
**Toplotnoizolacijski proizvodi za opremo stavb in industrijske inštalacije -
Proizvodi iz trde poliuretanske pene (PUR) in poliizocianuratne pene (PIR) -
Specifikacija**

Thermal insulation products for building equipment and industrial installations - Factory made rigid polyurethane foam (PUR) and polyisocyanurate foam (PIR) products - Specification

Wärmedämmstoffe für die technische Gebäudeausrüstung und für betriebstechnische Anlagen in der Industrie - Werkmäßig hergestellte Produkte aus Polyurethan-Hartschaum (PUR) und Polyisocyanurat-Schaum (PIR) - Spezifikation

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Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Produits manufacturés de rigide polyuréthane (PUR) et en mousse polyisocyanurate (PIR) - Spécification

Ta slovenski standard je istoveten z: EN 14308:2009

ICS:

| | | |
|-----------|-------------------------------------------|----------------------------------------|
| 91.100.60 | Materiali za toplotno in zvočno izolacijo | Thermal and sound insulating materials |
|-----------|-------------------------------------------|----------------------------------------|

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EUROPEAN STANDARD

EN 14308

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2009

ICS 91.100.60

English Version

Thermal insulation products for building equipment and industrial installations - Factory made rigid polyurethane foam (PUR) and polyisocyanurate foam (PIR) products - Specification

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Produits manufacturés en mousse rigide de polyuréthane (PUR) et en mousse polyisocyanurate (PIR) - Spécification

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This European Standard was approved by CEN on 29 September 2009.

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EN 14308:2009 (E)**Foreword**

This document (EN 14308:2009) 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of an identical text or by endorsement, at the latest by May 2010, and conflicting national standards shall be withdrawn at the latest by August 2011.

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 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), Determination of minimum service temperature
- Annex C (normative), Determination of the aged value of thermal conductivity
- Annex D (normative), 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 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 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/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, 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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EN 14308:2009 (E)**1 Scope**

This European Standard specifies the requirements for factory made rigid polyurethane foam (PUR) and polyisocyanurate foam (PIR) products, with a closed cell content not less than 90 %, with or without facings, which are used for the thermal insulation of building equipment and industrial installations, with an operating temperature range of approximately, - 200 °C to + 200 °C.

NOTE Below an operating temperature of - 50 °C, special tests regarding the suitability of the products 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 blocks, 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 are to be found in regulations and invitations to tender.

Products with a declared thermal conductivity greater than 0,100 W/(m · K) at 10 °C are not covered by this standard.

This standard does not cover products for in situ insulation (spraying or dispensing) or products for the insulation of the building structure.

This standard does not cover the following acoustical aspects: direct airborne sound insulation and impact noise transmission index.

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

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 12667:2001, *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 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 13471, *Thermal insulating products for building equipment and industrial installations — Determination of the coefficient of thermal expansion*

EN 13501-1:2007, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire test*

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

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

EN ISO 4590, *Rigid cellular plastics — Determination of the volume percentage of open cells and of closed cells (ISO 4590:2002)*

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 insulating 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.

EN 14308:2009 (E)**3.1.1 Terms and definitions as given in EN ISO 9229:2007****3.1.1.1****block****billet**

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

NOTE In English, some industries define a large block as a billet.

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 supplied in tapered form.

3.1.1.3**pipe section****section**

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

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**service temperature range**

temperature range between the maximum service temperature and the minimum service temperature (see 4.3.2 and 4.3.3)

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3.1.2 Additional terms and definitions**3.1.2.1****rigid polyurethane foam (PU)**

family of rigid cellular plastic insulation products with a substantially closed cell structure including both polymer types based on PIR and PUR

3.1.2.2**PIR**

rigid cellular plastic insulation product with a substantially closed cell structure based on polymers mainly of polyisocyanurate groups

3.1.2.3**PUR**

rigid cellular plastic insulation product with a substantially closed cell structure based on polymers mainly of polyurethane groups

NOTE Regarding the properties described in this standard PUR and PIR types are not distinguished between.

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**prefabricated ware**

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

3.1.2.7**production line**

assemblage of equipment that produces products using a continuous process

3.1.2.8**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 sections | mm |
| d | is the thickness | mm |
| d_D | is the declared thickness of the product | mm |
| $\Delta\epsilon_b$ | is the relative change in width | % |
| $\Delta\epsilon_d$ | is the relative change in thickness | % |
| $\Delta\epsilon_l$ | is the relative change in length | % |
| X_{ct} | is the absolute compressive creep | mm |
| X_t | is the total thickness reduction | mm |
| ϵ_{ct} | is the relative compressive creep | % |
| ϵ_t | is the relative deformation | % |
| f | is the cryogenic thermal stress resistance | — |
| L | is the deviation from linearity | mm |
| 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 | — |
| R_D | is the declared thermal resistance | m ² · K/W |
| S_b | is the deviation from squareness for boards on length and width | mm/m |
| S_d | is the deviation from squareness for boards on thickness | mm |
| S_{max} | is the deviation from flatness | mm |

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| | | |
|-------------------------|------------------------------------------------------------------------------------|-----------------------------|
| σ_{10} | is the compressive stress at 10 % deformation | kPa |
| σ_c | is the compressive stress | kPa |
| σ_m | is the compressive strength | kPa |
| ν | is the deviation from squareness for pipe sections | mm |
| W_{it} | is the long-term water uptake by total immersion | % |
| W_p | is the short-term water uptake by partial immersion | % |
| ψ_0 | is the closed cell content (corrected) | % |
| Z | is the water vapour resistance | $m^2 \cdot h \text{ Pa/mg}$ |
| $CC(i_1/i_2/y)\sigma_c$ | is the symbol of the declared level for compressive creep | |
| CL | is the symbol of the declared level for soluble chlorides ions | |
| CS(10\Y) | is the symbol of the declared level for compressive stress or compressive strength | |
| CV | is the symbol of the declared value for closed cell content | |
| DS(TH) | is the symbol of the declared value for dimensional stability | |
| F | is the symbol of the declared value for soluble fluoride ions | |
| MU | is the symbol of the declared value for water vapour diffusion resistance factor | |
| NA | is the symbol of the declared value for soluble sodium ions | |
| pH | is the symbol of the declared value for the pH-value | |
| SI | is the symbol of the declared value for 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 | |
| WVT | is the symbol of the declared level for water vapour transmission | |
| WVP | is the symbol of the declared level for water vapour permanence | |
| WVPE | is the symbol of the declared level for water vapour permeability | |
| Z | is the symbol of the declared value for water vapour resistance | |

3.2.2 Abbreviated terms used in this standard

| | |
|-----|-------------------------------------------------------------------|
| PU | is rigid P oly U rethane foam including PUR and PIR |
| 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 1 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 numbers of test specimens given in Table 4.

4.2 For all applications

4.2.1 Thermal resistance and 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 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 and Annex C of this product standard. They shall be declared by the manufacturer according to measuring standards mentioned above, covering the product service temperature range. The following conditions apply:

- the measured values shall be expressed with 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 lowest reference mean test temperature required is - 170 °C.

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 boards 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.

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

Table 1 — Dimensional tolerances

| Form of delivery | Length | Width | Thickness | Inside diameter |
|--------------------------|--------------|------------|--------------|------------------------------------------------------------------|
| Boards $l < 1\ 000$ mm | ± 5 mm | ± 5 mm | $\pm 1,5$ mm | — |
| $l = 1\ 000$ to $2\ 000$ | $\pm 7,5$ mm | | | |
| $l = 2\ 001$ to $4\ 000$ | ± 10 mm | | | |
| $l > 4\ 000$ | ± 15 mm | | | |
| Pipe section | ± 3 mm | — | ± 2 mm | $- 0$ mm + 2 mm ^a $- 0$ mm + 3 mm ^b |
| Segments | + 3 mm | ± 2 mm | ± 2 mm | $- 0$ mm + 4 mm |
| Prefabricated ware | + 3 mm | — | ± 2 mm | — |

^a Applies to inside diameter less than 170 mm.
^b Applies to inside diameter of 170 mm and greater.

NOTE Smaller tolerances may be declared by the manufacturer.

4.2.2.2 Squareness

Deviation from squareness, S_b , of boards and slabs shall be determined in accordance with EN 824. Deviation from squareness, v , of pipe sections shall be determined in accordance with EN 13467. For boards the deviation from squareness on length and width, S_b , shall not exceed 6 mm/m and the deviation from squareness on thickness, S_d , shall not exceed 2 mm. For pipe sections and segments the deviation from squareness, v , shall not exceed 3 mm.

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

4.2.2.3 Flatness

Deviation from flatness, S_{max} , shall be determined in accordance with EN 825. The deviation from flatness, S_{max} , shall not exceed 10 mm.

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

4.2.2.4 Pipe section linearity

Deviation from linearity, L , shall be determined for pipe sections in accordance with EN 13467. The deviation from linearity, L , shall not exceed 6 mm.

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

4.2.3 Dimensional stability under specified 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 $(- 20 \pm 3)$ °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 2 for the declared level.

Table 2 — Levels for dimensional stability

| Test conditions | Relative Changes | | Level DS(TH) | | |
|-----------------|--------------------------------------------|---|--------------|------------|------------|
| | | | 1 | 2 | 3 |
| 1 | $\Delta\varepsilon_l, \Delta\varepsilon_b$ | % | ≤ 5 | ≤ 3 | ≤ 2 |
| | $\Delta\varepsilon_d$ | % | ≤ 10 | ≤ 8 | ≤ 6 |
| 2 | $\Delta\varepsilon_l, \Delta\varepsilon_b$ | % | ≤ 1 | $\leq 0,5$ | $\leq 0,5$ |
| | $\Delta\varepsilon_d$ | % | ≤ 2 | ≤ 2 | ≤ 2 |

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 always 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 13501-1:2007, Table 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 the reaction to fire classification report shall be given in the manufacturer's literature.

4.2.5 Durability characteristics

4.2.5.1 General

The appropriate durability characteristics have been considered and are covered in Subclauses 4.2.5.2, 4.2.5.3 and 4.2.5.4.

4.2.5.2 Durability of reaction to fire against ageing/degradation and high temperature

The reaction to fire performance of PU products does not change with time or when subjected to the declared maximum service temperature.

4.2.5.3 Durability of thermal resistance against ageing/degradation

Any change of the thermal conductivity is covered and considered for declaration by Subclause 4.2.1 and Annex C.