SLOVENSKI STANDARD
SIST EN 13164:2009

01-februar-2009

Nadomeģ a:
SIST EN 13164:2002
SIST EN 13164:2002/A1:2004
SIST EN 13164:2002/AC:2006

Toplotnoizolacijski proizvodi za stavbe - Proizvodi iz ekstrudiranega polistirena (XPS) - Specifikacija

Thermal insulation products for buildings - Factory made products of extruded polystyrene foam (XPS) - Specification

Wärmedämmstoffe für Gebäude - Werkmäßig hergestellte Produkte aus extrudiertem Polystyrolschaum (XPS) - Spezifikation

Produits isolants thermiques pour le bâtiment - Produits manufacturés en mousse de polystyrène extrudé (XPS) - Spécification

Ta slovenski standard je istoveten z: **EN 13164:2008**

ICS:

91.100.60	Materiali za toplotno in zvoļ no izolacijo	Thermal and sound insulating materials

SIST EN 13164:2009 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13164

November 2008

ICS 91.100.60

Supersedes EN 13164:2001

English Version

Thermal insulation products for buildings - Factory made products of extruded polystyrene foam (XPS) - Specification

Produits isolants thermiques pour le bâtiment - Produits manufacturés en mousse de polystyrène extrudé (XPS) - Spécification

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This European Standard was approved by CEN on 12 October 2008.

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Ref. No. EN 13164:2008: E

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Foreword

This document (EN 13164:2008) 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of an identical text or by endorsement, at the latest by May 2009, and conflicting national standards shall be withdrawn at the latest by May 2009.

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.

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 supersedes EN 13164:2001.

This document 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/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/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, 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.

1 Scope

This European Standard specifies the requirements for factory made products of extruded polystyrene foam, with or without facings or coatings, which are used for thermal insulation of buildings. The products are manufactured in the form of boards, which are also available with special edge and surface treatment (tongue and grooves, shiplap, etc.).

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 insulating systems and composite panels; the performance of systems incorporating these products is not covered. This European Standard also covers multilayered insulation boards.

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

This European Standard does not cover in situ insulation products and 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.

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 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*

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 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 12667, *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 13172:2008, *Thermal insulating products — Evaluation of conformity*

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

EN 13793, *Thermal insulating products for building applications - Determination of behaviour under cyclic loading*

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 ISO 1182, *Reaction to fire tests for building products — Non-combustibility test (ISO 1182:2002)*

EN ISO 1716, *Reaction to fire tests for building products — Determination of the heat of combustion (ISO 1716:2002)*

EN ISO 4590, *Rigid cellular plastics - Determination of the volume percentage of open cells and 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, 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
extruded polystyrene foam
rigid cellular plastics insulation material expanded and extruded with or without a skin, from polystyrene or one of its copolymers and which has a closed cell structure

3.1.1.2
board
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

3.1.2 Additional 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
d_S	is the thickness of 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_{ct}	is the compressive creep	%
ε_t	is the total relative thickness reduction	%
ε_1	is the relative deformation after step A	%
ε_2	is the relative deformation after step B	%
k	is a factor related to the number of test results available	–
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)
$\lambda_{90/90,60d}$	is the 90 % fractile with a confidence level of 90 % for the thermal conductivity of foam at 60 days	W/(m·K)
$\lambda_{90/90>60d}$	is the 90 % fractile with a confidence level of 90 % for the thermal conductivity of foam older than 60 days	W/(m·K)
λ_D	is the declared thermal conductivity	W/(m·K)
λ_l	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)
$\lambda_{mean,60d}$	is the mean thermal conductivity of values for 60 days old foam	W/(m·K)

$\lambda_{>60d}$	is the measured value of the thermal conductivity of foam older than 60 days	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·K/W
$R_{90/90,60d}$	is the 90 % fractile with a confidence level of 90 % for the thermal resistance of foam at 60 days	m^2·K/W
$R_{90/90>60d}$	is the 90 % fractile with a confidence level of 90 % for the thermal resistance of foam older than 60 days	m^2·K/W
R_D	is the declared thermal resistance	m^2·K/W
R_I	is one test result of thermal resistance	m^2·K/W
R_{mean}	is the mean thermal resistance	m^2·K/W
S_b	is the deviation from squareness on width or length	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·K/W
s_λ	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 thermal conductivity	W/(m·K)
$s_{\lambda i}$	is the estimate of the standard deviation of the initial thermal conductivity within 90 days of production	W/(m·K)
σ_{10}	is the compressive stress at 10 % deformation	kPa
σ_c	is the declared compressive stress	kPa
σ_m	is the compressive strength	kPa
σ_{mt}	is the tensile strength perpendicular to faces	kPa
W_{dV}	is the water absorption by diffusion	%
W_{lt}	is the long term water pick up by total immersion	%
W_V	is the water absorption by diffusion and by freeze-thaw	%
Z	is the water vapour resistance	m^2·h·Pa/mg

CC(i_1/i_2/y)σ_c	is the symbol of the declared level for compressive creep*
CS(10\Y)x	is the symbol of the declared level for compressive stress or strength
DLT(1)5	is the symbol of the declared level of deformation under specified compressive load and temperature at conditions set 1 with a maximum of 5 % deformation
DLT(2)5	is the symbol of the declared level of deformation under specified compressive load and temperature at conditions set 2 with a maximum of 5 % deformation
DS(T+)	is the symbol of the declared value for dimensional stability at specified temperature
DS(TH)	is the symbol of the declared value for dimensional stability under specified temperature and humidity
FT	is the symbol of the declared level for freeze thaw resistance
MUi	is the symbol of the declared level for water vapour diffusion resistance factor*

Ti	is the symbol of the declared class for thickness tolerances*
TRi	is the symbol of the declared level for tensile strength perpendicular to faces*
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
Zi	is the symbol of the declared value for 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

XPS	e**X**truded **P**oly**S**tyrene foam
ITT	**I**nitial **T**ype **T**esting
RtF	**R**esistance **t**o **F**ire
FPC	**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 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

The 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 values 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 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 declared thermal conductivity value, $\lambda_{90/90}$;

— 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 $m^2 \cdot K/W$, and declared as R_D in levels with steps of 0,05 $m^2 \cdot K/W$;

— 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 $m^2 \cdot K/W$ and declared as R_D in levels with steps of 0,05 $m^2 \cdot K/W$.

4.2.2 Length, width, squareness, flatness

Length, l, and width, b, shall be determined in accordance with EN 822, the squarenesses on length and width, S_b, in accordance with EN 824, and the flatness, S_{max}, in accordance with EN 825. No test result shall deviate from the nominal values by more than the tolerances given in Table 1.

Table 1 — Tolerances of length, width, squareness and flatness

Nominal length or width mm	Tolerances		
	Length or width mm	Squareness on length and width S_b mm/m	Flatness S_{max} mm
less than 1 000	± 8	5	7,0
1 000 to 2 000	± 10	5	14,0
> 2 000 to 4 000	± 10	5	28,0
> 4 000	± 10	5	35,0

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 labelled class.