



SLOVENSKI STANDARD

SIST EN 13167:2002

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Toplotnoizolacijski proizvodi za stavbe - Proizvodi iz penjenega stekla (CG) - Specifikacija

Thermal insulation products for buildings - Factory made cellular glass (CG) products -
Specification

Wärmedämmstoffe für Gebäude - Werkmäßig hergestellte Produkte aus Schaumglas
(CG) - Spezifikation

Produits isolants thermiques pour le bâtiment - Produits manufacturés en verre cellulaire
(CG) - Spécification

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ICS 91.100.60

English version

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Wärmedämmstoffe für Gebäude - Werkmäßig hergestellte
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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
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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of an identical text or by endorsement, at the latest by November 2001, and conflicting national standards shall be withdrawn at the latest by March 2003.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 five annexes:

- | | |
|------------------------|--|
| Annex A (normative) | Determination of the declared values of thermal resistance and thermal conductivity; |
| Annex B (normative) | Factory production control; |
| Annex C (informative) | Preparation of the test specimens to measure thermal conductivity; |
| Annex D (informative) | Additional properties; |
| Annex ZA (informative) | Clauses of this European Standard addressing the provisions of the EU Construction Products Directive. |

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This European Standard is one of a series of standards for insulation products used in buildings, but this standard may be used in other areas where appropriate.

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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 insulating products for buildings - Factory made mineral wool (MW) products – Specification.*

EN 13163, *Thermal insulating products for buildings - Factory made products of expanded polystyrene (EPS) – Specification.*

EN 13164, *Thermal insulating products for buildings - Factory made products of extruded polystyrene foam (XPS) – Specification.*

EN 13165, *Thermal insulating products for buildings - Factory made rigid polyurethane foam (PUR) products- Specification.*

EN 13166, *Thermal insulating products for buildings - Factory made products of phenolic foam (PF) – Specification.*

EN 13167, *Thermal insulating products for buildings - Factory made cellular glass (CG) products – Specification.*

EN 13168, *Thermal insulating products for buildings - Factory made wood wool (WW) products – Specification.*

EN 13169, *Thermal insulating products for buildings - Factory made products of expanded perlite (EPB)– Specification.*

EN 13170, *Thermal insulating products for buildings - Factory made products of expanded cork (ICB) – Specification.*

EN 13171, *Thermal insulating 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 cellular glass products, with or without facings, which are used for the thermal insulation of buildings. The products are manufactured in the form of boards or slabs.

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

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 0,50 m²·K/W or a declared thermal conductivity greater than 0,065 W/(m·K) at 10 °C are not covered by this standard.

This standard does not cover products intended to be used for the insulation of building equipment and industrial installations.

This standard does not cover the following acoustical aspects: Direct airborne sound insulation and impact noise transmission.

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 826:1996, *Thermal insulating products for building applications - Determination of compression behaviour.*

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

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 1608, *Thermal insulating products for building applications - Determination of tensile strength parallel 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 tests 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 tests for building products – Part 2: Ignitability when subjected to direct impingement of flame (ISO/DIS 11925-2:1998).*

EN 12086:1997, *Thermal insulating products for building applications - Determination of water vapour transmission properties.*

EN 12087, *Thermal insulating products for building applications - Determination of long term water absorption by immersion.*

EN 12089, *Thermal insulating products for building applications - Determination of bending behaviour.*

EN 12430, *Thermal insulating products for building applications - Determination of behaviour under point load.*

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 tests for building products – Building products excluding flooring exposed to the thermal attack by a single burning item.*

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 standard, the following terms and definitions apply.

3.1.1 Terms and definitions as given in prEN ISO 9229

3.1.1.1

cellular glass

rigid insulation material made from expanded glass with a closed cell structure

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.

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

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3.1.2.2

class

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

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3.1.2.3

faced cellular glass board

board of cellular glass with facing(s) on one or two faces which may be roofing felt or metal foil or paper, cardboard, plastic foil or similar materials. The core may consist of either one board, a part of a board or a number of boards bonded edge to edge in the factory, with an appropriate adhesive. Bitumen is a suitable adhesive which may be used to bond both the joints and the facings

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
d	is the thickness	mm
d_N	is the nominal thickness of the product	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
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)
μ	is the water vapour diffusion resistance factor	—

n	is the number of test results	–
P_d	is the deformation under point load	mm
$R_{90/90}$	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	$m^2 \cdot K/W$
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	$W/(m \cdot K)$
σ_b	is the bending strength	kPa
σ_c	is the declared compressive stress	kPa
σ_m	is the compressive strength	kPa
σ_{mt}	is the tensile strength perpendicular to faces	kPa
σ_t	is the tensile strength parallel 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
X_{ct}	is the compressive creep	mm
X_t	is the deformation at time t (total thickness reduction)	mm
Z	is the water vapour resistance	$m^2 \cdot h \cdot Pa/mg$

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
BS	is the symbol of the declared level for bending strength
CC(i_1/l_2 mm/y)	σ_c is the symbol of the declared level for compressive creep
CS(Y)	is the symbol of the declared level for compressive strength
DS(T+)	is the symbol of the declared value for dimensional stability at specified temperature
DS(TH)	is the symbol of the declared value for dimensional stability under specified temperature and humidity
MU	is the symbol of the declared value for water vapour diffusion resistance factor
PL(P)	is the symbol of the declared level for penetration under point load
TP	is the symbol of the declared level for tensile strength parallel to faces
TR	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
WS	is the symbol of the declared level for short term water absorption
Z	is the symbol of the declared value for water vapour resistance

Abbreviated terms used in this standard:

CG	is Cellular Glass
ITT	is Initial Type Test

4 Requirements

4.1 General

Product properties shall be assessed in accordance with clause 5. To comply with this standard, products shall meet the requirements of 4.2, and the requirements of 4.3 as appropriate.

NOTE Information on additional properties is given in annex D.

One test result on a product property is the average of the measured values on the number of test specimens given in Table 4.

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 annex A 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;
- 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 declared thermal conductivity, λ_D , shall be given as limit values representing at least 90 % of the production, determined with a confidence level of 90 %;
- the value of thermal conductivity, $\lambda_{90/90}$, shall be rounded upwards to the nearest 0,001 W/(m·K) and declared as λ_D in levels with steps of 0,001 W/(m·K);
- the declared thermal resistance, R_D , shall be calculated from the nominal thickness, d_N , and the corresponding thermal conductivity value, $\lambda_{90/90}$;
- the value of thermal resistance, $R_{90/90}$, when calculated from the nominal thickness, d_N , and the corresponding thermal conductivity, $\lambda_{90/90}$, shall be rounded downwards to the nearest 0,05 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.

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 following:

Unfaced board:	± 2 mm	for length and width
Faced board:	± 5 mm	for length
	± 2 mm	for width

4.2.3 Thickness

Thickness, d , shall be determined in accordance with EN 823. The load shall be 250 Pa. No test result shall deviate from the nominal thickness, d_N , by more than ± 2 mm.

The nominal thicknesses of faced products refer to the cellular glass without facings. The thickness of any facing exceeding 2 mm shall be indicated in the manufacturers' literature.

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

4.2.5 Flatness

Flatness shall be determined in accordance with 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. The relative changes in length, $\Delta\epsilon_l$, and width, $\Delta\epsilon_b$, shall not exceed 0,5 %. The relative change 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 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, $\Delta\epsilon_l$, and width, $\Delta\epsilon_b$, shall not exceed 0,5 %. The relative change in thickness, $\Delta\epsilon_d$, shall not exceed 1,0 %.

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

4.2.7 Point load

Deformation under a point load of 1000 N, P_d , shall be determined in accordance with EN 12430. No test result shall exceed the value, given in Table 1, for the declared level.

Table 1 - Levels for deformation under point load

Level	Requirement mm
PL(P)2	$\leq 2,0$
PL(P)1,5	$\leq 1,5$
PL(P)1	$\leq 1,0$
PL(P)0,5	$\leq 0,5$

4.2.8 Reaction to fire

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

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

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

4.3.3 Compressive strength

Compressive strength, σ_m , shall be determined in accordance with EN 826. No test result shall be less than the value, given in Table 2, for the declared level.

Table 2 - Levels for compressive strength

Level	Requirement kPa
CS(Y)400	≥ 400
CS(Y)700	≥ 700
CS(Y)900	≥ 900
CS(Y)1200	≥ 1200
CS(Y)1600	≥ 1600

4.3.4 Bending strength

Bending strength, σ_b , shall be determined in accordance with EN 12089. No test result shall be less than the value, given in Table 3, for the declared level.

Table 3 - Levels for bending strength

Level	Requirement kPa
BS200	≥ 200
BS400	≥ 400
BS450	≥ 450
BS500	≥ 500
BS550	≥ 550

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4.3.5 Tensile strength parallel to faces

Tensile strength parallel to faces, σ_t , shall be determined in accordance with EN 1608. The value of tensile strength parallel to faces shall be declared in levels, TP, with steps of 50 kPa. No test result shall be less than the declared level.

4.3.6 Tensile strength perpendicular to faces

Tensile strength perpendicular to faces, σ_{mt} , shall be determined in accordance with EN 1607. No test result shall be less than the declared level, TR, chosen from the following values: 100, 150, 200, 250, 300, 350, 400 or 500 kPa.

4.3.7 Compressive creep

Compressive creep, X_{ct} , and total thickness reduction, X_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 corresponding to ten years 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 0,1 mm 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 ^a mm
CC(i_1/i_2 mm/10) σ_c	122	10	σ_c	$i_1/i_2 \leq i$
CC(i_1/i_2 mm/25) σ_c	304	25	σ_c	$i_1/i_2 \leq i$
CC(i_1/i_2 mm/50) σ_c	608	50	σ_c	$i_1/i_2 \leq i$

^a The creep of the bitumen used for the facings is not taken into account in these values.