



# SLOVENSKI STANDARD

## SIST EN 13166:2013

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Nadomešča:  
SIST EN 13166:2009

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### Toplotnoizolacijski proizvodi za stavbe - Proizvodi iz fenolne pene (PF) - Specifikacija

Thermal insulation products for buildings - Factory made phenolic foam (PF) products -  
Specification

Wärmedämmstoffe für Gebäude - Werkmäßig hergestellte Produkte aus  
Phenolharzschaum (PF) - Spezifikation

Produits isolants thermiques pour le bâtiment - Produits manufacturés en mousse  
phénolique (PF) - Spécification

Ta slovenski standard je istoveten z: EN 13166:2012

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#### ICS:

91.100.60	Materiali za toplotno in zvočno izolacijo	Thermal and sound insulating materials
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EUROPEAN STANDARD

**EN 13166**

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## Thermal insulation products for buildings - Factory made phenolic foam (PF) products - Specification

Produits isolants thermiques pour le bâtiment - Produits manufacturés en mousse phénolique (PF) - Spécification

Wärmedämmstoffe für Gebäude - Werkmäßig hergestellte Produkte aus Phenolharzschaum (PF) - Spezifikation

This European Standard was approved by CEN on 6 October 2012.

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-CENELEC 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-CENELEC Management Centre has the same status as the official versions.

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**EN 13166:2012 (E)****Foreword**

This document (EN 13166:2012) has been prepared by Technical Committee CEN/TC 88 “Thermal insulation 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of an identical text or by endorsement, at the latest by May 2013, and conflicting national standards shall be withdrawn at the latest by May 2013.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 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 document.

This document supersedes EN 13166:2008.

Compared with EN 13166:2008, the main changes are:

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- a) better harmonisation between the individual standards of the package (EN 13162 to EN 13171) on definitions, requirements, classes and levels;
  - b) new normative annex on multi-layered products;
  - c) changes on some editorial and technical content. This includes the limiting of the use of the slicing method for ageing in Annex C to unfaced and open-faced products and the clearer definition of how the ageing techniques should be applied to various types of PF products;
  - d) addition of links to EN 15715, *Thermal insulation products — Instructions for mounting and fixing for reaction to fire testing — Factory made products*;
  - e) changes to the Annex ZA.

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

In pursuance of Resolution BT20/1993 revised, CEN/TC 88 have proposed defining the standards listed below as a package of documents.

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 expanded polystyrene (EPS) products — Specification*

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

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

EN 13166, *Thermal insulation products for buildings — Factory made phenolic foam (PF) products — 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 expanded perlite board (EPB products) — 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*

The reduction in energy used and emissions produced during the installed life of thermal insulation products exceeds by far the energy used and emissions made during the production and disposal processes.

According to the CEN/CENELEC Internal Regulations, the national standards organisations 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.

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**EN 13166:2012 (E)****1 Scope**

This European Standard specifies the requirements for factory made phenolic foam products, with or without facings or coatings, which are used for the thermal insulation of buildings. The products are manufactured in the form of boards and laminates.

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.

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

This standard does not specify the required level of a given property to 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 or non-conflicting standards.

Products with a declared thermal resistance lower than 0,40 m<sup>2</sup>-K/W or a declared thermal conductivity greater than 0,050 W/(m-K) at 10 °C are not covered by this standard.

This standard does not cover in-situ thermal insulation products, products intended to be used for the thermal insulation of building equipment and industrial installations (covered by EN 14314 [3]).

**2 Normative references**

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 the apparent density*

EN 1603, *Thermal insulating products for building applications — Determination of dimensional stability under constant normal laboratory conditions (25 °C/50 % relative humidity)*

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 1607, *Thermal insulating products for building applications — Determination of tensile strength perpendicular to faces*

EN 1609, *Thermal insulating products for building applications — Determination of short term water absorption by partial immersion*

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*

EN 12089:1997, *Thermal insulating products for building applications — Determination of bending behaviour*

EN 12429, *Thermal insulating products for building applications — Conditioning to moisture equilibrium under specified temperature and humidity conditions*

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 13172:2012, *Thermal insulation products — Evaluation of conformity*

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

EN 13820, *Thermal insulating materials for building applications — Determination of organic content*

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

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

EN ISO 1182, *Reaction to fire tests for products — Non-combustibility test (ISO 1182)*

EN ISO 1716, *Reaction to fire tests for products — Determination of the gross heat of combustion (calorific value) (ISO 1716)*

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

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

EN ISO 11925-2, *Reaction to fire tests — Ignitability of products subjected to direct impingement of flame — Part 2: Single-flame source test (ISO 11925-2)*

ISO 16269-6:2005, *Statistical interpretation of data — Part 6: Determination of statistical tolerance intervals*

### 3 Terms, definitions, symbols, units and abbreviated terms

#### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 9229:2007 apply with the exception or in addition of the following:

##### 3.1.1

##### **phenolic foam**

rigid cellular foam, the polymer structure of which is made primarily from the polycondensation of phenol, its homologues and/or derivatives, with or without aldehydes or ketones

**EN 13166:2012 (E)****3.1.2****board, slab**

rigid or semi-rigid (thermal insulation) product of rectangular shape and cross section in which the thickness is uniform and substantially smaller than the other dimensions

Note 1 to entry: Boards are usually thinner than slabs. They may also be supplied in tapered form.

**3.1.3****level**

value which is the upper or lower limit of a requirement and given by the declared value of the characteristic concerned

**3.1.4****class**

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

**3.1.5****facings**

functional or decorative surface layer, with a thickness less than 3mm, e. g. paper, plastic film, fabric or metal foil, which is not considered as separate thermal insulation layer to be added to the thermal resistance of the product

**3.1.6****coating**

functional or decorative surface layer, with a thickness less than 3mm, usually applied by painting, spraying, pouring or trowelling, which is not considered as separate thermal insulation layer to be added to the thermal resistance of the product

**3.1.7****multi-layered thermal insulation product**

product which can be faced or coated made from two or more layers of a thermal insulation material from the same European Standard, which are bonded together by chemical or physical adhesion either horizontally and/or vertically

**3.1.8****composite thermal insulation product**

product which can be faced or coated made from two or more layers bonded together by chemical or physical adhesion consisting of at least one factory made thermal insulation material layer

**3.2 Symbols, units and abbreviated terms**

For the purposes of this document, the following symbols and units apply.

$b$	is the width	mm
$d$	is the thickness	mm
$d_N$	is the nominal thickness of the product	mm
$\Delta S$	is the overall change in flatness	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	%
$\Delta \lambda_a$	is the ageing increment of thermal conductivity ( $\lambda_a - \lambda_i$ )	W/(m·K)
$K$	is a factor related to the number of test results available (see Table A.1)	–
$K_a$	is a factor related to the number of test results of aged thermal conductivity	–

$K_i$	is a factor related to the number of test results of initial thermal conductivity	–
$l$	is the length	mm
$\lambda_{90/90}$	is the 90 % fractile with a confidence level of 90 % for the thermal conductivity	W/(m·K)
$\lambda_D$	is the declared thermal conductivity	W/(m·K)
$\lambda_i$	is one test result of thermal conductivity	W/(m·K)
$\lambda_a$	is the time averaged value of thermal conductivity over 25 years	W/(m·K)
$\lambda_u$	is the design thermal conductivity	W/(m·K)
$\lambda_{\text{mean}}$	is the mean thermal conductivity	W/(m·K)
$\lambda_{\text{mean,a}}$	is the mean of the time averaged aged values of thermal conductivity	W/(m·K)
$\lambda_{\text{mean,i}}$	is the mean of the initial values of thermal conductivity	W/(m·K)
$\mu$	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 <sup>2</sup> ·K/W
$R_D$	is the declared thermal resistance	m <sup>2</sup> ·K/W
$R_i$	is one test result of thermal resistance	m <sup>2</sup> ·K/W
$R_u$	is the design thermal resistance	m <sup>2</sup> ·K/W
$R_{\text{mean}}$	is the mean thermal resistance	m <sup>2</sup> ·K/W
$\rho_a$	is the apparent density	kg/m <sup>3</sup>
$S_b$	is the deviation from squareness on length and width	mm/mm
$S_d$	is the deviation from squareness on thickness	mm
$S_{\text{max}}$	is the deviation from flatness	mm
$s_R$	is the estimate of the standard deviation of the thermal resistance	m <sup>2</sup> ·K/W
$s_\lambda$	is the estimate of the standard deviation of the thermal conductivity	W/(m·K)
$s_{\lambda,a}$	is the estimate of the standard deviation of the aged values of thermal conductivity	W/(m·K)
$s_{\lambda,i}$	is the estimate of the standard deviation of the initial values of thermal conductivity	W/(m·K)
$\sigma_b$	is the bending strength	kPa
$\sigma_c$	is the compressive stress	kPa
$\sigma_m$	is the compressive strength	kPa
$\sigma_{\text{mt}}$	is the tensile strength perpendicular to faces	kPa
$W_{\text{lp}}$	is the long term water absorption by partial immersion	kg/m <sup>2</sup>
$W_p$	is the short term water absorption	kg/m <sup>2</sup>
$\psi_0$	is the closed cell content (corrected)	%
$\chi_{\text{ct}}$	is the compressive creep	%
$\chi_t$	is the total thickness reduction	%

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Z is the water vapour resistance m<sup>2</sup>·h·Pa/mg

AD	is the symbol of the declared value of apparent density
CC(i <sub>1</sub> /i <sub>2</sub> /y) σ <sub>c</sub>	is the symbol of the declared level of compressive creep
CS(Y)	is the symbol of the declared level of compressive strength
CV	is the symbol of the declared value of closed cell content
DS(N)	is the symbol for the declared class for dimensional stability under constant normal laboratory conditions
DS(T+)	is the symbol of the declared value of dimensional stability at specified temperature
DS(T-)	is the symbol of the declared value of dimensional stability at -20 °C
DS(TH)	is the symbol of the declared value of dimensional stability under specified temperature and humidity conditions
Li	is the symbol for tolerance in length
Wi	is the symbol for tolerance in width
MU	is the symbol of the declared value of water vapour diffusion resistance factor
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
WL(P)	is the symbol of the declared level for long term water absorption by partial immersion
WS	is the symbol of the declared level for short term water absorption
Z	is the symbol of the declared value for the water vapour resistance

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**Abbreviated terms used in this standard:**

PF	is <b>Phenolic Foam</b>
ITT	is <b>Initial Type Test</b>
FPC	is <b>Factory Production Control</b>
RtF	is <b>Reaction to Fire</b>

**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.

For multi-layered products additional requirements are given in Annex E.

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 EN 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 value shall be expressed with three significant figures;
- for products of uniform thickness, the declared thermal resistance,  $R_D$ , shall always be declared. The thermal conductivity,  $\lambda_D$ , shall be declared where possible. Where appropriate, for products of non-uniform thickness (i.e. for sloped and tapered products) only the thermal conductivity,  $\lambda_D$ , shall be declared.
- the declared thermal resistance,  $R_D$ , and declared thermal conductivity,  $\lambda_D$ , shall be given as limit values representing at least 90 % of the production, determined with a confidence level of 90 %;
- the statistical value of thermal conductivity,  $\lambda_{90/90}$ , shall be rounded upwards to the nearest 0,001 W/(m·K) and declared as  $\lambda_D$  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 statistical 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 m<sup>2</sup>·K/W and declared as  $R_D$  in levels with steps of 0,05 m<sup>2</sup>·K/W;
- the statistical value of thermal resistance  $R_{90/90}$ , for those products for which only the thermal resistance is measured directly, shall be rounded downwards to the nearest 0,05 m<sup>2</sup>·K/W and declared as  $R_D$  in levels with steps of 0,05 m<sup>2</sup>·K/W.

NOTE  $\lambda_U$  and  $R_U$  (design values) may be determined with reference to EN ISO 10456.

### 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 corresponding dimensions.