NORMA EUROPEA

Isolanti termici per edilizia
Prodotti di resine fenoliche espanse (PF) ottenuti in fabbrica
Specificazione

UNI EN 13166

MARZO 2009

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

La norma specifica i requisiti per i prodotti di resine fenoliche espanse ottenuti in fabbrica, con o senza rivestimenti, che sono utilizzati per l'isolamento termico degli edifici.
La norma descrive le caratteristiche del prodotto e include procedimenti di prova, valutazione di conformità, marcatura ed etichettatura.
La norma non tratta i prodotti con una resistenza termica dichiarata minore di 0,40 $m^2 \times K/W$ o una conduttività termica dichiarata maggiore di 0,050 $W/(m \times K)$ a 10 °C.

TESTO INGLESE

La presente norma è la versione ufficiale in lingua inglese della norma europea EN 13166 (edizione novembre 2008).

La presente norma è la revisione della UNI EN 13166:2006.

ICS 91.100.60

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La presente norma costituisce il recepimento, in lingua inglese, della norma europea EN 13166 (edizione novembre 2008), che assume così lo status di norma nazionale italiana.

La presente norma è stata elaborata sotto la competenza dell'ente federato all'UNI

CTI - Comitato Termotecnico Italiano

Rispetto all'edizione precedente è stato aggiunto il punto 4.2.9 Caratteristiche di durabilità ed è stata rivista l'appendice ZA in relazione ai sistemi di attestazione di conformità.

La presente norma è stata ratificata dal Presidente dell'UNI ed è entrata a far parte del corpo normativo nazionale il 5 marzo 2009.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13166

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.

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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*

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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.

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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 $m^2 \cdot K/W$ 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.

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*

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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.

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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	–

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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_o	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

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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 **P**henolic **F**oam

ITT **I**nitial **T**ype **T**est

RtF **R**eaction to **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 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, $\lambda_{90/90}$;

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— 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 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

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.

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4.2.5 Flatness

Flatness shall be determined in accordance with EN 825. The deviation from flatness, S_{max}, shall not exceed the tolerances given in Table 3 for the corresponding nominal thickness, d_N.

Table 3 — Tolerances for deviation from flatness

Dimensions in millimetres

Nominal thickness	Tolerance
< 50	≤ 10,0
50 to 100	≤ 7,5
> 100	≤ 5,0

4.2.6 Dimensional stability

4.2.6.1 Dimensional stability under constant normal laboratory conditions

Dimensional stability under constant normal laboratory conditions (23 °C/50 % relative humidity) shall be determined in accordance with EN 1603. The relative changes in length, $\Delta\varepsilon_l$, and width, $\Delta\varepsilon_b$, shall not exceed ± 0,5 %. The overall change in flatness, Δ_S, shall not exceed the values given in Table 3 for the corresponding nominal thickness, d_N.

4.2.6.2 Dimensional stability under specified temperature and humidity conditions

Dimensional stability under specified temperature and humidity conditions shall be determined in accordance with EN 1604. The test shall be carried out after storage for 48 h at (23 ± 2) °C and (90 ± 5) % relative humidity. The relative changes in length, $\Delta\varepsilon_l$, and width, $\Delta\varepsilon_b$, shall not exceed ± 0,5 %. The relative change in thickness, $\Delta\varepsilon_d$, shall not exceed ± 1,5 %.

This test shall not be performed when the more severe test, described in 4.3.2.2 is carried out.

4.2.7 Bending behaviour

The bending strength, σ_b, shall be determined in accordance with EN 12089. For handling purposes, products shall have a bending strength greater than 200 kPa.

4.2.8 Reaction to fire

Reaction to fire classification (Euroclasses) shall be determined in accordance with EN 13501-1.

4.2.9 Durability characteristics

4.2.9.1 General

The appropriate durability characteristics have been considered and are covered in 4.2.9.2, 4.2.9.3 and 4.2.9.4.

4.2.9.2 Durability of reaction to fire against ageing/degradation

The reaction to fire performance of factory made products of phenolic foam does not change with time.

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4.2.9.3 Durability of thermal resistance and thermal conductivity against ageing/degradation

The thermal conductivity of factory made products of phenolic foam can change with time. This is covered by 4.2.1 and Annex C Thermal conductivity, 4.2.2 Length and width and 4.2.6 Dimensional stability or 4.3.2 Dimensional stability and 4.3.10 Closed cell content.

4.2.9.4 Durability of compressive strength against ageing/degradation

The durability of compressive strength is covered by 4.3.6 Compressive creep.

4.3 For specific applications

4.3.1 General

If there is no requirement for a property described in 4.3 for a product in use, then the property does not need to be determined and declared by the manufacturer.

4.3.2 Dimensional stability under specified conditions

4.3.2.1 Dimensional stability at specified temperature

Dimensional stability at specified temperature shall be determined in accordance with EN 1604. The test shall be carried out after storage for 48 h at (70 ± 2) °C. The relative changes in length, $\Delta\varepsilon_l$, and width, $\Delta\varepsilon_b$, shall not exceed ± 1,5 %. The relative changes in thickness, $\Delta\varepsilon_d$ shall not exceed ± 3 %.

4.3.2.2 Dimensional stability under specified temperature and humidity conditions

Dimensional stability under specified temperature and humidity conditions shall be determined in accordance with EN 1604. The test shall be carried out after storage for 48 h at (70 ± 2) °C and (90 ± 5) % relative humidity. The relative change in length, $\Delta\varepsilon_l$, width, $\Delta\varepsilon_b$, and thickness, $\Delta\varepsilon_d$ shall not exceed ± 1,5 %.

4.3.2.3 Dimensional stability at – 20 °C

Dimensional stability at – 20 ºC shall be determined in accordance with EN 1604. The test shall be carried out after storage for 48 h at (– 20 ± 2) °C. The relative change in length, $\Delta\varepsilon_l$, width, $\Delta\varepsilon_b$ and thickness, $\Delta\varepsilon_d$, shall not exceed ± 1,5 %.

4.3.3 Compressive strength

Compressive strength, σ_m, shall be determined in accordance with EN 826. No test result for compressive strength, σ_m, shall be less than the value given in Table 4 for the declared level.

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Table 4 — Levels for compressive strength

Level	Requirement kPa
CS(Y) 50	≥ 50
CS(Y) 100	≥ 100
CS(Y) 120	≥ 120
CS(Y) 150	≥ 150
CS(Y) 175	≥ 175
CS(Y) 200	≥ 200
CS(Y) 300	≥ 300
CS(Y) 400	≥ 400

4.3.4 Tensile strength perpendicular to faces

Tensile strength perpendicular to faces, σ_{mt}, shall be determined in accordance with EN 1607. The value of tensile strength perpendicular to faces shall be declared in levels, TR, with steps of 20 kPa. No test result shall be less than the declared level.

4.3.5 Point load

The effects of foot traffic shall be assessed by means of the determination of compressive strength in accordance with EN 826 (see 4.3.3).

4.3.6 Compressive creep

Compressive creep, ε_{ct}, and total thickness reduction, ε_t, shall be determined after at least one hundred and twenty two days of testing at a declared compressive stress, σ_c, given in steps of at least 1 kPa and the results extrapolated thirty times to obtain the declared levels in accordance with EN 1606. Compressive creep shall be declared in levels, i_2, and the total thickness reduction shall be declared in levels, i_1, with steps of 1 % at the declared stress. No test result shall exceed the declared levels at the declared stress.

NOTE 1 Examples for declaration of levels for compressive creep.

Level	Test time days	Extrapolation time years	Declared stress kPa	Requirement %
$CC(i_1/i_2\%/10)\sigma_c$	122	10	σ_c	$i_1/i_2 \leq i$
$CC(i_1/i_2\ \%/25)\sigma_c$	304	25	σ_c	$i_1/i_2 \leq i$
$CC(i_1/i_2\ \%/50)\sigma_c$	608	50	σ_c	$i_1/i_2 \leq i$

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NOTE 2 Referring to the designation code CC ($i_1/i_2/y$) σ_c, according to Clause 6, a declared level CC (3/2/10)50, as for example, indicates a value not exceeding 2 % for compressive creep and 3 % for total thickness reduction after extrapolation at 10 years (i.e. 30 times one hundred twenty two days of testing) under a declared stress of 50 kPa.

4.3.7 Water absorption

4.3.7.1 Short term water absorption

Short term water absorption by partial immersion, W_p, shall be determined in accordance with EN 1609. No test result shall exceed the value given in Table 5 for the declared level.

Table 5 — Levels for short term water absorption by partial immersion

Level	Requirement kg/m^2
WS 1	≤ 1,25
WS 2	≤ 1,00
WS 3	≤ 0,75
WS 4	≤ 0,50
WS 5	≤ 0,25

4.3.7.2 Long term water absorption by partial immersion

Long term water absorption by partial immersion, W_{lp}, shall be determined in accordance with EN 12087. No test result shall exceed the value given in Table 6 for the declared level.

Table 6 — Levels for long term water absorption by partial immersion

Level	Requirement kg/m^2
WL (P) 1	≤ 3,00
WL (P) 2	≤ 2,00
WL (P) 3	≤ 1,50
WL (P) 4	≤ 1,00
WL (P) 5	≤ 0,50

4.3.8 Water vapour transmission

Water vapour transmission properties shall be determined in accordance with EN 12086 and declared as the water vapour diffusion resistance factor, μ, for homogeneous products and the water vapour resistance, Z, for faced or non-homogeneous products. No test result of μ shall exceed the declared value and no test result of Z shall be less than the declared value.

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4.3.9 Apparent density

Apparent density, ρ_a, shall be determined in accordance with EN 1602. Test sample shall be conditioned in accordance with EN 12429. The manufacturer shall declare the measured value in kilograms per cubic metre.

4.3.10 Closed cell content

Closed cell content (corrected), ψ_o, shall be determined in accordance with EN ISO 4590. Surface facings or natural skins shall be removed. No test result shall be less than 90 %.

4.3.11 Release of dangerous substances

NOTE See Annex ZA.

4.3.12 Continuous glowing combustion

NOTE A test method is under development and the standard will be amended when this is available.

5 Test methods

5.1 Sampling

Test specimens shall be taken from the same sample with a total area sufficient to cover the needed tests. The shorter side of the sample shall not be less than 300 mm or full size of the product whichever is smaller.

5.2 Conditioning

No special conditioning of the test specimens is needed unless otherwise specified in the test standard except for the determination of initial thermal conductivity and apparent density. For the determination of initial thermal conductivity and apparent density the test specimens shall be conditioned in accordance with EN 12429 at (70 ± 2) °C, and then at (23 ± 2) °C and (50 ± 5) % relative humidity prior to testing.

5.3 Testing

5.3.1 General

Table 7 gives the dimensions of the test specimens, the minimum number of test specimens required to get one test result and any specific conditions which are necessary.

5.3.2 Thermal resistance and thermal conductivity

Thermal resistance and thermal conductivity shall be measured in accordance with EN 12667 or EN 12939 for thick products under the following conditions:

— at a mean temperature of (10 ± 0,3) °C;

— after conditioning in accordance with 5.2.

NOTE Thermal resistance and thermal conductivity may also be measured at mean temperatures other than 10 °C, providing that the accuracy of the relationship between temperature and thermal properties is well documented.

Thermal resistance and thermal conductivity shall be determined directly at measured thickness. In the event that this is not possible, they shall be determined by measurements on other thicknesses of the product providing that:

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— the product is of similar chemical and physical characteristics and is produced on the same production unit; and

— it can be demonstrated in accordance with EN 12939 that the thermal conductivity does not vary by more than 2 % over the range of thicknesses where the calculation is applied.

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Table 7 — Test methods, specimens and conditions

Dimensions in millimetres

Clause		Test Method	Test specimen length and width[a]	Minimum number of measurements to get one test result	Specific conditions
No	Title				
4.2.1	Thermal resistance and thermal conductivity	EN 12667 or EN 12939	See EN 12667 or EN 12939	1	–
4.2.2	Length and width	EN 822	Full size	1	–
4.2.3	Thickness	EN 823	Full size	1	Method B.3
4.2.4	Squareness	EN 824	Full size	1	–
4.2.5	Flatness	EN 825	Full size	1	–
4.2.6	Dimensional stability under constant normal laboratory conditions	EN 1603	Full size	1	–
	Dimensional stability under specified temperature and humidity conditions	EN 1604	200 × 200	3	–
4.2.7	Bending behaviour	EN 12089	See 6.1.2 in EN 12089:1997	3	Method B
4.2.8	Reaction to fire	See EN 13501-1			–
4.3.2	Dimensional stability at specified temperature	EN 1604	200 × 200	3	–
	Dimensional stability under specified temperature and humidity conditions	EN 1604	200 × 200	3	–
	Dimensional stability at – 20 °C	EN 1604	200 × 200	3	–
4.3.3	Compressive strength	EN 826	50 × 50	5	≤ 50 mm thick
			100 × 100	5	> 50 mm thick
4.3.4	Tensile strength perpendicular to faces	EN 1607	50 × 50	3	–
4.3.5	Point load	See 4.3.3	–	-	–
4.3.6	Compressive creep	EN 1606	50 × 50	3	≤ 50 mm thick
			100 × 100	3	> 50 mm thick
4.3.7	Short term water absorption	EN 1609	200 × 200	3	Method A
	Long term water absorption	EN 12087	200 × 200	3	Method 1A
4.3.8	Water vapour transmission	EN 12086	See 6.1 in EN 12086:1997	3	–
4.3.9	Apparent density	EN 1602	200 × 200	3	–
4.3.10	Closed cell content	EN ISO 4590	100 × 30 × 30	3	Method 2
4.3.11	Release of dangerous substances	b	–	–	–
4.3.12	Continuous glowing combustion	b	–	–	–

a Full-size product thickness except for 4.2.8 and 4.3.10.
b When drafting this standard, no European harmonized test method was available.

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6 Designation code

A designation code for the product shall be given by the manufacturer. The following shall be included except when there is no requirement for a property described in 4.3:

— The phenolic foam abbreviated term	PF
— This document number	EN 13166
— Thickness tolerance	Ti
— Dimensional stability at specified temperature	DS(T+)
— Dimensional stability under specified temperature and humidity conditions	DS(TH)
— Dimensional stability at – 20 °C	DS(T-)
— Compressive strength	CS(Y)i
— Tensile strength perpendicular to faces	TRi
— Compressive creep	$CC(i_1/i_2/y)\sigma_c$
— Short term water absorption	WSi
— Long term water absorption	WL(P)i
— Water vapour transmission	MU or Z
— Apparent density	AD
— Closed cell content	CV

where “i” shall be used to indicate the relevant class or level, “σ_c” shall be used to indicate the compressive stress and “y” to indicate the number of years.

The designation code for a product of phenolic foam is illustrated by the following example:

PF — EN 13166 — T2 — DS(T+) — DS(TH) — DS(T-) — CS(Y)150 — TR50 — WS 5 — WL(P) 4 — AD40 — CV

NOTE The characteristics determined in 4.2 are not included in the designation code if a limit value (threshold value) is given for the product.

7 Evaluation of conformity

The manufacturer or his authorised representative shall be responsible for the conformity of his product with the requirements of this European Standard. The evaluation of conformity shall be carried out in accordance with EN 13172 and shall be based on initial type testing (ITT), factory production control (FPC) by the manufacturer, including product assessment and tests on samples taken at the factory.

The compliance of the product with the requirements of this standard and with the stated values (including classes) shall be demonstrated by:

— initial type testing (ITT),

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— factory production control by the manufacturer, including product assessment.

If a manufacturer decides to group his products, it shall be done in accordance with EN 13172.

The minimum frequencies of tests in the factory production control shall be in accordance with Annex B of this standard. When indirect testing is used, the correlation to direct testing shall be established in accordance with EN 13172.

The manufacturer or his authorised representative shall make available, in response to a request, a certificate or declaration of conformity as appropriate.

All characteristics defined in 4.2 and those in 4.3 where required shall be subject to an initial type testing.

NOTE For the EC certificate and declaration of conformity, as appropriate, see ZA.2.2.

8 Marking and labelling

Products conforming to this standard shall be clearly marked, either on the product or on the label or on the packaging, with the following information:

— product name or other identifying characteristic;

— name or identifying mark and address of the manufacturer or his authorised representative;

— shift or time of production and manufacturing plant or traceability code;

— reaction to fire class;

— declared thermal resistance;

— declared thermal conductivity;

— nominal thickness;

— designation code as given in Clause 6;

— type of facing, if any;

— nominal length, nominal width;

— number of pieces and area in the package, as appropriate.

NOTE For CE marking and labelling, see ZA.3.

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Annex A
(normative)

Determination of the declared values of thermal resistance and thermal conductivity

A.1 General

It is the responsibility of the manufacturer to determine the declared values of thermal resistance and thermal conductivity. He will have to demonstrate conformity of the product to its declared values. The declared values of thermal resistance and thermal conductivity of a product are the expected values of these properties during an economically reasonable working life under normal conditions, assessed through measured data at reference conditions.

A.2 Input data

The manufacturer shall have at least ten test results for thermal resistance or thermal conductivity, obtained from internal or external direct measurements in order to calculate the declared values. The direct thermal resistance or thermal conductivity measurements shall be carried out at regular intervals spread over a period of the last twelve months. If less than ten test results are available, the time period may be extended until ten test results are obtained, but with a maximum period of three years, within which the product and production conditions have not changed significantly.

For new products the ten thermal resistance or thermal conductivity test results shall be carried out spread over a minimum period of ten days.

The declared values shall be calculated according to the method given in A.3 and shall be recalculated at intervals not exceeding three months of production.

A.3 Declared values

A.3.1 General

The derivation of the declared values R_D and λ_D from the calculated values $R_{90/90}$ and $\lambda_{90/90}$ shall use the rules given in 4.2.1 which include the rounding conditions.

A.3.2 Case where thermal resistance and thermal conductivity are declared

The declared values R_D and λ_D shall be derived from the calculated values $R_{90/90}$ and $\lambda_{90/90}$ which are determined using Equations A.1, A.2 and A.3.

$$\lambda_{90/90} = \lambda_{mean} + k \times s_\lambda \tag{A.1}$$

$$s_\lambda = \sqrt{\frac{\sum_{i=1}^{n}(\lambda_i - \lambda_{mean})^2}{n-1}} \tag{A.2}$$

$$R_{90/90} = d_N/\lambda_{90/90} \tag{A.3}$$

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A.3.3 Case where only thermal resistance is declared

The declared value R_D,shall be derived from the calculated value $R_{90/90}$ which is determined using Equations A.4 and A.5.

$$R_{90/90} = R_{mean} + k \times s_R \tag{A.4}$$

$$s_R = \sqrt{\frac{\sum_{i=1}^{n} (R_i - R_{mean})^2}{n-1}} \tag{A.5}$$

Table A.1 — Values for k for one side 90 % tolerance interval with a confidence level of 90 %

Number of test results	k
10	2,07
11	2,01
12	1,97
13	1,93
14	1,90
15	1,87
16	1,84
17	1,82
18	1,80
19	1,78
20	1,77
22	1,74
24	1,71
25	1,70
30	1,66
35	1,62
40	1,60
45	1,58
50	1,56
100	1,47
300	1,39
500	1,36
2 000	1,32
For other numbers of test results use ISO 12491 or linear interpolation.	

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Annex B
(normative)

Factory production control

Table B.1 — Minimum product testing frequencies

Clause		Minimum testing frequency[a]
No	Title	
4.2.1	Thermal resistance and thermal conductivity	1 per 2 years (aged value) 1 per 24 h (initial value)
4.2.2	Length and width[b]	1 per 4 h
4.2.3	Thickness[b]	1 per 4 h
4.2.4	Squareness[b]	1 per 4 h
4.2.5	Flatness[b]	1 per 4 h
4.2.6	Dimensional stability under constant normal laboratory conditions	ITT[c]
	Dimensional stability under specified temperature and humidity conditions	ITT[c]
4.2.7	Bending behaviour	ITT[c]
4.2.8	Reaction to fire	See Table B.2
4.3.2	Dimensional stability at specified temperature	1 per 24 h
	Dimensional stability under specified temperature and humidity conditions	ITT[c]
	Dimensional stability at – 20 °C	ITT[c]
4.3.3	Compressive strength	1 per 24 h
4.3.4	Tensile strength perpendicular to faces	ITT[c]
4.3.5	Point load	See 4.3.3
4.3.6	Compressive creep	ITT[c]
4.3.7	Short term water absorption	1 per year
	Long term water absorption	1 per year
4.3.8	Water vapour transmission	1 per year
4.3.9	Apparent density	1 per 24 h
4.3.10	Closed cell content	1 per 180 days
4.3.11	Release of dangerous substances	[d]

[a] The minimum testing frequencies, expressed in test results, shall be understood as the minimum for each production unit/line under stable conditions. In addition to the testing frequencies given above, testing of relevant properties of the product shall be repeated when changes or modifications are made that are likely to affect the conformity of the product. For mechanical properties, the testing frequencies given are independent of the change of product. In addition the manufacturer shall establish internal rules for process adjustments related to these properties when changing the product.

[b] To be tested on final product.

[c] ITT, see EN 13172.

[d] Frequencies are not given. When drafting this standard, no European harmonized test method was available.

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Table B.2 — Minimum product testing frequencies for the reaction to fire characteristics

Clause	Minimum testing frequency[a]								
No	Title	Direct testing[b]		Indirect testing[c]					
	Reaction to fire			Product		Components[d, e]			
						Substantial		Non-substantial	
4.2.8	class	Test Method	Frequency	Test Method	Frequency	Test Method	Frequency	Test Method	Frequency
	A1 without testing[f]	EN 13820	1 per 3 months[g] or 1 per 2 years and indirect testing	–	–	–	–	–	–
				–	–	–	–	–	–
	A1	EN ISO 1182 and EN ISO 1716 (and EN 13823)	1 per 2 years and indirect testing	–	–	–	–	–	–
						–	–	–	–
	A2	EN ISO 1182 or EN ISO 1716 and EN 13823	1 per 2 years and indirect testing	–	–	–	–	–	–
						–	–	–	–
	B C D	EN 13823 and EN ISO 11925-2	1 per month or 1 per 2 years and indirect testing[h]	–	–	–	–	–	–
				Manufacturer's method	1 per day	Manufacturer's method	1 per day	–	–
			1 per week or 1 per 2 years and indirect testing	–	–	–	–	–	–
				Manufacturer's method	1 per day	–	–	–	–

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Table B.2 *(continued)*

Clause		Minimum testing frequency[a]							
No	Title	Direct testing[b]		Indirect testing[c]					
	Reaction to fire			Product		Components[d, e]			
						Substantial		Non-substantial	
4.2.8	class	Test Method	Frequency	Test Method	Frequency	Test Method	Frequency	Test Method	Frequency
	E	EN ISO 11925-2	1 per week or 1 per 2 years and indirect testing	–	–	–	–	–	–
				Manufacturer's method	1 per day	–	–	–	–
	F	–	–	–	–	–	–	–	–

NOTE Not all Euroclasses may apply for the products conforming to this standard.

a The minimum testing frequencies, expressed in test results, shall be understood as the minimum for a product or product group for each production unit/line under stable conditions. In addition to the testing frequencies given above, testing of relevant properties of the product shall be repeated when changes or modifications are made that are likely to affect the conformity of the product.

b Direct testing may be conducted either by third party or by the manufacturer.

c Indirect testing may be either on the product or on its components.

d Definition as given in the Euroclasses Decision 2000/147/EC:

– Substantial component: a material that constitutes a significant part of a non-homogeneous product. A layer with a mass per unit area ≥ 1,0 kg/m^2 or a thickness ≥ 1,0 mm is considered to be a substantial component.

– Non-substantial component: a material that does not constitute a significant part of a non-homogeneous product. A layer with a mass per unit area < 1,0 kg/m^2 and a thickness < 1,0 mm is considered to be a non-substantial component.

e In case of certified component, the frequency is once per delivery of the component.

f European Decision 96/603EC: Materials to be considered as reaction to fire class A provided for in Decision 94/611/EC without the need for testing (of reaction to fire characteristics).

g Only for unfaced products.

h Indirect testing is only possible in the case of products falling within the system 1 for attestation of conformity of reaction to fire, or by having a notified body verifying the correlation to the direct testing.

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Annex C
(normative)

Determination of the aged values of thermal resistance and thermal conductivity

C.1 General

This Annex covers products of phenolic foam, with or without facings, up to a thickness of 200 mm.

This Annex provides two methods for the determination of the aged values of thermal resistance and thermal conductivity. The methods predict the time averaged value over 25 years.

The ageing methods are valid for products of phenolic foam produced by using high molecular weight blowing agents which substantially remain in the products for time periods well in excess of those required for a “reasonable economic life” as given in the CPD.

Method 1 (slicing) is suitable for all homogeneous products with a closed cell content > 10 %. A product is considered to be homogeneous when the density variation between the slices obtained from the test sample is ≤ 10 %.

Method 2 (heat ageing) is suitable for all products, with or without facings, expanded with hydrofluorocarbons (e.g. 365mfc, 227ea), iso-propyl chloride, mixtures of pentane and iso-propyl chloride (LBL2) and mixtures of pentanes with the following characteristics:

— closed cell content ≥ 90 % as determined in accordance with 4.3.10;

— an apparent density of ≥ 30 $kg.m^{-3}$ (as determined in accordance with 4.3.9) for products expanded with LBL2 and LBL2/pentane mixtures;

— an apparent density of ≥ 35 $kg.m^{-3}$ (as determined in accordance with 4.3.9) for all other products;

— an apparent density of ≥ 35 kg/m^3 as determined in accordance with 4.3.9;

— a compressive strength ≥ 100 kPa as determined in accordance with 4.3.3;

— a cell gas shall be identified in accordance with D.3.

NOTE If a manufacturer uses accelerated ageing on a product of apparent density lower than that specified, the manufacturer must show that the acceleration factor at 70 °C and/or 110 °C is similar to that for higher density products.

This Annex does not cover products with a closed cell content ≤ 10 %. The thermal conductivity of these products shall be determined in accordance with 5.3.2.

C.2 Preparation of test sample

C.2.1 Sampling

The test sample shall be taken from the full size product not less than 7 days and not more than 50 days after manufacture.

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C.2.2 Dimensions

Select a test sample such that the area dimensions shall not be less than those specified in Table A1 of EN 12677:2001 which correspond to the product thickness or equal to the maximum product thickness. The maximum size of test sample shall be 800 mm × 600 mm.

C.2.3 Conditioning

For Method 1 (slicing) and Method 2 (heat ageing) at 70° (C.4.2.2.1.1) the test samples shall be conditioned in accordance with EN 12429 at (70 ± 2) °C and then at (23 ± 2) °C and (50 ± 5) % relative humidity. For Method 2 at 110 °C (C.4.2.2.1.2) the test sample shall be dried at (70 ± 2) °C for seven days prior to ageing. For unfaced products, the maximum conditioning at (70 ± 2) °C shall not exceed 14 days.

C.3 Determination of the initial value of thermal conductivity

The initial value of the thermal conductivity of the test sample shall be derived from the measurement of the thermal resistance:

— prepare the test sample for thermal resistance measurement in accordance with C.2;

— measure the thermal resistance of the test sample in accordance with 5.3.2;

— report the initial value of thermal conductivity to the nearest 0,0001 W/(m·K).

C.4 Determination of the aged value of thermal conductivity

C.4.1 Method 1 (Slicing)

C.4.1.1 Preparation of the test specimens (slices)

Mark the edges of the test sample to ensure correct realignment of the stack of the test specimens (slices) after cutting.

Cut the test sample into test specimens (slices) of (10 ± 1) mm thick. A remaining slice less than 9 mm thick shall be discarded.

NOTE The cutting technique should not significantly damage the surfaces of the test specimens (slices). The cutting device can be a band-saw where the speed and teeth have been optimised.

C.4.1.2 Determination of the initial thermal conductivity of the test specimens (slices)

Reassemble the test specimens (slices), correctly aligned, into a stack within 3 h of cutting and determine the initial value of the thermal conductivity which shall be derived from the measurement of the thermal resistance. Testing to commence within 8 h of cutting:

— measure the thermal resistance of the test specimen in accordance with 5.3.2;

— report the initial value of the thermal conductivity of the test specimens (slices) to the nearest 0,0001 W/(m·K).

C.4.1.3 Ageing conditions

Age the individual test specimens (slices) at (23 ± 2) °C and (50 ± 5) % relative humidity for a time period corresponding to the thickness given in Table C.1.

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Table C.1 — Test times for product thicknesses

Thickness mm	**Test time** days
20 to 70	90 ± 2
> 70 to 120	50^{+2}_{-1}
> 120	30^{+2}_{0}

C.4.1.4 Determination of the aged value of thermal conductivity

The test specimens (slices), after ageing as in C.4.1.3, shall be reassembled, correctly aligned, and the aged value of thermal conductivity measured:

— measure the thermal resistance of the aged test specimens (slices) in accordance with 5.3.2;

— report the uncorrected aged value of thermal conductivity of the test specimens (slices) to the nearest 0,0001 W/(m·K).

C.4.1.5 Correction for damaged surface layers

Cutting the test sample into test specimens (slices) will increase the open cell content on the surface of the test material. This reduces the ‘effective’ thickness of the test specimens (slices). To correct for this reduction in ‘effective’ thickness, deduct the initial value of thermal conductivity of the test sample as determined in C.3 from the initial value of thermal conductivity of the test specimens (slices) as determined in C.4.1.2.

The correction for damaged surface cells shall not exceed 0,001 W/(m·K).

C.4.1.6 Reporting the aged value of thermal conductivity

The accelerated aged value of thermal conductivity shall be reported as the value of thermal conductivity obtained on the reassembled conditioned stack of the test specimens (slices), C.4.1.4, less the correction for damaged surface layer, C.4.1.5. Report the corrected aged value of thermal conductivity of the test specimens (slices) to the nearest 0,0001 W/(m·K).

C.4.2 Method 2 (Heat Ageing)

C.4.2.1 Test sample

The test sample shall include any facings, skins, etc. and shall be tested at product thickness after preparation in accordance with C.2.

C.4.2.2 Ageing conditions

C.4.2.2.1 Heat aging of the product may be at either 70 °C or 110 °C

C.4.2.2.1.1 Ageing at 70 °C

The test sample shall be aged for (175 ± 5) days at (70 ± 2) °C and then conditioned at (23 ± 2) °C and (50 ± 5) % relative humidity to constant weight as defined in EN 12429.

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C.4.2.2.1.2 Ageing at 110 °C

The test sample shall be aged for (14 ± 1) days at (110 ± 2) °C and then conditioned at (23 ± 2) °C and (50 ± 5) % relative humidity to constant weight as defined in EN 12429.

C.4.2.3 Determination of the aged value of thermal conductivity

The aged value of thermal conductivity of the test sample shall be derived from the measurement of thermal resistance:

- measure the thermal resistance of the test sample in accordance with 5.3.2;
- report the aged value to the nearest 0.0001 W/(m.K).

The accelerated aged value of the thermal conductivity shall be increased by the increments given in Table C.2 to obtain the time averaged value over 25 years.

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)

Products expanded with	LBL2/pentane mixtures	All other
Diffusion open facing or no facing	0,001	0,002
Diffusion closed facings	0,001	0,001

The diffusion tight property of the facing can also be proven, if the faced product (maximum size of the sample 800 mm × 600 mm and maximum thickness 50 mm) when tested under either of the test conditions permitted by C.4.2.2,does not show a lambda increase for the product greater than 0,001 W/(m·K).

NOTE Facings with oxygen diffusion levels less than 4,5 cm^3 per 24 h per 1 m^2 when measured in accordance with ASTM D3985-95 [2] at 20 °C can be considered diffusion tight.

C.5 Blowing agent

The manufacturer, in response to a request, shall declare the blowing agent used in the product.

NOTE The blowing agent can be identified by testing in accordance with D.3.

C.6 Declaration of thermal resistance and thermal conductivity

C.6.1 General

The statistical variation as required in Annex A for the declaration of thermal resistance and thermal conductivity shall be calculated using either the initial or the aged values of thermal conductivity.

The initial values shall be determined in accordance with C.3 and the aged values in accordance with C.4.1.6 or C.4.2.3.

C.6.2 Product grouping

The manufacturer shall declare either

— separate thermal values for each single product and each single thickness and then determine the $\lambda_{90/90}$ value on each thickness for each product, or

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— a thermal value for a product or product group including all or a range of thicknesses using the $\lambda_{90/90}$ value of the product or product group for the corresponding thickness range. Separate product groups shall be established for products without facing, diffusion open facing and diffusion tight facing.

The manufacturer shall decide whether to create groups and the size of the groups. The determined thermal values of thin, medium and thick products shall be included in the statistics of a product group which covers a complete or a thickness range.

A minimum of ten aged values shall be determined for each product group.

C.6.3 Initial values of thermal conductivity used to calculate the $R_{90/90}$ and $\lambda_{90/90}$ values

C.6.3.1 Method 1 (slicing)

$$\lambda_{90/90} = \lambda_{mean,i} + k_i \times s_{\lambda i} + \Delta\lambda_s \quad \text{(C.1)}$$

$$R_{90/90} = d_N/\lambda_D \quad \text{(C.2)}$$

C.6.3.2 Method 2 (heat ageing)

$$\lambda_{90/90} = \lambda_{mean,i} + k_i \times s_{\lambda i} + \Delta\lambda_a \quad \text{(C.3)}$$

$$R_{90/90} = d_N/\lambda_D \quad \text{(C.4)}$$

C.6.4 Aged values of thermal conductivity used to calculate the $R_{90/90}$ and $\lambda_{90/90}$ values

$$\lambda_{90/90} = \lambda_{mean,a} + k_a \times s_{\lambda a} \quad \text{(C.5)}$$

$$R_{90/90} = d_N/\lambda_D \quad \text{(C.6)}$$

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Annex D
(informative)

Additional properties

D.1 General

The manufacturer may choose to give information on the following additional properties (see Table D.1). This information, where appropriate for the product and the application, should be given as limit values for each test result obtained from the referenced test method, sampling and conditioning, as given in Table D.1.

D.2 Shear strength

Shear strength, τ, should be determined in accordance with EN 12090. If the shear strength is declared, no test result should be less than the declared value, SS.

D.3 Cell gas composition

Cell gas composition should be determined in accordance with gas chromatograph.

Table D.1 — Test methods, test specimens, conditions and minimum testing frequencies

Dimensions in millimetres

Clause		Test Method	Test specimens length and width[a]	Minimum number of measurements to get one test result	Specific conditions	Factory production control
No	Title					Minimum product testing frequency[b]
D.2	Shear strength	EN 12090	250 × 50	2		ITT[c]
D.3	Cell gas composition	Gas chromatograph[d]				ITT[c]

[a] Full size product thickness.

[b] Only relevant in case of declaration of the property.

[c] ITT, see EN 13172.

[d] Literature reference – S. Lohmeyer, G. Müller [1]

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Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/103[1] "Thermal insulation products" given to CEN by the European Commission and the European Free Trade Association.

The clauses of this document, shown in the Table below, meet the requirements of the Mandate M/103 given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the factory made products of phenolic foam covered by this annex for the intended uses indicated herein; reference shall be made to the information accompanying the CE marking.

WARNING — Other requirements and other EU Directives, not affecting the fitness for intended uses, can be applicable to the factory made products of phenolic foam falling within the scope of this European Standard.

NOTE 1 In addition to any specific clauses relating to dangerous substances contained in this standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

NOTE 2 An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through http://ec.europa.eu./enterprise/construction/internal/dangsub/dangmain_en.htm).

This Annex establishes the conditions for the CE marking of the construction products intended for the uses indicated in Table ZA.1 and shows the relevant clauses applicable:

This Annex has the same scope as Clause 1 of this standard and is defined by Table ZA.1.

[1] As amended by mandates M126, M130 and M367.

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Table ZA.1 — Relevant clauses for factory made products of phenolic foam and intended use

Construction Products:	**Factory made products of phenolic foam (PF) as covered by the scope of this standard**
Intended uses:	**Thermal insulation for buildings**

Requirement/Characteristic from the mandate	**Requirement clauses in this document**		**Levels and/or classes**	**Notes[a]**
Reaction to fire, Euroclass characteristics	4.2.8	Reaction to fire	Euroclasses	-
Water permeability	4.3.7	Water absorption	–	Levels
	4.3.10	Closed cell content	–	Limit value
Release of dangerous substances to the indoor environment	4.3.11	Release of dangerous substances	-	-
Continuous Glowing combustion	4.3.12	Continuous Glowing combustion	-	-
Thermal resistance	4.2.1	Thermal resistance – thermal conductivity	–	Levels of λ
	4.2.3	Thickness	–	Classes
	4.3.10	Closed cell content	–	Limit value
Water vapour permeability	4.3.8	Water vapour transmission	–	Limit values
	4.3.10	Closed cell content	–	Limit value
Compressive strength	4.3.3	Compressive strength	-	Levels
Tensile/Flexural strength	4.2.7	Bending strength[b]	–	Limit value
	4.3.4	Tensile strength perpendicular to faces	–	Levels
Durability of reaction to fire against heat, weathering, ageing/degradation	4.2.9	Durability characteristics[c]	–	–
Durability of thermal resistance against heat, weathering, ageing/degradation	4.2.1	Thermal resistance — thermal conductivity	–	Levels
	4.2.6.2	Dimensional stability	–	Level[d]
	4.2.9	Durability characteristics	–	Classes
	4.3.2.1	Dimensional stability at specified temperature	–	Level[d]
	4.3.2.2	Dimensional stability under specified temperature and humidity conditions	–	Level[d]
	4.3.2.3	Dimensional stability at - 20 °C	–	Level[d]
	4.3.10	Closed cell content	–	Limit value
Durability of compressive strength against ageing/degradation	4.3.6	Compressive creep	–	Levels

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a	The requirement on a certain characteristic is not applicable in those Member States (MSs) where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these MSs are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option “No performance determined” (NPD) in the information accompanying the CE marking (see ZA.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level (thermal resistance (thermal conductivity and thickness)).
b	This characteristic covers handling and installation.
c	No change in reaction to fire properties for products of phenolic foam.
d	For thickness only.

ZA.2 Procedures for attestation of conformity of factory made products of phenolic foam

ZA.2.1 Systems of attestation of conformity

For products having more than one of the intended uses specified in the following families, the tasks for the approved body, derived from the relevant systems of attestation of conformity, are cumulative.

The system of attestation of conformity for the factory made products of phenolic foam indicated in Table ZA.1 in accordance with the Decision of the European Commission 95/204/EC of 31.04.95 revised by decision 99/91/EC of 25.01.99 amended by the decision 01/596/EC of 8th January and as given in Annex III of the mandate M103 as amended by mandates M126, M130 and M367 is shown in Table ZA.2 for the indicated intended use(s).

Table ZA.2 — Systems of attestation of conformity

Product(s)	Intended use(s)	Level(s) or class(es) (reaction to fire)	Attestation of conformity system(s)
Thermal insulation products (Factory made products)	For uses subject to regulations on reaction to fire	(A1, A2, B, C)[a]	1
		(A1, A2, B, C)[b], D, E	3
		(A1 to E)[c], F	3 (with 4 for RtF)
	Any	—	3
System 1: See CPD Annex III.2.(i), without audit-testing of samples System 3: See CPD Annex III.2.(ii), Second possibility System 4: See CPD Annex III.2.(ii), Third possibility			

a	Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material).
b	Products/materials not covered by footnote ([a]).
c	Products/materials that do not require to be tested for reaction to fire (e.g. Products/materials of classes A1 according to Commission Decision 96/603/EC, as amended).

The system of attestation of conformity for the CE marking of the product is defined in accordance with Annex ZA (see ZA.2.1). For products of phenolic foam the footnote [a] of Table ZA.2 applies except when it can be demonstrated to the notified body for a particular product that no stage in the production process will result in an improvement of the reaction to fire classification (see Table ZA.2, footnote [b]).

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The attestation of conformity of the factory made products of phenolic foam in Table ZA.1 shall be based on the evaluation of conformity procedures indicated in Tables ZA.3 to ZA.4 resulting from application of the clauses of this or other European Standard indicated therein.

Where more than one Table applies for the product (i.e. because its intended use makes different characteristics relevant), Table ZA.3 has to be read in conjunction with subsequent tables in order to determine which characteristics assigned to the manufacturer in Table ZA.3 are type tested by a notified test lab (system 3) and which by the manufacturer (system 4).

Table ZA.3 — Assignment of evaluation of conformity tasks for products under system 1

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to all relevant characteristics of Table ZA.1	Clauses 1 to 5, Annexes B and C of EN 13172:2008 Clause 7 of this standard
	Further testing of samples taken at factory	All relevant characteristics of Table ZA.1	Annex B of this standard
	Initial type testing by the manufacturer	Those relevant characteristics of Table ZA.1 not tested by the notified body	Clause 6 of EN 13172:2008 Clause 7 of this standard
Tasks for the product certification body	Initial type testing	— Reaction to fire — Thermal resistance — Release of dangerous substances[a] — Compressive strength — Water permeability	Clause 6 of EN 13172:2008 Clause 7 of this standard
	Initial inspection of factory and of FPC	Parameters related to all relevant characteristics of Table ZA.1, in particular reaction to fire.	Annex B and C of EN 13172:2008 Clause 7 of this standard
	Continuous surveillance, assessment and approval of FPC	Parameters related to all relevant characteristics of Table ZA.1, in particular reaction to fire	Annex B and C of EN 13172:2008 Clause 7 of this standard

[a] When drafting this standard, no European harmonized test method was available.

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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

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks under the responsibility of the manufacturer	Factory production control (FPC)	Parameters related to all characteristics of Table ZA.1 relevant for the intended use	Clause 7 of this standard and Clauses 1 to 5 of EN 13172:2008 and: For system 3 Annex C of EN 13172:2008. For system 3 (with 4 for RtF) Annex C and D of EN 13172:2008
	Initial type testing by the manufacturer	Those relevant characteristics of Table ZA.1 not tested by the notified test lab including reaction to fire for system 4	Clause 7 of this standard and Clause 6 of EN 13172:2008
	Initial type testing by a notified test laboratory	— Reaction to fire (system 3) — Thermal resistance — Release of dangerous substances[a] — Compressive strength (for load bearing applications) — Release of corrosive substances — Water permeability	Clause 7 of this standard and Clause 6 of EN 13172:2008

[a] When drafting this standard, no European harmonized test method was available.

ZA.2.2 EC certificate and declaration of conformity

(In case of products under system 1) When compliance with the conditions of this Annex is achieved, the certification body shall draw up a certificate of conformity (EC Certificate of conformity), which entitles the manufacturer to affix the CE marking. The certificate shall include:

— name, address and identification number of the certification body;

— name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;

NOTE 1 The manufacturer may also be the person responsible for placing the product onto the EEA market, if he takes responsibility for CE marking.

— description of the product (type, identification, use, etc.);

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— provisions to which the product conforms (e.g. Annex ZA of this EN);

— particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions, etc.);

— the number of the certificate;

— conditions of validity of the certificate, where applicable;

— name of, and position held by, the person empowered to sign the certificate.

In addition, the manufacturer shall draw up and retain a declaration of conformity (EC Declaration of conformity) including the following:

— name and address of the manufacturer, or his authorised representative established in the EEA;

— name and address of the certification body;

— description of the product (type, identification, use, etc.), and a copy of the information accompanying the CE marking;

NOTE 2 Where some of the information required for the Declaration is already given in the CE marking information, it does not need to be repeated.

— provisions to which the product conforms (e.g. Annex ZA of this EN);

— particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions, etc.);

— number of the accompanying EC Certificate of conformity;

— name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or of his authorised representative.

(In case of products under system 3 or (3 and 4)) When compliance with the conditions of this Annex is achieved, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of conformity (EC Declaration of conformity), which entitles the manufacturer to affix the CE marking. This declaration shall include:

— name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;

NOTE 3 The manufacturer may also be the person responsible for placing the product onto the EEA market, if he takes responsibility for CE marking.

— description of the product (type, identification, use, etc.), and a copy of the information accompanying the CE marking;

NOTE 4 Where some of the information required for the Declaration is already given in the CE marking information, it does not need to be repeated.

— provisions to which the product conforms (e.g. Annex ZA of this EN),

— particular conditions applicable to the use of the product, (e.g. provisions for use under certain conditions, etc);

— name and address of the notified laboratory(ies);

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— name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

The above mentioned declaration and certificate shall be presented in the language or languages accepted in the Member State in which the product is to be used.

The validity of the declaration/certificate shall be verified at least once a year.

ZA.3 CE Marking and labelling

The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking.

The CE marking symbol to affix shall be in accordance with Directive 93/68/EC and shall be shown on the product itself, or on the accompanying label or on the packaging. The following information shall accompany the CE marking symbol:

— identification number of the certification body (only for products under systems 1),

— name or identifying mark and registered address of the manufacturer (see Note 1 in ZA.2.2),

— the last two digits of the year in which the marking is affixed,

— number of the EC Certificate of conformity (if relevant),

— reference to this European Standard,

— description of the product: generic name, material, dimensions, etc. and intended use,

— information on those relevant essential characteristics listed in Table ZA.1 which are to be declared presented as:

  — standard designation(s) in combination with declared values as described in Clause 8,

  — “No performance determined” for characteristics where this is relevant.

The “No performance determined” (NPD) option may not be used where the characteristic is subject to a threshold level. Otherwise, the NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements in the Member State of destination.

Figure ZA.1 gives an example of the information to be given on the product, label, packaging and/or commercial documents.

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CE 01234	*CE conformity marking, consisting of the "CE"-symbol given in Directive 93/68/EEC.* *Identification number of the certification body (for products under system 1)*
Any Co Ltd, PO Box 21, B-1050 **08** 01234-CPD-00234	*Name or identifying mark and registered address of the producer* *Last two digits of the year in which the marking was affixed* *Certificate number (for products under system 1)*
EN 13166:2008 PF, intended to be used as thermal insulation product in buildings Reaction to fire – Class A1 Thermal resistance 2,5 $m^2 \cdot K/W$ Thermal conductivity 0,040 W/m·K Thickness 100 mm PF — EN 13166 — T2 — DS(T+) — DS(TH) — DS(T-) — CS(Y)150 — TR50 — WS 5 — WL(P) 4 — AD40 — CV	*No. of dated version of European Standard* *Description of product* *Information on regulated characteristics* Reaction to fire – Euroclass Declared thermal resistance Declared thermal conductivity Nominal thickness Designation code (in accordance with clause 6 of this standard for the relevant characteristics according to Table ZA.1)

Figure ZA.1 — Example CE marking information

In addition to any specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE 1 European legislation without national derogations need not be mentioned.

NOTE 2 Affixing the CE marking symbol means, if a product is subject to more than one directive, that it complies with all applicable directives.

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[2] ASTM D 3985-95, *Oxygen gas transmission rate through plastic film and sheeting using a coulometric sensor*

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