



SLOVENSKI STANDARD
SIST EN 13165:2002
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Toplotnoizolacijski proizvodi za stavbe - Proizvodi iz trde poliuretanske pene (PUR) - Specifikacija

Thermal insulation products for buildings - Factory made rigid polyurethane foam (PUR) products - Specification

Wärmedämmstoffe für Gebäude - Werkmäßig hergestellte Produkte aus Polyurethan Hartschaum (PUR) - Spezifikation

Produits isolants thermiques pour le bâtiment - Produits manufacturés en mousse rigide de polyuréthane (PUR) - Spécification

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91.100.60 Thermal and sound insulating materials

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English version

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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of an identical text or by endorsement, at the latest by November 2001, and conflicting national standards shall be withdrawn at the latest by March 2003.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) Determination of the aged values of thermal resistance and thermal conductivity;
- Annex D (informative) Additional properties;
- Annex ZA (informative) Clauses of this European Standard addressing the provisions of the EU Construction Products Directive.

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

In pursuance of Resolution BT 20/1993 Revised, CEN/TC88 has proposed defining the standards listed below as a package of European 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/TC88:

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.

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1 Scope

This European Standard specifies the requirements for factory made rigid polyurethane foam (PUR) products, with or without rigid or flexible facings or coatings and with or without integral reinforcement, which are used for the thermal insulation of buildings. PUR also includes polyisocyanurate foam (PIR).

The products are manufactured in the form of boards. The standard also covers the thermal performance of composite panels in which polyurethane rigid foam is the main insulant.

The 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.

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

Products with a declared thermal resistance lower than $0,05 \text{ m}^2 \cdot \text{K/W}$ or a declared thermal conductivity greater than $0,1 \text{ W/(m} \cdot \text{K)}$ at $10 \text{ }^\circ\text{C}$ are not covered by this standard.

This standard does not cover in situ insulation products, products intended to be used for the insulation of building equipment and industrial installations. This standard does not cover the acoustical aspect of impact noise transmission.

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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 ISO 354:1993/A1, *Acoustics – Measurement of sound absorption in a reverberation room - Amendment 1: Test specimen mountings for sound absorption tests (ISO 354:1985/AMD 1:1997).*

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.*

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

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.*

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).*

EN ISO 11654, *Acoustics – Sound absorbers for use in buildings – Rating of sound absorption (ISO 11654:1997).*

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 12086:1997, *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.*

prEN 12667:2000, *Thermal performance of building materials and products – Determination of thermal resistance by means of guarded hot plate and heat flow meter method - 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 13820, *Thermal insulating products for building applications – Determination of organic content.*

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

ISO 4590, *Cellular plastics - Determination of volume percentage of open and closed cells of rigid materials.*

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

3 Terms, definitions, symbols, units and abbreviated terms

3.1 Terms and definitions

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

3.1.1 Terms and definitions as given in prEN ISO 9229

3.1.1.1

board; slab

rigid or semi-rigid (insulation) 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 supplied in tapered form.

3.1.1.2

composite insulation

combination of layers of at least two different insulation materials. The insulation property of the composite is derived from the insulation properties of the individual materials

3.1.1.3

composite panel

panel made from two or more different materials deriving its performance from a combination of the properties of the individual materials, e.g. metal, plywood, particle board and insulation material

3.1.1.4

facing

functional or decorative surface material, e.g. paper, plastic film, fabric or metal foil

3.1.1.5

rigid polyurethane foam

rigid or semi-rigid cellular plastics insulation material or product with a substantially closed cell structure based on polyurethane

3.1.2 Additional terms and definitions

3.1.2.1

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

3.1.2.2

class

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

3.1.2.3

integral reinforcement

a non-polyurethane product introduced into the polyurethane foam to improve some properties

3.1.2.4

polyisocyanurate foam

rigid cellular plastics insulation material with a substantially closed cell structure based on polymers mainly of the isocyanurate type

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NOTE Regarding the properties described in this standard it is not distinguished between rigid polyurethane foam (PUR) and polyisocyanurate foam (PIR). The abbreviation PUR used in this standard includes PIR products.

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3.2 Symbols, units and abbreviated terms

Symbols and units used in this standard:

α_p	is the practical sound absorption coefficient	-
α_w	is the weighted sound absorption coefficient	-
b	is the width	mm
d	is the thickness	mm
d_N	is the nominal thickness of the product	mm
d_S	is the thickness of the test specimen	mm
Δe_b	is the relative change in width	%
Δe_d	is the relative change in thickness	%
Δe_l	is the relative change in length	%
ε_{ct}	is the compressive creep	%
ε_t	is the total thickness reduction	%
k	is a factor related to the number of test results	-
k_a	is a factor related to the number of aged test results	-
k_i	is a factor related to the number of initial test results	-
l	is the length	mm
$\lambda_{90/90}$	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)
$\lambda_{mean,a}$	is the mean thermal conductivity of aged values	W/(m·K)
$\lambda_{mean,i}$	is the mean thermal conductivity of initial values	W/(m·K)
$\Delta\lambda_a$	is the ageing increment from measured aged values of thermal conductivity	W/(m·K)
$\Delta\lambda_f$	is the fixed ageing increment	W/(m·K)
μ	is the water vapour diffusion resistance factor	-

n	is the number of test results	-
$R_{90/90}$	is the 90 % fractile with a confidence level of 90 % for the thermal resistance	$m^2 \cdot K/W$
R_D	is the declared thermal resistance	$m^2 \cdot K/W$
R_i	is one test result of thermal resistance	$m^2 \cdot K/W$
R_{mean}	is the mean thermal resistance	$m^2 \cdot K/W$
S_b	is the deviation from squareness on length and width	mm/m
S_{max}	is the deviation from flatness	mm
S_R	is the estimate of the standard deviation of the thermal resistance	$m^2 \cdot K/W$
S_λ	is the estimate of the standard deviation of the thermal conductivity	$W/(m \cdot K)$
$S_{\lambda,a}$	is the estimate of the standard deviation of the aged values of the thermal conductivity	$W/(m \cdot K)$
$S_{\lambda,i}$	is the estimate of the standard deviation of the initial values of the thermal conductivity	$W/(m \cdot K)$
σ_c	is the declared compressive stress	kPa
σ_{10}	is the compressive stress at 10 % deformation	kPa
σ_m	is the compressive strength	kPa
σ_{mt}	is the tensile strength perpendicular to faces	kPa
W_{lt}	is the long-term water uptake by total immersion	%
Z	is the water vapour resistance	$m^2 \cdot h \cdot Pa/mg$
AP	is the symbol of the declared level of practical sound absorption coefficient	
AW	is the symbol of the declared level of weighted sound absorption coefficient	
CC($i_1/i_2/y$) σ_c	is the symbol of the declared level for compressive creep	
CS(10\Y)	is the symbol of the declared level for compressive stress or strength	
DLT(i)5	is the symbol of the declared level for deformation under load and temperature at conditions set with a maximum of 5 % deformation	
DS(TH)	is the symbol of the declared level for dimensional stability under specified temperature and humidity	
MU	is the symbol of the declared level for the water vapour diffusion resistance factor	
FW	is the symbol of the declared level for change in deviation from flatness after one-sided wetting	
T	is the symbol of the declared class for thickness tolerances	
TR	is the symbol of the declared level for tensile strength perpendicular to faces	
WL (T)	is the symbol of the declared level for long term water absorption by total immersion	
Z	is the symbol of the declared level for water vapour resistance	

Abbreviated terms used in this standard:

PUR	is Rigid PolyUrethane foam
ITT	is Initial Type Test

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 9.

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 thermal conductivity shall be determined in accordance with annex A and annex C

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 declared thermal resistance, R_D , and 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 $\lambda_{90/90}$;
- 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.

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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.

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Table 1 - Tolerances on length and width

Dimensions mm	Tolerances mm
< 1000	± 5
1000 to 2000	± 7,5
2001 to 4000	± 10
> 4000	± 15

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 2 for the declared class.

Table 2 - Classes for thickness tolerances

Class	Nominal thickness mm		
	< 50	50 to 75	> 75
	Tolerance mm		
T1	± 3	± 4	+ 6,- 3
T2	± 2	± 3	+ 5,- 2
T3	± 1,5	± 1,5	± 1,5

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 6 mm/m.

4.2.5 Flatness

Flatness shall be determined in accordance with EN 825. The deviation from flatness, S_{max} , shall not exceed the values given in Table 3.

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Table 3 - Deviation from flatness
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Full-size product		Deviation from flatness mm
Length m	Area m ²	
≤ 2,50	≤ 0,75	≤ 5
	> 0,75	≤ 10

4.2.6 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 tests, each on different sets of specimens, shall be carried out under the following test conditions:

- 1) (48 ± 1) h at (70 ± 2) °C and a relative humidity of (90 ± 5) %;
- 2) (48 ± 1) h at (-20 ± 3) °C.

The relative changes in length, $\Delta\varepsilon_l$, width, $\Delta\varepsilon_b$ and thickness, $\Delta\varepsilon_d$, shall not exceed the values given in Table 4 for the declared level.