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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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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 2219 was prepared by Technical Committee ISO/TC 87, *Cork*, and it is based on EN 13170.

This third edition cancels and replaces the second edition (ISO 2219:1989), of which it constitutes a technical revision.

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

1 Scope

This International 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.

This International Standard describes product characteristics and includes procedures for testing, evaluation of conformity, marking, labelling and packaging.

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

This International Standard does not specify the required level of a given property to be achieved by a product to demonstrate fitness for purpose in a particular application. The levels required for a given application are to be found in regulations or non-conflicting standards.

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

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.

ISO 354, *Acoustics — Measurement of sound absorption in a reverberation room*

ISO 633, *Cork — Vocabulary*

ISO 1182, *Reaction to fire tests for products — Non-combustibility test*

ISO 1716, *Reaction to fire tests for products — Determination of the heat of combustion (calorific value)*

ISO 2066, *Resilient floor coverings — Determination of moisture content of agglomerated composition cork*

ISO 2191, *Cork — Expanded pure agglomerated — Deformation under constant pressure*

ISO 8301, *Thermal insulation — Determination of steady-state thermal resistance and related properties — Heat flow meter apparatus*

ISO 8302, *Thermal insulation — Determination of steady-state thermal resistance and related properties — Guarded hot plate apparatus*

ISO 9052-1, *Acoustics — Determination of dynamic stiffness — Part 1: Materials used under floating floors in dwellings*

ISO 9053:1991, *Acoustics — Materials for acoustical applications — Determination of airflow resistance*

ISO 9229:2007, *Thermal insulation — Vocabulary*

ISO 11654, *Acoustics — Sound absorbers for use in buildings — Rating of sound absorption*

ISO 11925-2, *Reaction to fire tests — Ignitability of products subjected to direct impingement of flame — Part 2: Single-flame source test*

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

ISO 29465, *Thermal insulating products for building applications — Determination of length and width*

ISO 29466:2008, *Thermal insulating products for building applications — Determination of thickness*

ISO 29467, *Thermal insulating products for building applications — Determination of squareness*

ISO 29468, *Thermal insulating products for building applications — Determination of flatness*

ISO 29470, *Thermal insulating products for building applications — Determination of the apparent density*

ISO 29471:2008, *Thermal insulating products for building applications — Determination of dimensional stability under constant normal laboratory conditions (23 °C/50 % relative humidity)*

ISO 29472, *Thermal insulating products for building applications — Determination of dimensional stability under specified temperature and humidity conditions*

ISO 29764, *Thermal insulating products for building applications — Determination of deformation under specified compressive load and temperature conditions*

ISO 29765, *Thermal insulating products for building applications — Determination of tensile strength perpendicular to faces*

ISO 29767:2008, *Thermal insulating products for building applications — Determination of short-term water absorption by partial immersion*

ISO 29769, *Thermal insulating products for building applications — Determination of behaviour under point load*

ISO 29770, *Thermal insulating products for building applications — Determination of thickness for floating-floor insulating products*

EN 1606, *Thermal insulating products for building applications — Determination of compressive creep*

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

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

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

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 633 and ISO 9229 and the following apply.

3.1
expanded cork board
cork board
manufactured product obtained from the expansion of granulated cork, which is agglutinated exclusively with its own natural binder exuded from cork cells by heating under pressure

3.2
level
given value which is the upper or lower limit of a requirement

NOTE The level is given by the declared value of the characteristic concerned.

3.3
class
combination of two levels of the same property between which the performance shall fall

4 Symbols, units and abbreviated terms

4.1 Symbols and units

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 conditions	mm
ε_{ct}	is the compressive creep	%

ε_t	is the total thickness reduction	%
F_p	is the compressive force at the 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
$\bar{\lambda}$	is the mean 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)
$\lambda_{90/90}$	is the 90 % fractile with a confidence level of 90 % for the thermal conductivity	W/(m·K)
n	is the number of test results	—
R_D	is the declared thermal resistance	m^2·K/W
R_i	is one test result of thermal resistance	m^2·K/W
$\bar{R}$	is the mean thermal resistance	m^2·K/W
$R_{90/90}$	is the 90 % fractile with a confidence level of 90 % for the 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 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

4.2 Abbreviated terms and symbols used in designations

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

5 Requirements

5.1 General

Product properties shall be assessed in accordance with Clause 6. To comply with this International Standard, products shall meet the requirements of 5.2 and of 5.3, as appropriate.

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

5.2 For all applications

5.2.1 Thermal resistance and thermal conductivity

Thermal resistance and thermal conductivity shall be based upon measurements carried out in accordance with ISO 8302 or ISO 8301 for thick products.

The thermal resistance and thermal conductivity shall be determined in accordance with the 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.

— 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 (i.e. for sloped and tapered products), only the thermal conductivity, λ_D, shall be declared.

— The declared thermal resistance, R_D, and the declared thermal conductivity, λ_D shall be given as limit values representing at least 90 % of the production, determined with a confidence level of 90 %.

— The value of the thermal conductivity, $\lambda_{90/90}$, shall be rounded up 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 down to the nearest 0,05 m^2·K/W, and declared as R_D, in levels with steps of 0,05 m^2·K/W.

— The value of $R_{90/90}$, for those products for which only the thermal resistance is measured directly, shall be rounded down to the nearest 0,05 m^2 K/W and declared as R_D in levels with steps of 0,05 m^2·K/W.

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

5.2.2 Length and width

The length, l, and width, b, shall be determined in accordance with ISO 29465. No test result shall deviate from the nominal values by more than the tolerances given in Tables 1 and 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

The commonly used linear dimensions of ICB boards are

— length: 1 000 mm, and

— width: 500 mm.

5.2.3 Thickness

The thickness, d, shall be determined in accordance with ISO 29466:2008, 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, d	Tolerances
T1	20 mm $\leqslant d \leqslant$ 50 mm	±1 mm
T2	$d >$ 50 mm	±2 %, maximum ±2 mm

5.2.4 Squareness

The squareness shall be determined in accordance with ISO 29467. 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.

5.2.5 Flatness

The flatness shall be measured according to ISO 29468. The deviation from flatness, S_{max}, shall not exceed 2 mm.

5.2.6 Dimensional stability

5.2.6.1 Dimensional stability under constant normal laboratory conditions

The dimensional stability under constant normal laboratory conditions (temperature 23 °C/relative humidity 50 %) shall be determined in accordance with ISO 29471 after storage for 48 h. The relative changes in length, $\Delta\varepsilon_l$, and width, $\Delta\varepsilon_b$, shall not exceed 0,5 %; the relative change in flatness, $\Delta\varepsilon_s$, shall not exceed 1 mm/m.

5.2.6.2 Dimensional stability under specified temperature and humidity conditions

The dimensional stability under specified temperature and humidity conditions shall be determined in accordance with ISO 29472. The test shall be carried out after storage for 48 h at a temperature of (23 ± 2) °C and a relative humidity of (90 ± 5) %. 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 %.

This test shall not be performed when the more severe test described in 5.3.2.2 is used.

5.2.7 Bending strength

The bending strength, σ_b, shall be determined in accordance with EN 12089:1997, method B. For handling purposes, the bending strength shall not be lower than 130 kPa.

5.2.8 Reaction to fire

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

5.2.9 Durability characteristics

5.2.9.1 General

The appropriate durability characteristics have been considered and are covered in 5.2.9.2, 5.2.9.3 and 5.2.9.4.

5.2.9.2 Durability of reaction to fire against ageing/degradation

The reaction to fire performance of products of expanded cork does not change with time.

5.2.9.3 Durability of thermal resistance against ageing/degradation

The thermal conductivity of products of expanded cork does not change with time. This is covered in 5.2.1 for thermal conductivity, 5.2.2 for length and width, and 5.2.6 or 5.3.2 for dimensional stability.

5.2.9.4 Durability of compressive strength against ageing/degradation

The durability of compressive strength is covered in 5.3.7 (compressive creep).

5.2.10 Moisture content

Moisture content, H, shall be determined in accordance with ISO 2066. The product shall be protected from rain during storage. Under these conditions, no test result shall exceed a mass fraction of 8 %.

5.2.11 Apparent density

The apparent density, ρ_a, shall be determined in accordance with ISO 29470. The product shall be protected from rain during storage. Under these conditions, no test result shall exceed 130 kg/m^3.

5.3 For specific applications

5.3.1 General

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

5.3.2 Dimensional stability under specified conditions

5.3.2.1 Dimensional stability at specified temperature

The dimensional stability at specified temperature shall be determined in accordance with ISO 29472. 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 0,5 %. The relative change in thickness, $\Delta\varepsilon_d$, shall not exceed 1 %.

5.3.2.2 Dimensional stability under specified temperature and humidity conditions

The dimensional stability under specified temperature and humidity conditions shall be determined in accordance with ISO 29472. The test shall be carried out after storage for 48 h at a temperature of (70 ± 2) °C and a relative humidity of (90 ± 5) %. 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 %.

5.3.3 Deformation under specified compressive load and temperature

The deformation under specified load and temperature conditions, ε, shall be carried out in accordance with ISO 29764. No test result shall be greater than the declared level, DLT.