



SLOVENSKI STANDARD SIST EN 13166:2009

01-februar-2009

BUXca Yý U

SIST EN 13166:2002

SIST EN 13166:2002/A1:2004

SIST EN 13166:2002/AC:2006

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

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

iTeh STANDARD PREVIEW

(standards.iteh.ai)

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

[SIST EN 13166:2009](#)

[https://standards.iteh.ai/catalog/standards/sist/83a2a05b-93ed-4e18-bcfc-](https://standards.iteh.ai/catalog/standards/sist/83a2a05b-93ed-4e18-bcfc-95be2838f4ed/sist-en-13166-2009)

[95be2838f4ed/sist-en-13166-2009](https://standards.iteh.ai/catalog/standards/sist/83a2a05b-93ed-4e18-bcfc-95be2838f4ed/sist-en-13166-2009)

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

Ta slovenski standard je istoveten z: EN 13166:2008

ICS:

91.100.60

Ta slovenski standard je istoveten z: EN 13166:2008

Thermal and sound insulating
materials

SIST EN 13166:2009

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 13166:2009

<https://standards.iteh.ai/catalog/standards/sist/83a2a05b-93ed-4e18-bcfc-95be2838f4ed/sist-en-13166-2009>

EUROPEAN STANDARD

EN 13166

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2008

ICS 91.100.60

Supersedes EN 13166:2001

English Version

Thermal insulation products for buildings - Factory made products of phenolic foam (PF) - 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 11 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.

CEN members are the national standards bodies of 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 United Kingdom.

[SIST EN 13166:2009](https://standards.iteh.ai/catalog/standards/sist/83a2a05b-93ed-4e18-bcfc-95be2838f4ed/sist-en-13166-2009)

<https://standards.iteh.ai/catalog/standards/sist/83a2a05b-93ed-4e18-bcfc-95be2838f4ed/sist-en-13166-2009>



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

Page

Foreword.....	4
1 Scope	6
2 Normative references	6
3 Terms, definitions, symbols, units and abbreviated terms	7
3.1 Terms and definitions	7
3.2 Symbols, units and abbreviated terms.....	8
4 Requirements	10
4.1 General.....	10
4.2 For all applications	10
4.3 For specific applications.....	13
5 Test methods.....	16
5.1 Sampling.....	16
5.2 Conditioning.....	16
5.3 Testing	16
6 Designation code.....	19
7 Evaluation of conformity.....	19
8 Marking and labelling	20
Annex A (normative) Determination of the declared values of thermal resistance and thermal conductivity.....	21
A.1 General.....	21
A.2 Input data.....	21
A.3 Declared values.....	21
Annex B (normative) Factory production control.....	23
Annex C (normative) Determination of the aged values of thermal resistance and thermal conductivity.....	26
C.1 General.....	26
C.2 Preparation of test sample.....	26
C.3 Determination of the initial value of thermal conductivity	27
C.4 Determination of the aged value of thermal conductivity	27
C.5 Blowing agent	29
C.6 Declaration of thermal resistance and thermal conductivity	29
Annex D (informative) Additional properties.....	31
D.1 General.....	31
D.2 Shear strength.....	31
D.3 Cell gas composition.....	31
Annex ZA (informative) Clauses of this European Standard addressing the provisions of the EU Construction Products Directive.....	32
ZA.1 Scope and relevant characteristics	32
ZA.2 Procedures for attestation of conformity of factory made products of phenolic foam	34
ZA.3 CE Marking and labelling	38
Bibliography	40

Tables

Table 1 — Tolerances for length and width	11
Table 2 — Classes for thickness tolerances	11
Table 3 — Tolerances for deviation from flatness	12
Table 4 — Levels for compressive strength	14
Table 5 — Levels for short term water absorption by partial immersion	15
Table 6 — Levels for long term water absorption by partial immersion	15
Table 7 — Test methods, specimens and conditions.....	18
Table A.1 — Values for k for one side 90 % tolerance interval with a confidence level of 90 %	22
Table B.1 — Minimum product testing frequencies.....	23
Table B.2 — Minimum product testing frequencies for the reaction to fire characteristics	24
Table C.1 — Test times for product thicknesses	28
Table C.2 — Increments to be added to accelerated aged values of thermal conductivity to obtain the time averaged value over 25 years (W/m·K)	29
Table D.1 — Test methods, test specimens, conditions and minimum testing frequencies	31
Table ZA.1 — Relevant clauses for factory made products of phenolic foam and intended use.....	33
Table ZA.2 — Systems of attestation of conformity	34
Table ZA.3 — Assignment of evaluation of conformity tasks for products under system 1	35
Table ZA.4 — Assignment of evaluation of conformity tasks for products under system 3 or system 3 combined with system 4 for reaction to fire	36

[SIST EN 13166:2009](https://standards.iteh.ai/catalog/standards/sist/83a2a05b-93ed-4e18-bcfc-95be2838f4ed/sist-en-13166-2009)

<https://standards.iteh.ai/catalog/standards/sist/83a2a05b-93ed-4e18-bcfc-95be2838f4ed/sist-en-13166-2009>

Figures

Figure ZA.1 — Example CE marking information	39
--	----

Foreword

This document (EN 13166:2008) 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 2009, and conflicting national standards shall be withdrawn at the latest by May 2009.

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 EC Directive(s).

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

This document supersedes EN 13166:2001.

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 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 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.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 13166:2009](#)

<https://standards.iteh.ai/catalog/standards/sist/83a2a05b-93ed-4e18-bcfc-95be2838f4ed/sist-en-13166-2009>

EN 13166:2008 (E)**1 Scope**

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

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 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 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 m²·K/W or a declared thermal conductivity greater than 0,050 W/(m·K) at 10 °C are not covered by this European Standard.

This European Standard does not cover in-situ insulation products, products intended to be used for the insulation of building equipment and industrial installations or products intended for acoustic insulation.

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.

- STANDARD PREVIEW**
(standards.iteh.ai)
- <https://standards.iteh.ai/catalog/standards/sist/83e2a05b-93ed-4e18-b0f5-95be2838f4ed/sist-en-13166-2009>
- 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 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 12090, *Thermal insulating products for building applications — Determination of shear behaviour*

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

EN 12667:2001, *Thermal performance for 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 for 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 test data from reaction to fire test*

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

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

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

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*

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.

3.1.1 Terms and definitions as given in EN ISO 9229:2007

3.1.1.1

phenolic foam

rigid cellular foam, the polymer structure of which is made primarily from the polycondensation of phenol, its homologues and/or derivatives, with aldehydes or ketones

3.1.1.2

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.

EN 13166:2008 (E)

3.1.1.3

laminate

combination of two or more materials that are bonded together during manufacture to produce a single item or product

3.1.2 Additional terms and definitions

3.1.2.1

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

3.1.2.2

class

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

3.2 Symbols, units and abbreviated terms

3.2.1 Symbols and units used in this standard:

b	is the width	mm
d	is the thickness	mm
d_N	is the nominal thickness of the product	mm
ΔS	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	W/(m·K)
$\Delta \lambda_s$	is the ageing increment of thermal conductivity as determined by the slicing method	W/(m·K)
ε_{ct}	is the compressive creep	%
ε_t	is the total thickness reduction	%
k	is a factor related to the number of test results available	–
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)
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 of the aged values of thermal conductivity	W/(m·K)
$\lambda_{mean,i}$	is the mean of the initial values of thermal conductivity	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	$m^2 \cdot K/W$
ρ_a	is the apparent density	kg/m^3
S_b	is the deviation from squareness on length and width	mm/m
S_d	is the deviation from squareness on thickness	mm
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 thermal conductivity	$W/(m \cdot K)$
$s_{\lambda,i}$	is the estimate of the standard deviation of the initial values of thermal conductivity	$W/(m \cdot K)$
σ_b	is the bending strength	kPa
σ_c	is the compressive stress	kPa
σ_m	is the compressive strength	kPa
σ_{mt}	is the tensile strength perpendicular to faces	kPa
W_{lp}	is the long-term water absorption by partial immersion	kg/m^2
W_p	is the short-term water absorption	kg/m^2
ψ_0	is the closed cell content (corrected)	%
Z	is the water vapour resistance	$m^2 \cdot h \cdot Pa/mg$

AD	is the symbol of the declared value of apparent density
CC($i_1/i_2/y$) σ_c	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(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
MUi	is the symbol of the declared value of water vapour diffusion resistance factor*
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*
WL(P)	is the symbol of the declared level for long term water absorption by partial immersion

EN 13166:2008 (E)

WS is the symbol of the declared level for short-term water absorption

Zi is the symbol of the declared value for the water vapour resistance*

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

3.2.2 Abbreviated terms used in this standard:

PF Phenolic Foam

ITT Initial Type Test

RtF Reaction to Fire

FPC Factory Production Control

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 7.

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 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 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.

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.

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

Table 1 — Tolerances for length and width

Dimensions in millimetres

Dimensions	Length	Width
< 1 250	± 5,0	± 3,0
1 250 to 2 000	± 7,5	± 7,5
2 001 to 4 000	± 10,0	not applicable
> 4 000	± 15,0	not applicable

4.2.3 Thickness

SIST EN 13166:2009

<https://standards.itech.ai/catalog/standards/sist/83a2a05b-93ed-4e18-bcfc-95be2838f4ed/sist-en-13166-2009>

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 tolerance given in Table 2 for the labelled class.

Table 2 — Classes for thickness tolerances

Dimensions in millimetres

Nominal thickness	Tolerance	
	T1	T2
< 50	± 2,0	± 1,5
50 to 100	- 2,0 + 3,0	± 1,5
> 100	- 2,0 + 5,0	± 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 10 mm/m. The deviation from squareness on thickness, S_d , shall not exceed 2 mm.