



SLOVENSKI STANDARD

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Toplotnoizolacijski proizvodi za stavbe - Proizvodi iz ekspanzirane plute (ICB) - Specifikacija

Thermal insulation products for buildings - Factory made products of expanded cork (ICB) - Specification

Wärmedämmstoffe für Gebäude - Werkmäßig hergestellte Produkte aus expandiertem Kork (ICB) - Spezifikation

Produits isolants thermiques pour le bâtiment - Produits manufacturés en liege expansé (ICB) - Spécification

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Thermal insulation products for buildings - Factory made products of expanded cork (ICB) - Specification

Produits isolants thermiques pour le bâtiment - Produits manufacturés en liège expansé (ICB) - Spécification

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This European Standard was approved by CEN on 16 April 2001.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by November 2001, and conflicting national standards shall be withdrawn at the latest by March 2003.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this standard.

This European Standard contains four annexes:

- Annex A (normative) – Determination of the declared values of thermal resistance and thermal conductivity;
- Annex B (normative) – Factory production control;
- Annex C (informative) – Examples for the determination of the declared values of thermal resistance and thermal conductivity for a product or a product group;
- Annex ZA (informative) – Clauses of this European Standard addressing the provisions of the EU Construction Products Directive.

This European Standard is one of a series of standards for insulation products used in buildings, but 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 European Standards, setting (21 months after availability) 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:

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 products (PUR) – 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the requirements for factory made products of expanded cork, which are used for the thermal insulation of buildings. The products are made with granulated cork agglomerated without additional binders and are delivered as boards without facings.

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

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

This standard 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 $0,25 \text{ m}^2\text{-K/W}$, at $10 \text{ }^\circ\text{C}$, or a declared thermal conductivity greater than $0,060 \text{ W/(m}\cdot\text{K)}$, at $10 \text{ }^\circ\text{C}$, 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 (including amendments).

EN ISO 354:1993/A1, *Acoustics – Measurement of sound absorption in a reverberation room - Amendment 1: Test specimen mountings for sound absorption tests (ISO 354:1985/AMD 1:1997)*.

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*.

prEN ISO 1182, *Reaction to fire test for building products – Non-combustibility test (ISO/DIS 1182:1998)*.

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 1605, *Thermal insulating products for building applications - Determination of deformation under specified compressive 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 1609, *Thermal insulating products for building applications - Determination of short term water absorption by partial immersion*.

prEN ISO 1716, *Reaction to fire test for building products – Determination of calorific value (ISO/DIS 1716:1998)*.

prEN ISO 9229, *Thermal insulation - Definitions of terms (ISO/DIS 9229:1997)*.

EN ISO 11654, *Acoustics - Sound absorbers for use in buildings - Rating of sound absorption (ISO 11654:1997)*.

prEN ISO 11925-2, *Reaction to fire test for building products – Part 2: Ignitability when subject to direct impingement of flame (ISO/DIS 11925-2:1998).*

EN 12086, *Thermal insulating products for building applications - Determination of water vapour transmission properties.*

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 12105, *Resilient floor coverings - Determination of moisture content of agglomerated composition cork.*

EN 12430, *Thermal insulating products for building application – Determination of the behaviour under point load.*

EN 12431, *Thermal insulating products for building applications – Determination of thickness for floating floor insulation products.*

prEN 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 13172:2001, *Thermal insulating products - Evaluation of conformity.*

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

prEN 13820, *Thermal insulating products for building applications – Determination of organic content.*

prEN 13823, *Reaction to fire test for building products – Building products excluding floorings exposed to the thermal attack by a single burning item.*

EN 29052-1, *Acoustics - Determination of dynamic stiffness - Part 1: Materials used under floating floors in dwellings (ISO 9052-1:1989).*

EN 29053, *Acoustics - Determination of air flow resistance (ISO 5053:1991).*

ISO 12491, *Statistical methods for quality control of building materials and components.*

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3 Terms, definitions, symbols, units and abbreviated terms

3.1 Terms and definitions

For the purposes of this standard, the following terms and definitions apply.

3.1.1 Terms and definitions as given in prEN ISO 9229

3.1.1.1

cork

protective layer of the cork oak tree (*Quercus suber* L.) which may be periodically removed from its trunk and branches to provide the raw material for cork products

3.1.1.2

granulated cork

fragments of cork obtained by grinding and/or milling raw or manufactured cork

NOTE Usually, the size of granules is between 4 mm and 22 mm.

3.1.1.3

expanded cork board (cork board)

pre-formed product made from ground granulated cork expanded and bonded exclusively with its own natural binder exuded from cork cell walls by heating under pressure

3.1.1.4

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.

3.1.2 Additional terms and definitions

3.1.2.1

level

the 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

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

3.2 Symbols, units and abbreviated terms

Symbols and units used in this standard:

α_p	is the practical sound absorption coefficient	-
α_w	is the weighted sound absorption coefficient	-
b	is the width	mm
c	is the compressibility	mm
d	is the thickness under a load of (2,5 ± 0,5) kPa	mm
d_B	is the thickness under a load of 2 kPa after removal of an additional load of 48 kPa	mm
d_L	is the thickness under a load of 250 Pa	mm
d_N	is the nominal thickness of the product	mm
d_S	is the thickness of the 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	%
$\Delta\varepsilon_s$	is the relative change in flatness	mm/m
ε	is the deformation under specified compressive load and temperature	mm
ε_{ct}	is the compressive creep	%
ε_t	is the total relative thickness reduction	%
F_p	is the compressive force at critical point	kN
H	is the moisture content	%
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)
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)
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_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
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 ·K/W
s_λ	is the estimate of the standard deviation of the thermal conductivity	W/(m·K)
s'	is the dynamic stiffness	MN/m ³
σ_{10}	is the compressive stress at 10 % deformation	kPa
σ_b	is the bending strength	kPa
σ_c	is the declared compressive stress (for compressive creep)	kPa
σ_{mt}	is the tensile strength perpendicular to faces	kPa
W_p	is the short-term water absorption	kg/m ²
τ	is the shear strength	kPa
Z	is the water vapour resistance	m ² ·h·Pa/mg

AF	is the symbol of the declared level of air flow resistance
AP	is the symbol of the declared level of practical sound absorption coefficient
AW	is the symbol of the declared level of weighted sound absorption coefficient
CC(i_1/i_2 %,y) σ_c	is the symbol of the declared level for compressive creep
CP	is the symbol of the declared level for compressibility
CS(10)	is the symbol of the declared level for compressive stress at 10% deformation
DS(TH)	is the symbol of the level for dimensional stability under specified temperature and humidity conditions
DS(T+)	is the symbol of the declared value for dimensional stability at specified temperature
DLT	is the symbol of the declared value for the deformation under specified load and temperature
L	is the symbol of the declared class for length tolerances
PL(P)	is the symbol of the declared level of point load at the critical point
SD	is the symbol of the declared level for dynamic stiffness
T	is the symbol of the declared class for thickness tolerances
TR	is the symbol of the declared level for tensile strength perpendicular to faces
W	is the symbol of the declared class for width tolerances
WS	is the declared value for short term water absorption
Z	is the symbol of the declared value for water vapour resistance
i	is the symbol used in the designation code to indicate the relevant class or level of a declared property
σ_c	is the symbol used in the designation code to indicate the declared compressive stress for compressive creep
y	is the symbol used in the designation code to indicate the number of years for extrapolation (compressive creep)

Abbreviated terms used in this standard:

ICB	is Expanded (Insulation) Cork Board
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 of 4.3, as appropriate.

One test result for a product property is the average of the measured values on the number of test specimens given in Table 6.

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 prEN 12667 or EN 12939 for thick products.

The thermal resistance and thermal conductivity shall be determined in accordance with procedures given in annex A 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;
- the thermal resistance, R_D , shall always be declared. The thermal conductivity, λ_D , shall be declared where possible;
- the declared thermal resistance, R_D , and the 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 the thermal conductivity, $\lambda_{90/90}$, shall be rounded upwards to the nearest 0,001 W/(m·K) and declared as λ_D in levels with steps of 0,001 W/(m·K);
- the declared thermal resistance, R_D , shall be calculated from the nominal thickness, d_N , and the corresponding thermal conductivity, $\lambda_{90/90}$.
- the value of the thermal resistance, $R_{90/90}$, when calculated from the nominal thickness, d_N , and the corresponding thermal conductivity, $\lambda_{90/90}$, shall be rounded downwards to the nearest 0,05 m² K/W, and declared as R_D in levels with steps of 0,05 m² K/W;
- the value of $R_{90/90}$, for those products for which only the thermal resistance is measured directly, shall be rounded downwards to the nearest 0,05 m² K/W and declared as R_D in levels with steps of 0,05 m² K/W.

Examples of determination of declared values of thermal resistance, R_D , and thermal conductivity, λ_D , are given in annex C.

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 and Table 2 for the declared classes.

Table 1 - Classes for length tolerances

Class	Tolerances mm
L1	± 3
L2	± 5

Table 2 - Classes for width tolerances

Class	Tolerances mm
W1	± 2
W2	± 3

NOTE The commonly linear dimensions of ICB boards are:

Length: 1000 mm
Width: 500 mm

4.2.3 Thickness

Thickness, d , shall be determined in accordance with EN 823, method B.2, under a pressure of (2,5 ± 0,5) kPa. No test result shall deviate from the nominal thickness, d_N , by more than the tolerances given in Table 3 for the declared class.

Table 3 - Classes for thickness tolerances

Class	Thickness	Tolerances
T1	20 mm ≤ d ≤ 50 mm	± 1 mm
T2	d > 50 mm	± 2 %, maximum ± 2 mm

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 4 mm/m. The deviation from squareness on thickness, S_d , shall not exceed 2 mm.

4.2.5 Flatness

Flatness shall be measured according to EN 825. The deviation from flatness, S_{max} , shall not exceed 2 mm.

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 after storage for 48 h. The relative changes in length, $\Delta\epsilon_l$, and width, $\Delta\epsilon_b$, shall not exceed 0,5 %; the relative deviation in flatness, $\Delta\epsilon_s$, shall not exceed 1 mm/m.

4.2.6.2 Dimensional stability under specified temperature and humidity conditions

Dimensional stability under 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, $\Delta\epsilon_l$, and width, $\Delta\epsilon_b$, shall not exceed 0,5 %; the relative deviation from thickness, $\Delta\epsilon_d$, shall not exceed 1 %.

This test shall not be performed when the more severe test described in 4.3.2.2 is used.

4.2.7 Bending strength

Bending strength, σ_b , shall be determined in accordance with EN 12089, method B. For handling purposes, the bending strength shall not be lower than 130 kPa.

4.2.8 Reaction to fire

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

4.2.9 Moisture content

Moisture content, H , shall be determined in accordance with EN 12105. The product shall be protected from rain during storage. Under these conditions, no test result shall exceed a mass fraction of 8 %.

4.2.10 Apparent density

Apparent density, ρ_a , shall be determined in accordance with EN 1602. The product shall be protected from rain during storage. Under these conditions, no test result shall exceed 130 kg/m³.

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, $\Delta\epsilon_l$, and width, $\Delta\epsilon_b$, shall not exceed 0,5 %. The relative change in thickness, $\Delta\epsilon_d$, shall not exceed 1 %.

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 changes in length, $\Delta\epsilon_l$, and width, $\Delta\epsilon_b$, shall not exceed 0,5 %. The relative change in

thickness, $\Delta \varepsilon_d$, shall not exceed 1 %.

4.3.3 Deformation under specified compressive load and temperature

Deformation under specified load and temperature conditions, ε , shall be carried out in accordance with EN 1605. No test result shall be greater than the declared level, DLT.

4.3.4 Compressive stress at 10 % deformation

Compressive stress at 10 % deformation, σ_{10} , shall be determined in accordance with EN 826. No test result shall be lower than the value given in Table 4 for the declared level.

Table 4 - Levels for compressive stress at 10 % deformation

Level	Requirement kPa
CS(10)90	≥ 90
CS(10)100	≥ 100
CS(10)110	≥ 110

4.3.5 Tensile strength perpendicular to faces

Tensile strength perpendicular to the faces, σ_{mt} , shall be determined in accordance with EN 1607. The value of tensile strength shall be declared in steps of 10 kPa. No test result shall be lower than the value given in Table 5 for the declared level.

Table 5 - Levels for tensile strength perpendicular to faces

Level	Requirement kPa
TR40	≥ 40
TR50	≥ 50
TR60	≥ 60

4.3.6 Point load

Compressive force at the critical point, F_p , shall be determined in accordance with EN 12430 and declared in levels with steps of 50 N. No test result shall be lower than the declared level, PL(P).

4.3.7 Compressive creep

Compressive creep, ε_{ct} , and total relative thickness reduction, ε_t , shall be determined after at least one hundred 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 0,5 % 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	$i_1/i_2 \leq i$

NOTE 2 Referring to the designation code $CC(i_1/i_2/y)\sigma_c$, clause 6, a declared level $CC(2,5/2/10)50$, as for example, indicates a value not exceeding 2 % for compressive creep and 2,5 % for total relative 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.