



SLOVENSKI STANDARD
SIST EN 16977:2021

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Toplotnoizolacijski proizvodi za stavbe - Industrijsko izdelani proizvodi iz kalcijevih silikatov (CS) - Specifikacija

Thermal insulation products for buildings - Factory made calcium silicate (CS) products - Specification

Wärmedämmstoffe für Gebäude - Werkmäßig hergestellte Produkte aus Calciumsilicat (CS) - Spezifikation

Produits isolants thermiques pour le bâtiment - Produits manufacturés en silicate de calcium (CS) - Spécification

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ICS:

91.100.60	Materiali za toplotno in zvočno izolacijo	Thermal and sound insulating materials
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EUROPEAN STANDARD

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English Version

Thermal insulation products for buildings - Factory made calcium silicate (CS) products - Specification

Produits isolants thermiques pour le bâtiment -
Produits manufacturés en silicate de calcium (CS) -
Spécifications

Wärmedämmstoffe für Gebäude - Werkmäßig
hergestellte Produkte aus Calciumsilikat (CS) -
Spezifikation

This European Standard was approved by CEN on 28 September 2020.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 16977:2020) 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of an identical text or by endorsement, at the latest by May 2021 and conflicting national standards shall be withdrawn at the latest by August 2022.

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

This document has been prepared under a standardization request given to CEN by the European Commission and the European Free Trade Association.

For relationship with (EU) Regulation 305/2011, see informative Annex ZA, which is an integral part of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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1 Scope

This document specifies the characteristics for factory made calcium silicate (CS) products with or without lamination or coating intended to be used for the thermal insulation of buildings.

This document is applicable for materials with the main crystal phases Xonotlite and Tobermorite with or without Wollastonite.

This document is applicable for products which are manufactured in the form of boards, segments and prefabricated ware.

This document is applicable for multi-layered CS products.

The products covered by this documents can be used in roofs, walls, ceilings and floors.

This document specifies procedures for assessment and verification of constancy of performance (AVCP) of characteristics of factory made calcium silicate products (CS).

This document does not cover:

- products intended to be used for the insulation of building equipment and industrial installations;
- products intended to be used for civil engineering works;
- with a declared thermal conductivity greater than 0,078 W/(mK) at 10 °C;
- aerated concrete, autoclaved aerated concrete, mineral foam insulating products and sand-lime bricks;
- in situ insulation products.

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2 Normative references

[SIST EN 16977:2021](https://standards.iteh.ai/catalog/standards/sist/a7971d50-d326-4720-950f-3f829c61b3/sist-en-16977-2021)

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The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 822:2013, *Thermal insulating products for building applications - Determination of length and width*

EN 823:2013, *Thermal insulating products for building applications - Determination of thickness*

EN 824:2013, *Thermal insulating products for building applications - Determination of squareness*

EN 825:2013, *Thermal insulating products for building applications - Determination of flatness*

EN 826:2013, *Thermal insulating products for building applications - Determination of compression behaviour*

EN 1604:2013, *Thermal insulating products for building applications - Determination of dimensional stability under specified temperature and humidity conditions*

EN 12086:2013, *Thermal insulating products for building applications - Determination of water vapour transmission properties*

EN 12667:2001, *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 12939:2000, *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 13468:2001, *Thermal insulating products for building equipment and industrial installations - Determination of trace quantities of water soluble chloride, fluoride, silicate, sodium ions and pH*

EN 13501-1:2018, *Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests*

EN 13820:2003, *Thermal insulating materials for building applications - Determination of organic content*

EN 13823:2020, *Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item*

EN 15715:2009, *Thermal insulation products - Instructions for mounting and fixing for reaction to fire testing - Factory made products*

EN 16516:2017+A1:2020, *Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air*

EN ISO 1182:2020, *Reaction to fire tests for products - Non-combustibility test (ISO 1182:2020)*

EN ISO 1716:2018, *Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value) (ISO 1716:2018)* (standards.iteh.ai)

EN ISO 9229:2020, *Thermal insulation - Vocabulary (ISO 9229:2020)*

EN ISO 10456:2007, *Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values (ISO 10456:2007)*

EN ISO 11925-2:2020, *Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test (ISO 11925-2:2020)*

EN ISO 15148:2002/A1:2016, *Hygrothermal performance of building materials and products - Determination of water absorption coefficient by partial immersion - Amendment 1 (ISO 15148:2002/Amd 1:2016)*

ISO 16269-6:2014, *Statistical interpretation of data - Part 6: Determination of statistical tolerance intervals*

3 Terms, definitions, symbols, units and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 9229:2020 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

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3.1.1

calcium silicate

insulation material comprising hydrated calcium silicate, normally reinforced by incorporating fibres

3.1.2

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 1 to entry: Boards are usually thinner than slabs. Boards and slabs can also be supplied in tapered form.

3.1.3

segment

rigid or semi-rigid insulation product for application to large diameter cylindrical or spherical equipment

3.1.4

facing

functional or decorative surface layer with a thickness of less than 3 mm, e.g. paper, plastic film, fabric or metal foil, which is not considered as separate thermal insulation layer to be added to the thermal resistance of the product

3.1.5

coating

functional or decorative surface layer with a thickness of less than 3 mm usually applied by painting, spraying, pouring or trowelling, which is not considered as separate thermal insulation layer to be added to the thermal resistance of the product

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3.1.6

composite insulation product

product which can be faced or coated made from two or more layers bonded together by chemical or physical adhesion consisting of at least one factory made thermal insulation material layer

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3.1.7

multi-layered insulation product

product which can be faced or coated made from two or more layers of a thermal insulation material from the same European Standard, which are bonded together horizontally by chemical or physical adhesion

3.1.8

production lot

definite quantity produced per maximum 24 h of some commodity manufactured or produced under conditions which are presumed uniform

3.1.9

production line

assemblage of equipment that produces products using a continuous process

3.1.10

production unit

assemblage of equipment that produces products using a discontinuous process

Note 1 to entry: For PTD and FPC, units using the same process in one factory.

3.2 Symbols, units and abbreviated terms

For the purposes of this document, the following symbols, units and abbreviated terms apply.

α	the coefficient describing the influence of moisture on the thermal conductivity	–
α_p	the practical sound absorption coefficient	–
α_w	the weighted sound absorption coefficient	–
b	the width	mm
d	the thickness	mm
d_N	the nominal thickness of the product	mm
l	the length	mm
$\Delta\varepsilon_b$	the relative change in width	%
$\Delta\varepsilon_d$	the relative change in thickness	%
$\Delta\varepsilon_l$	the relative change in length	%
k	a factor related to the number of test results available	–
λ	the thermal conductivity	W/(m·K)
$\lambda_{90/90}$	a 90 % fractile with a confidence level of 90 % for the thermal conductivity	W/(m·K)
λ_D	the declared thermal conductivity	W/(m·K)
λ_{mean}	the mean thermal conductivity	W/(m·K)
$\lambda_{10,\text{dry}}$	the thermal conductivity in the dry state	W/(m·K)
λ_U	the design thermal conductivity	W/(m·K)
m_{dry}	the mass of specimen in the dry state at 23 °C	kg
$m_{23,50}$	the mass of specimen at 23 °C and 50 % relative humidity	kg
μ	the water vapour diffusion resistance factor	–
R_D	the declared thermal resistance	m ² ·K/W
$R_{90/90}$	the 90 % fractile with a confidence level of 90 % for the thermal resistance	m ² ·K/W
R_U	the design thermal resistance	m ² ·K/W
S_b	the deviation from squareness on length and width	mm/m
S_d	the deviation from squareness on thickness	mm/m
S_{max}	the deviation from flatness	mm
s_R	the estimate of the standard deviation of the thermal resistance	m ² ·K/W
s_λ	the estimate of the standard deviation of the thermal conductivity	W/(m·K)
σ_b	the bending strength	kPa

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σ_m	the compressive strength	kPa
σ_{10}	the compressive stress at 10 % deformation	kPa
$u_{23,50}$	the moisture content by mass at 23 °C and 50 % relative humidity	kg/kg
W_p	the short-term water absorption by partial immersion	kg/m ²
Z	the water vapour resistance	m ² ·h·Pa/mg
W_w	the water absorption coefficient	kg/(m ² h ^{0,5})
CS(10\Y)	the symbol of the level for compressive stress or compressive strength	
DS(70,-)	the symbol of the declared value for dimensional stability under specified temperature conditions	
DS(23,90) or DS(70,90)	the symbol of the declared value for dimensional stability under specified temperature and relative humidity conditions	
MU	the symbol of the declared value for water vapour diffusion resistance factor	
WA	the symbol of the declared value of water absorption coefficient	

AVCP is Assessment and Verification of Constancy of Performance (previously named attestation of conformity)

CS Calcium Silicate

DoP Declaration of Performance

FPC Factory Production Control

NPD No Performance Declared

PTD Product-type Determination

RtF Reaction to Fire

ThIB Thermal Insulation for Buildings

4 Characteristics

4.1 Reaction to fire

4.1.1 Determination

Reaction to fire classification shall be determined in accordance to 5.2.1.

4.1.2 Expression

The reaction to fire shall be classified and expressed according to EN 13501-1:2018, Clause 11.

EXAMPLE Class A1.

4.2 Release of VOCs

4.2.1 Determination

The release of VOCs into indoor air shall be determined in accordance to 5.2.2.

4.2.2 Expression

The release of VOCs into indoor air shall be expressed as values in accordance to EN 16516:2017+A1:2020, 10.6.

4.3 Rate of release of corrosive substances

4.3.1 Determination

The rate of release of corrosive substances (trace quantities of water-soluble ions and pH-value) shall be determined in accordance to 5.2.3.

4.3.2 Expression

The rate of release of corrosive substances (trace quantities of water-soluble ions and pH-value) shall be expressed as values in accordance to EN 13468:2001.

4.4 Compressive strength

4.4.1 Determination iTeh STANDARD PREVIEW

The Compressive strength shall be determined in accordance to 5.2.4. (standards.iteh.ai)

4.4.2 Evaluation and Expression

The compressive strength shall be expressed as a designation code CS(Y)*i* or CS(10)*i*, depending on the result of the testing of 5.2.4. The test result *i* shall be rounded downwards in steps of 100 kPa. SIST EN 16977:2021

EXAMPLE 1 CS(Y)0, when the test result is lower than 100 kPa

EXAMPLE 2 CS(Y)1000

EXAMPLE 3 CS(10)1500

4.5 Bending strength

4.5.1 Determination

The bending strength shall be determined in accordance to 5.2.5.

4.5.2 Expression

The bending strength, σ_b , shall be expressed as a designation code BS. The value of the bending strength, σ_b , shall be rounded downwards in steps of 100 kPa.

EXAMPLE BS200

4.6 Thermal resistance

4.6.1 Determination

The thermal resistance shall be determined according to 5.2.6.

EN 16977:2020 (E)**4.6.2 Expression**

The thermal resistance shall be rounded downwards to the nearest 0,05 m²·K/W and be expressed as a value in m²·K/W. It shall be expressed together with thermal conductivity rounded upwards in steps of 0,000 5 W/(m·K) and expressed as a value in W/(m·K). It shall be expressed together with the thickness given as a value in mm.

EXAMPLE $R_D = 4,60 \text{ m}^2\cdot\text{K}/\text{W}$ ($\lambda_D = 0,0065 \text{ W}/(\text{m}\cdot\text{K})$, $d = 30 \text{ mm}$).

4.7 Dimensional stability under specified temperature and humidity conditions**4.7.1 Determination**

Dimensional stability under specified temperature or under specified temperature and humidity conditions shall be determined in accordance to 5.2.7.

4.7.2 Expression

Dimensional stability under specified temperature or under specified temperature and humidity conditions shall be expressed as a code in the following way: If the relative changes in length and width do not exceed 1 % and the relative reduction in thickness does not exceed 3 %, the code shall be DS. Otherwise the code shall be NoDS.

EXAMPLE DS

4.8 Water absorption iTeh STANDARD PREVIEW (standards.iteh.ai)

The water absorption shall be determined in accordance to 5.2.8.

4.8.2 Expression <https://standards.iteh.ai/catalog/standards/sist/a7971d50-d326-4720-950f-2f3920c6b1b3/sist-en-16977-2021>

The test results shall be expressed as a value in [kg/(m²h^{0,5})].

4.9 Water vapour transmission**4.9.1 Determination**

The water vapour transmission shall be determined in accordance to 5.2.9.

4.9.2 Expression

The water vapour transmission properties shall be expressed as the water vapour diffusion resistance factor, μ , for homogeneous products (EN 12086:2013, 8.6) and as the water vapour resistance, Z , in [m²·h·Pa/mg] for faced or non-homogeneous products (EN 12086:2013, 8.4).

5 Assessment methods**5.1 General****5.1.1 Sampling**

Test specimens shall be taken from the same sample with a total area not less than 0,5 m² and a length and width according to Table 1. The shorter side of the sample shall not be less than 300 mm or full size of the product, whichever is the smaller. The test may be performed on the unfaced/uncoated product, if the facing/coating is known to have no relevance to the test result.