

norm**NEN-EN 13163**

Producten voor thermische isolatie van gebouwen - Fabrieksmatig vervaardigde producten van geëxpandeerd polystyreenschuim - Specificatie

Publicatie uitsluitend voor commentaar

Thermal insulation products for buildings - Factory made products of expanded polystyrene - Specification

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Normcommissie 353 033 "Thermische isolatiematerialen"

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Descriptors:

English version

**Thermal insulation products for buildings - Factory made
products of expanded polystyrene - Specification**

Produits isolants thermiques pour le bâtiment - Produits
manufacturés en polystyrène expansé - Spécification

Wärmedämmstoffe für Gebäude - Werkmäßig hergestellte
Produkte aus expandiertem Polystyrol - Spezifikation

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 88.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 Central Secretariat has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard has been prepared by the Technical Committee CEN/TC 88, "Thermal insulating materials and products", the secretariat of which is held by DIN.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports the essential requirements of the EU Construction Products Directive (89/106/EEC). For relationship with the EU Directives see informative annex Z which is an integral part of this standard.

This European Standard contains six annexes:

Annex A (normative)	Determination of the declared values of thermal conductivity and thermal resistance
Annex B (normative)	Factory production control
Annex C (informative)	Additional properties
Annex D (informative)	Application of EPS products
Annex E (informative)	Information for users
Annex Z (informative)	Clauses of this European Standard addressing the provision of the EU Construction Products Directive

This European Standard is one of a series of standards for insulation products used in buildings.

In pursuance of Resolution BT 20/1993 revised, CEN/TC 88 has proposed defining the standards listed below as a European "package" of standards, setting 30th June, 2000 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:

- prEN.... Thermal insulation products for buildings – Factory made mineral wool products – Specification
- prEN.... Thermal insulation products for buildings – Factory made products of expanded polystyrene – Specification
- prEN.... Thermal insulation products for buildings – Factory made products of extruded polystyrene foam – Specification
- prEN.... Thermal insulation products for buildings – Factory made products of rigid polyurethane foam – Specification
- prEN.... Thermal insulation products for buildings – Factory made products of phenolic foam – Specification
- prEN.... Thermal insulation products for buildings – Factory made cellular glass products – Specification
- prEN.... Thermal insulation products for buildings – Factory made wood wool products – Specification
- prEN.... Thermal insulation products for buildings – Factory made products of expanded perlite – Specification
- prEN.... Thermal insulation products for buildings – Factory made products of expanded cork – Specification
- prEN.... Thermal insulation products for buildings – Factory made wood fibre products – Specification

1 Scope

This European Standard specifies the requirements for factory made products of expanded polystyrene, with or without facings or coatings which are used for the thermal insulation of buildings. The products are manufactured in the form of boards or rolls or other preformed ware.

The standard describes product characteristics and includes procedures for testing, marking and labelling.

Products covered by this standard are also used in prefabricated thermal insulation systems and composite panels; the structural performance of systems incorporating these products is not covered.

The standard does not specify the required class or 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 (not conflicting) standards.

Products with a declared thermal conductivity at 10 °C greater than 0,060 W/(m·K) or a declared thermal resistance lower than 0,25 m²K/W are not covered by this standard.

Expanded polystyrene beads for loose fill or poured insulation and products intended to be used for the insulation of building equipment and industrial installations are not covered by this standard.

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.

- EN 822 : 1994 Thermal insulating products for building applications – Determination of length and width
- EN 823 : 1994 Thermal insulating products for building applications – Determination of thickness
- EN 824 : 1994 Thermal insulating products for building applications – Determination of squareness
- EN 825 : 1994 Thermal insulating products for building applications – Determination of flatness
- EN 826 : 1996 Thermal insulating products for building applications – Determination of compression behaviour
- EN 1602 : 1996 Thermal insulating products for building applications – Determination of apparent density
- EN 1603 : 1996 Thermal insulating products for building applications – Determination of dimensional stability under constant normal laboratory conditions (23 °C / 50 % relative humidity)
- EN 1604 : 1996 Thermal insulating products for building applications – Determination of dimensional stability under specified temperature and humidity conditions

EN 1605 : 1996	Thermal insulating products for building applications – Determination of deformation under specified compressive load and temperature conditions
EN 1607 : 1996	Thermal insulating products for building applications – Determination of tensile strength perpendicular to faces
EN 29052-1 : 1992	Acoustics – Determination of dynamic stiffness – Part 1: Materials used under floating floors in dwellings
prEN ISO 9229	Thermal insulation – Definitions of terms
prEN 12085	Thermal insulating products for building applications – Determination of linear dimensions of test specimens
prEN 12086	Thermal insulating products for building applications – Determination of water vapour transmission properties
prEN 12087	Thermal insulating products for building applications – Determination of long-term water absorption by immersion
prEN 12088	Thermal insulating products for building applications – Determination of long-term water absorption by diffusion
prEN 12089	Thermal insulating products for building applications – Determination of bending behaviour
prEN 12090	Thermal insulating products for building applications – Determination of shear behaviour
prEN 12091	Thermal insulating products for building applications – Determination of freeze-thaw resistance
prEN 12431	Thermal insulating products for building applications – Determination of thickness for floating floor insulating products
prEN ISO 30456	Thermal insulation – Building materials and products – Methods to determine declared and design thermal values ... Thermal insulation products – Evaluation of conformity (CEN/TC 88 N 617)
WI 00127065	Reaction to fire – Classification
ISO 8301 : 1991	Thermal insulation – Determination of steady-state thermal resistance and related properties – Heat flow meter apparatus
ISO 8302 : 1991	Thermal insulation – Determination of steady-state thermal resistance and related properties – Guarded hot plate apparatus

3 Definitions, symbols and abbreviations

3.1 Definitions

3.1.1 For the purpose of this standard the following definitions apply:

3.1.1.1 expanded polystyrene (EPS): Rigid cellular plastic material, manufactured by moulding prefoamed beads of expandable polystyrene or one of its copolymers, with an air filled closed cellular structure.

3.1.1.2 expanded polystyrene block: Rigid insulation product or material generally of rectangular cross section and with a thickness not significantly smaller than the width. Blocks are supplied trimmed or untrimmed.

3.1.1.3 expanded polystyrene board: Rigid insulation product (cut, moulded, or continuously foamed) of rectangular shape and cross section in which the thickness is significantly smaller than the other dimensions. Boards may be of uniform thickness or tapered. The board edges may be of various sorts (e.g., square, half lapped, tongue and groove).

3.1.1.4 expanded polystyrene roll: Boards or strips bonded to a flexible facing, supplied in a wound or folded form which form a continuous insulation layer when unrolled.

3.1.1.5 preformed ware: Insulation shapes formed by cutting or grinding from blocks or boards or by shape moulding.

3.1.2 Other relevant definitions are to be found in prEN ISO 9229.

3.2 Symbols and abbreviations

Symbols used in this standard:

$1 - \alpha$	is the confidence level	1
b	is the width	mm
d	is the thickness	mm
d_B	is the thickness under load	mm
d_F	is the thickness for floating floor products under traffic load	mm
d_L	is the thickness under low load	mm
δ	is the water vapour permeability	mg/(m·h·Pa)
E_{dyn}	is the dynamic elasticity modulus	MN/m ²
F_D	is the thickness correction factor	1
F_v	is the moisture conversion factor	1
k	is a factor related to the number of test results	1
λ_D	is the declared thermal conductivity	W/(m·K)
λ_m	is the mean value of the measured thermal conductivity	W/(m·K)
λ_U	is the design thermal conductivity	W/(m·K)
μ	is the water vapour diffusion resistance index	1
p	is the fractile value (quantile)	1
ρ_a	is the apparent density	kg/m ³
R_D	is the declared thermal resistance	m ² K/W
R_m	is the mean value of the measured thermal resistance	m ² K/W
σ_{10}	is the compressive stress at 10% deformation	kPa
s'	is the dynamic stiffness	MN/m ³
σ_B	is the bending strength	kPa
s_λ	is the estimate of the standard deviation of the thermal conductivity	W/(m·K)
σ_m	is the tensile strength perpendicular to faces	kPa
s_R	is the estimate of the standard deviation of the thermal resistance	m ² K/W
τ	is the shear strength	kPa
W_p	is the practical long-term water content	vol.-%
W_t	is the long-term water absorption by immersion	vol.-%
A	is the symbol of the class for length and width tolerances	
B	is the symbol of the level for bending strength	
C	is the symbol of the level for compressive stress at 10 % deformation	
D	is the symbol of the class for thickness tolerance	
E	is the symbol of the class for squareness tolerance	
F	is the symbol of the level for water absorption by diffusion	
G	is the symbol of the class for flatness tolerance	
H	is the symbol of the class for dimensional stability under normal laboratory conditions	
K	is the symbol of the level for dimensional stability under load and temperature	
S	is the symbol of the level for dynamic stiffness	
T	is the symbol of the level for tensile strength perpendicular to faces	
W	is the symbol of the level for water absorption by immersion	

Abbreviations used in this standard:

EPS is Expanded PolyStyrene
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 the annexes C and D.

One test result for a product property is the average of the measured values on the number of test specimens given in. Wherever limit values are used, they shall represent the value achieved by at least 90% of the production.

For mechanical properties no single measured value within the consecutive group used for obtaining the test result, shall be more than 10 % less than the limit value defining the level. For non mechanical properties a deviation from the limit value may be required and where appropriate these are expressed in the text.

4.2 For all applications

4.2.1 Thermal resistance – thermal conductivity

Thermal resistance and thermal conductivity shall be based upon measurements carried out in accordance with ISO 8301 or ISO 8302. In case of dispute, ISO 8302 shall be the reference test method.

The thermal values shall be determined in accordance with annex A and declared by the manufacturer, at the reference temperature of 10 °C, according to the following:

- the measured values shall be expressed to three significant figures;
- the declared thermal values shall be given as limit values representing at least 90 % of the production with a 90 % confidence level.
- the declared thermal resistance values, R_D , shall be calculated from the nominal thickness and the corresponding declared thermal conductivity, λ_D . For a nominal thickness < 50 mm see 5.3.2;
- the thermal resistance, R_D , shall always be declared. The thermal conductivity, λ_D , shall be declared wherever this is possible;
- the value of the thermal conductivity, shall be rounded upwards to the nearest mW/(m·K) and declared in levels with steps of 1 mW/(m·K);
- the value of the thermal resistance, R_D , shall be rounded upwards to the nearest 0,05 m²·K/W and declared in levels with steps of 0,05 m²·K/W.

For those products for which the thermal resistance is measured directly, the R_D value shall be rounded downwards to the nearest 0,05 m²·K/W and declared in levels with steps of 0,05 m²·K/W.

The design thermal conductivity, λ_U , shall be calculated from the declared thermal conductivity, λ_D , using prEN ISO 30456 for different temperatures and moisture contents.

NOTE: Over the normal climatic range, λ_U and λ_D are the same for EPS products.

4.2.2 Length and width

Length and width 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 labelled classes.

4.2.3 Thickness

Thickness shall be determined in accordance with EN 823. No test result shall deviate from the nominal values by more than the tolerances given in Table 1, for the labelled classes.

4.2.4 Squareness

Squareness shall be determined in accordance with EN 824. Angles at all corners of the board shall be measured. The deviation from squareness on length and width shall not exceed the tolerances given in Table 1, for the labelled classes.

4.2.5 Flatness

Flatness shall be determined in accordance with EN 825. The maximum deviation from flatness shall not exceed the tolerances given in Table 1 for the labelled classes.

4.2.6 Dimensional stability under normal laboratory conditions

Dimensional stability under normal laboratory conditions shall be determined in accordance with EN 1603. The relative changes in length and width shall not exceed the values given in Table 1 for the labelled class.

Table 1: Dimensional tolerances

Property	Class	Tolerances	
		Boards	Rolls
Length	A1	$\pm 0,6 \% \text{ or } \pm 3 \text{ mm}^1)$	-1 %
	A2	$\pm 2 \text{ mm}^2)$	+ unrestricted
Width	A1	$\pm 0,6 \% \text{ or } \pm 3 \text{ mm}^1)$	$\pm 0,6 \% \text{ or } \pm 3 \text{ mm}^1)$
	A2	$\pm 2 \text{ mm}^2)$	
Thickness ³⁾	D1	$\pm 2 \text{ mm}$	
	D2	$\pm 1 \text{ mm}^2)$	
Squareness	E1	$\pm 5 \text{ mm} / 1\ 000 \text{ mm}$	
	E2	$\pm 2 \text{ mm} / 1\ 000 \text{ mm}^2)$	
Flatness	G0	no requirement	
	G1	$\pm 1,5 \%$	
	G2	$\pm 1,0 \%$	
	G3	$\pm 0,5 \%$	
Dimensional stability	H1	$\pm 0,5 \%$	
	H2	$\pm 0,2 \%^2)$	

¹⁾ Whichever gives the greatest numerical tolerance.
²⁾ These values are specified only for external thermal insulation composite systems or other applications requiring specific tolerances.
³⁾ Except d_L , d_F and d_B which are given in 4.3.10.

4.2.7 Handling

Handling is assessed by bending strength and compressive stress at 10 % deformation.

4.2.7.1 Bending strength

Bending strength shall be determined in accordance with prEN 12089. No test result shall be less than the value given in Table 2 for the labelled level.

Table 2: Levels of bending strength

Level	Requirement kPa
B1	≥ 50
B2	≥ 75
B3	≥ 100
B4	≥ 125
B5	≥ 150
B6	≥ 200
B7	≥ 275
B8	≥ 375
B9	≥ 475
B10	≥ 625

4.2.7.2 Compressive stress at 10% deformation

Compressive stress at 10 % deformation shall be determined in accordance with EN 826. No test result shall be less than the value given in Table 3 for the labelled level.

NOTE: The compressive stress at 10 % deformation is not a design value. For the compressive stress required by the application see annex C.

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