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**Toplotnoizolacijski proizvodi za opremo stavb in industrijske inštalacije -  
Proizvodi iz kalcijevih silikatov (CS) - Specifikacija**

Thermal insulation products for building equipment and industrial installations - Factory made calcium silicate (CS) products - Specification

Wärmedämmstoffe für die technische Gebäudeausrüstung und für betriebstechnische Anlagen in der Industrie - Werkmäßig hergestellte Produkte aus Calciumsilikat (CS) - Spezifikation

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Produits manufacturés en silicate de calcium (CS) - Spécification

**Ta slovenski standard je istoveten z: EN 14306:2009**

**ICS:**

91.100.60	Materiali za toplotno in zvočno izolacijo	Thermal and sound insulating materials
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## Thermal insulation products for building equipment and industrial installations - Factory made calcium silicate (CS) products - Specification

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Produits manufacturés en silicate de calcium (CS) - Spécification

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This European Standard was approved by CEN on 29 September 2009.

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## Foreword

This document (EN 14306:2009) 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of an identical text or by endorsement, at the latest by May 2010, and conflicting national standards shall be withdrawn at the latest by August 2011.

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 EU Directive 89/106/EEC.

For relationship with EU Directive 89/106/EEC, see informative Annex ZA, which is an integral part of this document.

Locally responsible authorities and contracting entities, who are bound by EU Directives to specify their requirements using European harmonized product standards, are allowed to demand additional properties outside the provisions of this standard if this is technically necessary because of prevailing operational conditions of the building equipment or the industrial installation projected or because of safety regulations.

This European Standard contains six annexes:

- Annex A (normative), Factory production control
- Annex B (normative), Testing for reaction to fire
- Annex C (normative), Determination of minimum service temperature
- Annex D (informative), Preparation of the test specimens to measure thermal conductivity
- Annex E (informative), Additional properties
- Annex ZA (informative), Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

This document includes a bibliography.

This European Standard is one of a series of standards for insulation products used in building equipment and industrial installations, but this standard can 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 European package of 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 14303, *Thermal insulation products for building equipment and industrial installations — Factory made mineral wool (MW) products — Specification*

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EN 14304, *Thermal insulation products for building equipment and industrial installations — Factory made flexible elastomeric foam (FEF) products — Specification*

EN 14305, *Thermal insulation products for building equipment and industrial installations — Factory made cellular glass (CG) products — Specification*

EN 14306, *Thermal insulation products for building equipment and industrial installations — Factory made calcium silicate (CS) products — Specification*

EN 14307, *Thermal insulation products for building equipment and industrial installations — Factory made extruded polystyrene foam (XPS) products — Specification*

EN 14308, *Thermal insulation products for building equipment and industrial installations — Factory made rigid polyurethane foam (PUR) and polyisocyanurate foam (PIR) products — Specification*

EN 14309, *Thermal insulation products for building equipment and industrial installations — Factory made products of expanded polystyrene (EPS) — Specification*

EN 14313, *Thermal insulation products for building equipment and industrial installations — Factory made polyethylene foam (PEF) products — Specification*

EN 14314, *Thermal insulation products for building equipment and industrial installations — Factory made phenolic foam (PF) 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 calcium silicate products which are used for the thermal insulation of building equipment and industrial installations with an operating temperature range of approximately - 170 °C to + 1 100 °C.

NOTE Calcium silicate products can be used below - 50 °C. Below the operating temperature of - 50 °C, special tests, regarding the suitability of the product in the intended application are advised (e.g. liquefaction of oxygen). Manufacturer's advice should be heeded in all cases.

The products are manufactured in the form of boards, pipe sections, segments and prefabricated ware.

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 structural performance of systems incorporating these products is not covered.

This standard does not specify the required level or class of a given property that shall be achieved by a product to demonstrate fitness for purpose in a particular application. The levels required for a given application can be found in regulations and invitations to tender.

Products with a declared thermal conductivity greater than 0,6 W/(mK) at 10 °C are not covered by this standard.

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This standard does not cover products intended to be used for the insulation of the building structure.

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

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## 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 993-14, *Methods of testing dense shaped refractory products — Part 14: Determination of thermal conductivity by the hot-wire (cross-array) method*

EN 1094-6, *Insulating refractory products — Part 6: Determination of permanent change in dimensions of shaped products on heating (ISO 2477:1987, modified)*

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

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EN 1609, *Thermal insulating products for building applications — Determination of short term water absorption by partial immersion*

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

EN 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, *Thermal insulating products — Evaluation of conformity*

EN 13467, *Thermal insulating products for building equipment and industrial installations — Determination of dimensions, squareness and linearity of preformed pipe insulation*

EN 13468, *Thermal insulating products for building equipment and industrial installations — Determination of trace quantities of water soluble chloride, fluoride, silicate, sodium ions and pH*

EN 13469, *Thermal insulating products for building equipment and industrial installations — Determination of water vapour transmission properties of preformed pipe insulation*

EN 13472, *Thermal insulating products for building equipment and industrial installations — Determination of short term water absorption by partial immersion of preformed pipe insulation*

EN 13501-1:2007, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

EN 13639, *Determination of total organic carbon in limestone*  
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EN 13823, *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 ISO 1182, *Reaction to fire tests for building products — Non-combustibility test (ISO 1182:2002)*

EN ISO 1716, *Reaction to fire tests for building products — Determination of the heat of combustion (ISO 1716:2002)*

EN ISO 8497, *Thermal insulation — Determination of steady-state thermal transmission properties of thermal insulation for circular pipes (ISO 8497:1994)*

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)*

EN ISO 13787, *Thermal insulation products for building equipment and industrial installations — Determination of declared thermal conductivity (ISO 13787:2003)*

### **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

##### **calcium silicate**

insulation material comprised of hydrated calcium silicate, normally reinforced by incorporating fibres

#### 3.1.1.2

##### **board**

##### **slab**

(insulation) rigid or semi-rigid 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 can also be supplied in tapered form.

#### 3.1.1.3

##### **pipe section**

##### **section**

(insulation) product in the shape of a cylindrical annulus which may be split to facilitate application

#### 3.1.1.4

##### **lag**

##### **segment**

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

### 3.1.2 Additional terms and definitions

#### 3.1.2.1

##### **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.

#### 3.1.2.2

##### **class**

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

#### 3.1.2.3

##### **prefabricated ware**

pieces cut, abraded or otherwise formed from a board or block of product, e.g. elbows, T-pieces, etc.

#### 3.1.2.4

##### **production line**

assemblage of equipment that produces products using a continuous process

#### 3.1.2.5

##### **production unit**

assemblage of equipment that produces products using a discontinuous process

## 3.2 Symbols, units and abbreviated terms

### 3.2.1 Symbols and units used in this standard

$b$	is the width	mm
$D_i$	is the inside diameter of pipe sections	mm
$d$	is the thickness	mm

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$d_D$	is the declared 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	%
$Li$	is the deviation from linearity	mm
$l$	is the length	mm
$\lambda$	is the thermal conductivity	W/(m · K)
$\lambda_D$	is the declared thermal conductivity	W/(m · K)
$\mu$	is the water vapour diffusion resistance factor	—
$S_b$	is the deviation from squareness of boards on length and width	mm/m
$S_d$	is the deviation from squareness of boards on thickness	mm
$S_{max}$	is the deviation from flatness	mm
$\sigma_{10}$	is the compressive stress at 10 % deformation	kPa
$\sigma_m$	is the compressive strength	kPa
$\nu$	is the deviation from squareness for pipe insulation	mm
$\rho_a$	is the apparent density	kg/m <sup>3</sup>
CS(Y)	is the symbol of the declared level for compressive stress at Y % deformation	
CS(10)	is the symbol of the declared level for compressive stress at 10 % deformation	
CL	is the symbol of the declared level of soluble chloride ions	
F	is the symbol of the declared level of soluble fluoride ions	
L	is the symbol of the declared class for length tolerances	
MU	is the symbol of the declared value for water vapour diffusion resistance factor	
P	is the symbol of the declared value for flatness tolerances	
pH	is the symbol of the declared level of the pH-value	
S	is the symbol of the declared class for squareness tolerances	
ST(+)	is the symbol of the declared level for maximum service temperature	
ST(-)	is the symbol of the declared level for minimum service temperature	
T	is the symbol of the declared class for thickness tolerances	
W	is the symbol of the declared class for width tolerances	

### 3.2.2 Abbreviations used in this standard

CS	is Calcium Silicate
ITT	is Initial Type Test
ML	is Manufacturer's Literature
FPC	is Factory Production Control

## 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 1 Information on additional properties is given in Annex E.

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

### 4.2 For all applications

#### 4.2.1 Thermal conductivity

For flat specimens thermal conductivity shall be based upon measurements carried out in accordance with EN 12667 and if relevant EN 12939 or EN 993-14 (this test is calibrated against EN 12667 and if relevant EN 12939). For cylindrical specimens EN ISO 8497 shall be used as specified in 5.3.2.

The thermal conductivity values shall be determined by the manufacturer and verified in accordance with EN ISO 13787. They shall be declared by the manufacturer according to the above specified measurement standards covering the declared product service temperature range. The following conditions apply:

- the measured values shall be expressed with three significant figures;
- the declared conductivity curve shall be given as limit curve, defined in EN ISO 13787;
- the values of the declared thermal conductivity,  $\lambda_D$ , shall be rounded upwards to the nearest 0,001 W/(m·K);
- the lowest reference mean test temperature that could be required is - 170 °C.

The declared equation/limit curve is the "declared reference" with three significant figures, that is to 0,001 W/(m·K) for all  $\lambda$  values. This shall be used as a reference for the verification of the declaration.

When thermal conductivity is declared as a table derived from the equation, rounding upwards to the next 0,001 W/(m·K) has to be done for the full range of the thermal conductivity.

NOTE Determinations of the declared thermal conductivity of pipe sections, following EN ISO 8497, having joints in the metering area, include the effects of these joints as defined in EN ISO 23993.

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## 4.2.2 Dimensions and tolerances

## 4.2.2.1 Linear dimensions

The length,  $l$ , width,  $b$ , and thickness,  $d$ , of boards and the dimensions of pipe sections and prefabricated ware shall be respectively determined in accordance with EN 822, EN 823 and EN 13467. No test result shall deviate from the declared values by more than the tolerance given in Table 1.

Table 1 — Dimensional tolerances

Form of delivery	Length	Width	Thickness	Inside diameter
Board	$\pm 3$ mm or	$\pm 3$ mm or	+ 3 mm	
	$\pm 0,4$ % <sup>a</sup>	$\pm 0,4$ % <sup>a</sup>	- 2 mm	
Pipe section or segment	$\pm 3$ mm or		+ 3 mm	- 0 mm
	$\pm 0,6$ % <sup>a</sup>		- 2 mm	+ 5 mm

<sup>a</sup> Whichever gives the greatest numerical tolerance.

## 4.2.2.2 Squareness

Deviation from squareness of boards,  $S_b$  and  $S_d$ , shall be determined in accordance with EN 824 and deviation from squareness for pipe sections and segments,  $v$ , in accordance with EN 13467. The deviation from squareness of boards on length and width,  $S_b$ , shall not exceed 6 mm/m and the deviation from squareness of boards on thickness,  $S_d$ , shall not exceed 2 mm. For pipe sections and segments, the deviation from squareness,  $v$ , shall not exceed 3 mm.

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## 4.2.2.3 Flatness

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Deviation from flatness,  $S_{max}$ , shall be determined in accordance with EN 825 for boards. The deviation from flatness,  $S_{max}$ , shall not exceed 6 mm.

## 4.2.2.4 Pipe section linearity

Deviation from linearity,  $Li$  shall be determined in accordance with EN 13467. The deviation from linearity,  $Li$ , shall not exceed 3 mm or  $\pm 0,6$  % on length, whichever gives the greatest numerical tolerance.

## 4.2.3 Dimensional stability

The 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  $(23 \pm 2)$  °C and  $(90 \pm 5)$  % relative humidity. The relative changes in length,  $\Delta\epsilon_l$ , and width,  $\Delta\epsilon_b$ , shall not exceed 1,0 %. The relative change in thickness,  $\Delta\epsilon_d$  shall not exceed 1,0 %.

## 4.2.4 Reaction to fire of the product as placed on the market

Reaction to fire classification (Euroclasses) of the product, as placed on the market, shall be determined in accordance with EN 13501-1, and the basic Mounting and Fixing rules given in EN 15715:2009.

NOTE 1 This classification is compulsory and always included in the CE marking label.

EN 13501-1:2007, Table 1, is applicable to products applied to flat surfaces or to curved surfaces with a diameter greater than 300 mm.