ISO 9229.

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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

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

3.1.3
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. Boards may be of uniform thickness or tapered. 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
the 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
a 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

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)
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/m²
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/m³
$R_{90/90}$	is the 90 % fractile with a confidence level of 90 % for the thermal resistance	m²·K/W
R_D	is the declared thermal resistance	m²·K/W
R_i	is one test result of thermal resistance	m²·K/W
R_i'	is one test result of thermal resistance for which the thickness effect is not negligible	m²·K/W
R_{mean}	is the mean thermal resistance	m²·K/W

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s'	is the dynamic stiffness	MN/m³
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
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

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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
CP	is the symbol of the declared level for compressibility
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 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
MU	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
SD	is the symbol of the declared level for dynamic stiffness
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 long term water absorption by total immersion
Z	is the symbol of the declared water vapour resistance value

Abbreviated terms used in this standard:

EPS	is **E**xpanded **P**oly**S**tyrene
ITT	is **I**nitial **T**ype **T**est

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 prEN 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:

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- the reference mean temperature shall be 10 °C;
- the measured values shall be expressed with three significant figures;

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

- the thermal resistance, R_D, shall always be declared. The thermal conductivity, λ_D, shall be declared where possible;
- 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 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 % + unrestricted
	L2	± 2 mm	
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 / 1000 mm	
	S2	± 2 mm / 1000 mm	
Flatness [c]	P1	± 30 mm	
	P2	± 15 mm	
	P3	± 10 mm	
	P4	± 5 mm	

[a] Whichever gives the greatest numerical tolerance.
[b] 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.