BS EN 14306:2015

BSI Standards Publication

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

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National foreword

This British Standard is the UK implementation of EN 14306:2015. It supersedes BS EN 14306:2009+A1:2013 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/540, Energy performance of materials components and buildings.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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English Version

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

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

This European Standard was approved by CEN on 24 October 2015.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

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European foreword

This document (EN 14306:2015) 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 June 2016, and conflicting national standards shall be withdrawn at the latest by September 2017.

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 supersedes EN 14306:2009+A1:2013.

This document is identifying those clauses of the standard which are needed for the compliance of the European Standard with the Construction Products Regulation (CPR).

The main technical changes that have been made in this new edition of EN 14306 are the following:

a) an addition to the foreword;

b) an addition in Clause 3.2.2;

c) a new Clause 4.3.8;

d) modification of Clause 5.3.2;

e) modification of Clause 7;

f) modification of Clause 8;

g) modification of Annex A;

h) deletion of Annex B (normative) Testing for reaction to fire;

i) a new Annex ZA.

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 Regulation (EU) No. 305/2011.

For relationship with Regulation (EU) No. 305/2011, 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), Determination of minimum service temperature;

— 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 Regulation.

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*

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*

EN 15501, *Thermal insulation products for building equipment and industrial installations — Factory made expanded perlite (EP) and exfoliated vermiculite (EV) 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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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.

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 European 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 European Standard does not specify the required level or class of a given property that should 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/(m·K) at 10 °C are not covered by this standard.

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

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

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 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*

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

EN 12085, *Thermal insulating products for building applications - Determination of linear dimensions of test specimens*

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 insulation 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+A1:2009, *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*

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

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 products - Non-combustibility test (ISO 1182)*

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

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

EN ISO 8894-1, *Refractory materials - Determination of thermal conductivity - Part 1: Hot-wire methods (cross-array and resistance thermometer) (ISO 8894-1)*

EN ISO 9229:2007, *Thermal insulation - Vocabulary (ISO 9229:2007)*

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

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

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 1 to entry: 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 witch 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 1 to entry: 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
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
λ	is the thermal conductivity	W/(m·K)
λ_D	is the declared thermal conductivity	W/(m·K)
μ	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
σ_{10}	is the compressive stress at 10 % deformation	kPa
σ_m	is the compressive strength	kPa
v	is the deviation from squareness for pipe insulation	mm
ρ_a	is the apparent density	kg/m^3
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

AVCP is **A**ssessment and **V**erification of **C**onstancy of **P**erformance (previously named attestation of conformity)

CS is **C**alcium **S**ilicate

DoP is **D**eclaration of **P**erformance

FPC is **F**actory **P**roduction **C**ontrol

PTD is **P**roduct **T**ype **D**etermination (previously named ITT for Initial Type Test)

RtF is **R**eaction to **F**ire

ThIBEII is **T**hermal **I**nsulation for **B**uilding **E**quipment and **I**ndustrial **I**nstallations

VCP is **V**erification of **C**onstancy of **P**erformance (previously named evaluation of conformity)

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 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 ISO 8894-1 (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, λ_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 λ 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.

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	±3 mm or ±0,4 % [a]	±3 mm or ±0,4 % [a]	+ 3 mm – 2 mm	
Pipe section or segment	±3 mm or ±0,6 % [a]		+ 3 mm – 2 mm	- 0 mm + 5 mm

[a] 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.

4.2.2.3 Flatness

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 ± 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 ± 2) °C and (90 ± 5) % relative humidity. The relative changes in length, $\Delta\varepsilon_l$, and width, $\Delta\varepsilon_b$ shall not exceed 1,0 %. The relative change in thickness, $\Delta\varepsilon_d$ 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+A1:2009, Table 1, is applicable to products applied to flat surfaces or to curved surfaces with a diameter greater than 300 mm.

If a flat product, which has a classification according to EN 13501-1:2007+A1:2009, Table 1, is used in a linear application it does not require further classification.

EN 13501-1:2007+A1:2009, Table 3, is applicable for products applied on linear objects or with a diameter below or equal 300 mm.

Detailed information about the test conditions and the field of application of the classification as stated in the reaction to fire classification report shall be given in the manufacturer's literature.

Manufacturers declaring Euroclass A1 without further test shall demonstrate by testing in accordance with EN 13820 that the products do not contain more than 1,0 % by weight of organic matter.

NOTE 2 The Commission Decision 96/603/EC of 4 October 1996 amended by the Commission Decision 00/605/EC of 26 September 2000 gives the list of products to be considered as reaction to fire Euroclass A1 without the need for testing.

4.2.5 Durability characteristics

4.2.5.1 General

The appropriate durability characteristics have been considered and are covered in 4.2.5.2, 4.2.5.3 and 4.2.5.4.

4.2.5.2 Durability of reaction to fire against ageing/degradation and high temperature

The reaction to fire performance of CS products does not change with time or when subjected to the declared maximum service temperature.

4.2.5.3 Durability of thermal resistance against ageing/degradation

The thermal conductivity of CS products does not change with time. This is covered by 4.2.1 thermal conductivity, 4.2.2 dimensions and tolerances and 4.2.3 dimensional stability or 4.3.2 maximum service temperature (dimensional stability).

4.2.5.4 Durability of thermal resistance against high temperature

The thermal conductivity of CS products does not change with time at a high temperature. This is covered by 4.3.2 maximum service temperature (dimensional stability).

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 that property does not need to be determined and declared by the manufacturer.

4.3.2 Maximum service temperature

The maximum service temperature, ST(+), for flat products shall be determined in accordance with EN 1094-6.

At the maximum service temperature the relative changes in length, $\Delta\varepsilon_l$, and in width, $\Delta\varepsilon_b$, shall not exceed 2 %.

The maximum service temperature, ST(+), shall be declared in °C in levels with steps of 50 °C.

The test specimen shall not exhibit evidence of self-heating.

Table 2 — Levels for maximum service temperature

Level	Requirement °C
ST(+) 650	≥ 650
ST(+) 700	≥ 700
ST(+) 750	≥ 750
ST(+) 800	≥ 800
ST(+) 850	≥ 850
ST(+) 900	≥ 900
ST(+) 950	≥ 950
ST(+) 1 000	≥ 1 000
ST(+) 1 050	≥ 1 050
ST(+) 1 100	≥ 1 100

4.3.3 Minimum service temperature

The minimum service temperature, ST(-), shall be declared in levels with steps of 50 °C.

The minimum service temperature, ST(-), shall be determined in accordance with Annex B.

At the minimum service temperature, ST(-) the relative changes in length, $\Delta\varepsilon_l$, and in width, $\Delta\varepsilon_b$, shall not exceed 2 %.

Minimum service temperature within the scope of this standard, but above 0 °C need not be tested.

4.3.4 Compressive stress or compressive strength

Compressive stress at 10 % deformation, σ_{10}, or the compressive strength, σ_m, shall be determined in accordance with EN 826. No test result shall be lower than the value, given in Table 3, for the declared level.

Table 3 — Levels for compressive stress at 10 % deformation or compressive strength

Level	Requirement kPa
CS(10\Y) 500	≥ 500
CS(10\Y) 1 000	≥ 1 000
CS(10\Y) 1 500	≥ 1 500
CS(10\Y) 2 000	≥ 2 000
CS(10\Y) 3 000	≥ 3 000
CS(10\Y) 4 000	≥ 4 000
CS(10\Y) 5 000	≥ 5 000
CS(10\Y) 10 000	≥ 10 000

NOTE EN 826 is not applicable to pipe sections, and compression behaviour is not determined.

4.3.5 Trace quantities of water soluble ions and the pH-value

Trace quantities of water soluble chloride and fluoride ions and the pH-value shall be determined in accordance with EN 13468. The manufacturer shall declare them as levels in mg per kg of product and the pH-value as levels in steps of 0,5. For chloride and fluoride, no test result shall exceed the declared value. For silicate and sodium, not test result shall be below the declared value. For the pH-value, no test result shall deviate from the declared value by more than 1,0.

4.3.6 Water vapour diffusion resistance

Calcium silicate products are used for applications at high temperatures where high humidity and water adsorption are irrelevant. In exceptional cases, the water vapour diffusion resistance factor, μ, shall be measured in accordance with EN 12086.

4.3.7 Short-term water absorption by partial immersion

Calcium silicate products could absorb water under poor storage conditions. The product shall be tested in accordance with EN 1609. Short-term water absorption by partial immersion of pipe sections, W_p, shall be determined in accordance with EN 13472.

4.3.8 Release of dangerous substances

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets.

In the absence of European harmonized test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

NOTE An informative database covering European and national provisions on dangerous substances is available at the Construction website on EUROPA accessed through: *http://ec.europa.eu/enterprise/construction/cpd-ds/*

4.3.9 Continuous glowing combustion

Where subjected to regulation a manufacturer shall declare the continuous glowing combustion according to national test method where available.

NOTE A European test method is under development and the standard will be amended when this is available.

5 Test methods

5.1 Sampling

Flat test specimens shall be taken from the same sample and sufficient to cover the needed tests.

The shorter side of the sample shall not be less than 300 mm or full size of the product whichever is the smaller.

Pipe section specimens shall be taken from a sample consisting of at least three full size sections.

Where applicable, the properties of pipe sections shall be measured on the boards from which the product is fabricated. In all cases dimensions and when relevant squareness and flatness shall be measured on the finished product.

5.2 Conditioning

No special conditioning of test specimens is needed unless otherwise specified in the test standard. In case of dispute, the test specimens shall be stored at (23 ± 2) °C and (50 ± 5) % relative humidity until constant mass prior to testing.

5.3 Testing

5.3.1 General

Table 4 gives the dimensions of the test specimens, the minimum number of test specimens required to get one test result and any specific conditions, which are necessary.

Table 4 — Test methods, test specimens and conditions

Dimensions in millimetres

Clause		Test method		Test specimens		Specific conditions
No.	**Title**	**Flat**	**Cylindrical**	**Dimensions** [a]	**Minimum number to get one test result**	
4.2.1	Thermal conductivity	EN 12939		≥ 300 × 300 × *d*	1	—
		EN ISO 8894-1		≥ 230 × 114 × *d*	1	—
			EN ISO 8497	Full-size	1	—
4.2.2	Dimensions and tolerances					
	Length and width	EN 822	EN 13467	Full-size	1	—
	Thickness	EN 823	EN 13467	Full-size	1	—
	Inside diameter		EN 13467	Full-size	1	—
4.2.2.2	Squareness	EN 824	EN 13467	Full-size	1	—
4.2.2.3	Flatness	EN 825		Full-size	1	—
4.2.2.4	Pipe section linearity		EN 13467	Full-size	1	—
4.2.3	Dimensional stability	EN 1604		Full size	1	—
				500 × 500 × *d*	3	—
				250 × 250 × *d*	3	—
				200 × 200 × *d*	3	—
4.2.4	Reaction to fire	EN 13501–1				EN 15715
4.3.2	Maximum service temperature	EN 1094–6	EN 1094–6	100 × 100 × *d* for pipe sections, see EN 1094–6	3	see 5.3.3
4.3.3	Minimum service temperature	Annex B		See Annex B	1	—
4.3.4	Compressive stress or compressive strength	EN 826	EN 826	see 6.1 in EN 826	3	—
4.3.5	Trace quantities of water soluble chlorides and the pH-value	EN 13468		—	3	20 g
4.3.6	Water vapour diffusion resistance	EN 12086	EN 13469	see 6.1 in EN 12086	3	—
				see 6.2 in EN 13469	3	see 6.1 in EN 13469
4.3.7	Short-term water absorption	EN 1609	EN 13472	200 × 200 × *d*	4	—
	Preformed pipe insulation				4	—
4.3.8	Release of dangerous substances	b	b	—	—	—
4.3.9	Continuous glowing combustion	b	b			

[a] Full-size product thickness, except for 4.2.3.

[b] Not yet available.

5.3.2 Thermal conductivity

For flat test specimens thermal conductivity shall be determined in accordance with EN 12667 for thin products or EN 12939 for thick products or EN ISO 8894-1 (when EN ISO 8894-1 is calibrated against EN 12667 or EN 12939). The tests in accordance with EN 12667 or EN 12939 may be replaced by tests in accordance with EN ISO 8894-1 provided it has been demonstrated that the results give safer (higher) values.

For cylindrical test specimens thermal conductivity shall be determined in accordance with EN ISO 8497. The tests in accordance with EN ISO 8497 may be replaced by tests in accordance with EN 12939 or EN ISO 8894-1 provided it has been demonstrated that the results give safe (higher) values.

The thermal conductivity shall be determined for the full temperature range of the product. For factory production control see Annex A.

The thermal conductivity shall be measured directly at the measured thickness. If this is not possible, it shall be determined by measurements on other thicknesses of the product providing that:

— the product is of similar chemical and physical characteristics and is produced on the same production unit;

— and it can be demonstrated that the thermal conductivity, λ, does not vary more than 5 % over the range of thicknesses where the calculation is applied.

Where a product is manufactured in a range of thicknesses and the manufacturer chooses to characterize the entire range by declaring only one λ, he shall declare the highest λ of the range.

For PTD, measurements of thermal conductivity made on two internal diameters of pipe sections at the greatest and smallest insulation thickness for each set of the diameters are deemed to be representative of the total product range.

For FPC, one dimension only is used.

NOTE Suitable sizes are 48 mm and 194 mm internal diameter.

The guarded hot plate method EN 12939 or the hot wire methods EN ISO 8894-1 shall be deemed to be a suitable method for measurement of pipe sections having a diameter exceeding 500 mm. Flat slabs shall be prepared having the same thickness and density as the sections.

5.3.3 Maximum service temperature

5.3.3.1 General

Maximum service temperature shall be determined in accordance with EN 1094-6 at the declared maximum service temperature with the exception that the minimum test temperature shall be 650 °C. Specimens for testing the maximum service temperature of pipe sections and segments may be cut from flat boards with the same composition and density as the pipe section or segment product.

5.3.3.2 Test specimens

The test specimens shall be square cut with a cross section of 100 mm × 100 mm.

The thickness shall be always product thickness for all applications.

5.3.4 Reaction to fire

The tests shall be carried out in accordance with the rules given in EN 13501-1.

Rules for mounting and fixing are given in EN 15715:2009.

Annex A of EN 15715:2009 gives tables for product and installation parameters for flat products and pipe insulation products as placed on the market. Installation parameters for standardized assemblies are only given for flat products.

6 Designation code

A designation code for the product shall be given by the manufacturer. The following shall be included except when there is no requirement for a property described in 4.3:

— The calcium silicate abbreviated term	CS
— Maximum service temperature	ST(+)i
— Minimum service temperature	ST(-)i
— Compressive stress at 10 % deformation or compressive strength	CS(10\Y)i
— Water soluble chloride, fluoride and the pH-value	CLi, Fi, pHi
— Water vapour diffusion resistance factor	MUi

where “i” shall be used to indicate the relevant class or level.

The designation code for a CS product is illustrated by the following example:

CS – EN 14306 – ST(+) 1050 – CS(10) 1500

7 Assessment and Verification of the Constancy of Performance (AVCP)

7.1 General

The manufacturer or his authorized representative shall be responsible for the conformity of his product with the requirements of this European Standard. The Assessment and Verification of Constancy of Performance (AVCP) shall be carried out in accordance with EN 13172 and shall be based on Product Type Determination (PTD), Factory Production Control (FPC) by the manufacturer, including product assessment and tests on samples taken at the factory.

The compliance of the product with the requirements of this standard and with the stated values (including classes) shall be demonstrated by:

— Product Type Determination (PTD),

— Factory Production Control (FPC) by the manufacturer, including product assessment.

If a manufacturer decides to group his products, it shall be done in accordance with EN 13172.

7.2 Product Type Determination (PTD)

All characteristics defined in 4.2 and those in 4.3 if declared, shall be subject to Product Type Determination (PTD). Product Type Determination (PTD) for the thermal conductivity curve shall be carried out in accordance with EN ISO 13787.

For Product Type Determination (PTD) only one test result is required for the thermal conductivity curve and the minimum and the maximum service temperature.

7.3 Factory Production Control (FPC)

The minimum frequencies of tests in the factory production control (FPC) shall be in accordance with Annex A of this standard. When indirect testing is used, the correlation to direct testing shall be established in accordance with EN 13172.

8 Marking and labelling

Products conforming to this standard shall be clearly marked, either on the product or on the label or on the packaging, with the following information:

— product name or other identifying characteristic;

— name or identifying mark and address of the manufacturer or his authorized representative in the European Economic Area;

— shift or time of production and manufacturing plant or traceability code;

— reaction to fire class; specific test conditions shall be indicated with the marking by reference to manufacturer's literature, where relevant;

— the intended use of the insulation material for Thermal Insulation of Building Equipment and Industrial Installations is given by the abbreviation ThIBEII;

— declared thermal conductivity: reference to Declaration of Performance (DoP), showing thermal conductivity as a function of temperature, given as a table, curve and/or equation;

— declared thickness;

— designation code as given in Clause 6;

— type of facing, if any;

— declared length and declared width or inside diameter, as appropriate;

— number of pieces and area in the package, as appropriate.

NOTE For CE marking and labelling, see ZA.3.

Annex A
(normative)

Factory production control

Table A.1 — Minimum product testing frequencies

Subclause		Minimum testing frequency [a]		
No.	Title	Direct testing	Indirect testing	
			Test method	Frequency
4.2.1	Thermal conductivity – at the declared temperature range	1 per 2 years	density and manufacturer's methods	1 per 24 h [b]
4.2.2	Dimensions and tolerances			
	– Length and Width	1 per 24 h	—	—
	– Thickness	1 per 24 h	—	—
	– Inside Diameter	1 per 24 h	—	—
4.2.2.2	Squareness	1 per 24 h	—	—
4.2.2.3	Flatness	1 per 24 h	—	—
4.2.2.4	Pipe section linearity	1 per 24 h	—	—
4.2.3	Dimensional stability	1 per 5 years	—	—
4.2.4	Reaction to fire	See Table A.2	—	—
4.3.2	Maximum service temperature	1 per 24 h	—	—
4.3.3	Minimum service temperature	1 per 5 years	—	—

Subclause		Minimum testing frequency [a]		
No.	Title	Direct testing	Indirect testing	
			Test method	Frequency
4.3.4	Compressive stress or strength	1 per 24 h	—	—
4.3.5	Trace quantities of water soluble chloride, fluoride and the pH-value	1 per 5 years	—	—
4.3.6	Water vapour diffusion resistance factor	1 per 5 years	—	—
4.3.7	Short-term water absorption	1 per 5 years	—	—
4.3.8	Release of dangerous substances	[c]	—	—
4.3.9	Continuous glowing combustion	[c]	—	—

[a] The minimum testing frequencies, expressed in number of test results required per period, shall be understood as the minimum for continuous production for each production unit/line under stable conditions. In addition to the testing frequencies given above, testing of relevant properties of the product shall be repeated when changes or modifications are made that are likely to affect the conformity of the product. For PTD and FPC, units using the same process in one factory are considered together (as one production line). For mechanical properties, the testing frequencies given are independent of the change of product. In addition, the manufacturer shall establish internal rules for process adjustments related to these properties when changing the product.

[b] Once per 24 h where there has been production.

[c] Frequencies are not given.

Table A.2 — Minimum product testing frequencies for the reaction to fire characteristics

Subclause		Minimum testing frequency [a]							
No.	Title	Direct testing [b]		Indirect testing [c]					
4.2.4	Reaction to fire class			Product		Components [d]			
						Substantial		Non-substantial	
		Test method	Frequency	Test method	Fre-quency	Test method	Frequency	Test method	Frequency
	A1 without further fire testing [e]	EN 13639	1 per 2 years and indirect testing	—	—	Check of raw material, Formulation, apparent density	1 per delivery, 1 per 24 h, 1 per 24 h	—	—
	A1	EN ISO 1182 and EN ISO 1716 and EN 13823 where applicable	1 per 2 years and indirect testing	—	—	Check of raw material, Formulation, apparent density	1 per delivery, 1 per 24 h, 1 per 24 h	—	—
	A2	EN ISO 1182 or EN ISO 1716 and EN 13823	1 per 2 years and indirect testing	—	—	Check of raw material, Formulation, apparent density	1 per delivery, 1 per 24 h, 1 per 24 h	—	—
	B C D	EN 13823 and EN ISO 11925-2	1 per 2 years and indirect testing	—	—	Check of raw material, Formulation, apparent density	1 per delivery, 1 per 24 h, 1 per 24 h	—	—

[a] The minimum testing frequencies expressed in test results required per period, shall be understood as the minimum for a product or product group for each production unit/line under stable conditions. In addition to the testing frequencies given above, testing of relevant properties of the product shall be repeated when changes or modifications are made that are likely to affect the conformity of the product.

[b] Direct testing may be conducted either by a third party or by the manufacturer.

[c] Indirect testing may be conducted by a third party or by the manufacturer on the product or on its components.

[d] Definition as given in the Euroclasses Decision 2000/147/EC:

– Substantial component: A material that constitutes a significant part of a non-homogeneous product. A layer with a mass per unit area ≥ 1,0 kg/m^2 or a thickness ≥ 1,0 mm is considered to be a substantial component.

– Non-substantial component: A material that does not constitute a significant part of a non-homogeneous product. A layer with a mass per unit area < 1,0 kg/m^2 and a thickness < 1,0 mm is considered to be a non-substantial component.

[e] European Decision 96/603/EC: Materials to be considered as reaction to fire class A provided for in Decision 94/611/EC without the need for testing (of reaction to fire characteristics).

Annex B
(normative)

Determination of minimum service temperature

B.1 Definitions

For the purposes of this annex, the following definition applies:

minimum service temperature

lowest temperature to which a thermal insulation product may be exposed at a given thickness and at which it will continue to function within specified limits of performance

NOTE 1 The required performance may be in the areas of dimensional stability, thermal properties, and mechanical properties.

NOTE 2 In the present test procedure, which is used as a reference, the test specimen is exposed to a temperature difference going from ambient to the minimum service temperature. This may not reflect the actual application conditions when products are exposed to different temperatures on the two main faces, e.g. in multilayer systems.

B.2 Principle

Determine the dimensional variation of the test specimen in contact with the coldest plate for the determination of the thermal conductivity by the guarded hot plate by measuring its length, width and thickness before the cooling down and after the apparatus has been returned to ambient temperature. Record the lowest temperature of the coldest plate during the measurement.

Alternative method: Determine the dimensional variation of the test specimen by the determination of the thermal conductivity by the hot wire method, by measuring its length, width and thickness before the cooling down and after the apparatus has been returned to ambient temperature. Record the lowest temperature during the measurement.

NOTE The procedure may be an iterative process.

B.3 Apparatus

B.3.1 Guarded hot plate apparatus, to measure the thermal conductivity

The apparatus shall be capable of functioning with a coldest plate as cold as the expected minimum service temperature of the test product.

The test specimen dimensions shall correspond to the requirements of this standard.

B.3.2 Hot wire apparatus, to measure the thermal conductivity

The apparatus shall be capable of functioning as cold as the expected minimum service temperature of the test product.

B.3.3 Micrometer, permitting thickness reading to at least 0,05 mm.

B.3.4 Sliding caliper, permitting reading to at least 0,1 mm.

B.4 Test specimens

B.4.1 Dimensions of test specimens

The test specimens shall be square cut or circular with dimensions corresponding to those foreseen for the used guarded hot plate method or for the used hot wire method.

For guarded hot plate, they shall not be less than 200 mm × 200 mm × 25 mm or exceed 500 mm × 500 mm × 50 mm for square test specimen or they shall not be less than 200 mm in diameter × 25 mm or exceed 500 mm in diameter × 50 mm for circular test specimen. For hot wire, they shall be 230 mm × 115 mm × d mm.

The length, width and thickness or diameter and thickness shall be as specified in this standard, complying with the requirements of this annex.

B.4.2 Number of test specimens

The minimum number of test specimens shall be as specified in this product standard.

B.4.3 Conditioning of the test specimens

The test specimens shall be stored in the conditions foreseen for the thermal conductivity measurement. In the absence of such conditions, they shall be stored for at least 6 h at (23 ± 5) °C or in case of dispute, at (23 ± 2) °C and (50 ± 5) % relative humidity as specified in 5.2.

B.5 Procedure

B.5.1 Test conditions

The initial conditions for the test shall be (23 ± 5) °C.

B.5.2 Test procedure

Measure the length and width of the test specimen, l_1, b_1, in accordance with EN 12085, read to the nearest 0,1 mm.

Measure the thickness of the test specimen, d_1, in accordance with EN 823 using the load specified in the relevant product standard, read to the nearest 0,05 mm.

Install the test specimen in the guarded hot plate apparatus, one plate of which shall be cooled down to the minimum service temperature during the thermal conductivity measurement.

Carry out the thermal conductivity measurements recording the lowest temperature of the coldest plate and the temperatures of the less cold plate at the same time.

After the measurement – usually consisting of several points – shut off the apparatus and wait until the apparatus is warmed up to ambient temperature.

Take the test specimen from the apparatus and remeasure its length l_2, and its width, b_2, in accordance with EN 12085, to the nearest 0,1 mm.

Remeasure the thickness of the test specimen, d_2, in accordance with EN 823 using the load specified in the relevant product standard, read to the nearest 0,05 mm.

B.5.3 Alternative test procedure

Measure the length and width of the test specimen, l_1, b_1, in accordance with EN 12085, read to the nearest 0,1 mm.

Measure the thickness of the test specimen, d_1, in accordance with EN 823 using the load specified in the relevant product standard, read to the nearest 0,05 mm.

Install the test specimen in the apparatus that will provide the determination of the thermal conductivity by hot wire method at low temperature and cool down to the requested temperature.

Carry out the thermal conductivity measurements recording the lowest temperature.

After the measurement – usually consisting of several points – shut off the apparatus and wait until the apparatus is warmed up to ambient temperature.

Take the test specimen from the apparatus and remeasure its length l_2, and its width, b_2, in accordance with EN 12085, to the nearest 0,1 mm.

Remeasure the thickness of the test specimen, d_2, in accordance with EN 823 using the load specified in the relevant product standard, read to the nearest 0,05 mm.

B.6 Calculation and expression of results

B.6.1 Dimensional changes

Calculate the dimensional changes of length, width and thickness, in percentage, using the following equations:

$$\Delta\varepsilon_{\mathrm{l}} = 100 \times \frac{l_2 - l_1}{l_1} \tag{B.1}$$

$$\Delta\varepsilon_{\mathrm{b}} = 100 \times \frac{b_2 - b_1}{b_1} \tag{B.2}$$

$$\Delta\varepsilon_{\mathrm{d}} = 100 \times \frac{d_2 - d_1}{d_1} \tag{B.3}$$

where

l_1, b_1 and d_1 are respectively the length, width and thickness of the test specimen before the measurement of the thermal conductivity;

l_2, b_2 and d_2 are respectively the length, width and thickness of the test specimen after the measurement of the thermal conductivity.

Calculate the mean values of dimensional changes, $\overline{\Delta\varepsilon_{\mathrm{l}}}$, $\overline{\Delta\varepsilon_{\mathrm{b}}}$, and $\overline{\Delta\varepsilon_{\mathrm{d}}}$ as a percentage rounded to the nearest 0,5 % of the individual results.

B.6.2 Additional tests and/or observation

The result of the visual examination of the test specimen shall be noted.

If the relevant clause of this annex and/or the relevant product standard specify additional requirements, the calculations and/or observations shall be noted accordingly.

B.7 Accuracy of measurements

NOTE It has not been possible to include a statement on the accuracy of the method in this edition of the standard, but it is intended to include such a statement when the standard is next revised.

B.8 Test report

The test report shall include the following information:

a) reference to this European Standard;

b) product identification:

   1) product name, factory, manufacturer or supplier;

   2) production code number;

   3) type of product;

   4) packaging;

   5) the form in which the product arrived at the laboratory;

   6) other information as appropriate, e.g. nominal dimensions, nominal density;

c) test procedure:

   1) pre-test history and sampling, e.g. who sampled and where;

   2) conditioning;

   3) if any deviation from B.4 and B.5;

   4) date of testing;

   5) dimensions and number of test specimens;

   6) the chosen temperature increase rate;

   7) general information relating to the test and test procedure (general or alternative test procedure);

   8) events which may have affected the results;

Information about the apparatus and identity of the technician should be available in the laboratory but it need not be recorded in the report.

d) results.

All individual deformation and temperature. All individual values and the mean values of the dimensional changes. Note if dimensional changes are shrinkage or expansion. All individual values and the mean value of the minimum service temperature. Note the visual evaluation. Additional results as specified in the relevant clauses of this Annex or the relevant product standard or any other European technical specification.

Annex C
(informative)

Preparation of the test specimens to measure thermal conductivity

C.1 Preparation of the test specimens to measure thermal conductivity

During the first heating of calcium silicate products self heating and cooling effects are possible. To avoid an influence of these effects it is recommended to either use dead burnt specimens or choose measurement temperatures without such effects, in accordance with EN ISO 13787. Differential thermal analysis data or mass change data of the product can be helpful to find temperature ranges without heating and cooling effects.

NOTE 1 When using EN 12939 it is recommended for maximum accuracy, that the temperature difference between the hot and the cold surface of the specimens is such that the temperature gradient in the specimen equals or exceeds 500 K/m with a minimum of 15 K.

NOTE 2 When using EN ISO 8894-1 it is recommended for maximum accuracy, that the temperature of the hot wire between the start and the end of the measurement varies not more than 30 K.

C.2 Ageing

No ageing of the thermal resistance properties of calcium silicate products occurs.

Annex D
(informative)

Additional properties

D.1 General

The manufacturer can choose to give information on the following additional properties (see Table D.1).

This information, where appropriate for the product and the application, should be given as limiting values for each test result obtained from the referred test method, sampling and conditions as given in Table D.1.

D.2 Coefficient of thermal expansion

Coefficient of thermal expansion, if voluntarily declared, will be determined in accordance with EN 13471.

D.3 Apparent and true porosity

The apparent and true porosity of calcium silicate products, if voluntarily declared, will be determined in accordance with EN 993-1.

D.4 Air flow resistance

Air flow resistance, if voluntarily declared, will be determined in accordance with EN 29053.

D.5 Creep in compression

Creep in compression, if voluntarily declared, will be determined in accordance with EN 993-9, *Methods of testing dense shaped refractory products — Part 9: Determination of creep in compression*.

D.6 Permeability to gases

Permeability to gases, if voluntarily declared, will be determined in accordance with EN 993-4.

D.7 Acoustic properties

Acoustic properties, if voluntarily declared, will be determined in accordance with EN ISO 11654.

D.8 Bending strength

Bending strength, if voluntarily declared, will be determined in accordance with EN 12089. No test result should be less than the declared level, BS, chosen from the following values: 250 kPa, 500 kPa, 750 kPa, 1 000 kPa, 1 500 kPa, 2 000 kPa, 3 000 kPa, 4 000 kPa, 5 000 kPa and 10 000 kPa.

D.9 Apparent density

Apparent density is a useful parameter, among others, for identification but it should not be used as a basis for the quality assessment of calcium silicate products.

Apparent density of boards, if voluntarily declared by the manufacturer will be determined in accordance with EN 1602, *Thermal insulating products for building applications — Determination of the apparent density*. No mean value of a product should deviate by more than ± 10 % from the declared value given in ML.

Apparent density of pipe sections not made from boards, if voluntarily declared by the manufacturer will be determined in accordance with EN 13470, T*hermal insulating products for building equipment and industrial installations — Determination of the apparent density of preformed pipe insulation*.

Table D.1 — Test methods, specimens and conditions

Dimensions in millimetres

Clause		Test method	Test specimens		Specific conditions	Factory production control
No.	**Title**	**EN**	**Dimensions** [a]	**Number to get one test result**		**Minimum product testing frequencies** [b]
D.2	Coefficient of thermal expansion	EN 13471	50 × 10 × 10 or diameter of 10	1	see 6.4 and 7.1 in EN 13471:2001	1 per 5 years
D.3	Apparent and true porosity	EN 993–1	—	—	—	1 per 5 years
D.4	Air flow resistance	EN 29053	—	—	—	1 per 5 years
D.5	Creep in compression	EN 993–9	cylinder 50 × 50	1	—	1 per 5 years
D.6	Permeability to gases	EN 993–4	—	—	—	1 per 5 years
D.7	Acoustic properties	EN ISO 11654	—	—	—	1 per 5 years
D.8	Bending strength	EN 12089	—	3	—	1 per 5 years
D.9	Apparent density	EN 1602, EN 13470	—	3	—	1 per 24 h

[a] Product thickness.

[b] Only relevant in case of declaration of the property.

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Regulation

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/103[1)] "Thermal insulation products" given to CEN by the European Commission and the European Free Trade Association.

If this European standard is cited in the Official Journal of the European Union (OJEU), the clauses of this standard, shown in this annex, are considered to meet the provisions of the relevant mandate, under the Regulation (EU) No. 305/2011.

This annex deals with the CE marking of the factory made calcium silicate (CS) intended for the use indicated in Table ZA.1 and shows the relevant clauses applicable.

This annex has the same scope as Clause 1 of this standard related to the aspects covered by the mandate and is defined by Table ZA.1.

1) As amended by mandates M126, M130 and M367

Table ZA.1 — Relevant clauses for factory made calcium silicate (CS) and intended use

Product: Factory made calcium silicate (CS) products **Intended use:** Thermal insulation for Building Equipment and Industrial Installations (ThIBEII)			
Essential Characteristics	**Clauses in this and other European standard(s) related to essential characteristics** [e]	**Regulatory classes**	**Notes**
Thermal resistance	4.2.1 Thermal conductivity	—	Declared λ_D curve or table vs. temperature
	4.2.2 Dimensions and tolerances	—	Flat products: Declared thickness d_D and tolerance class Linear products: Inner diameter D_i, thickness d_D and tolerance class
Reaction to fire	4.2.4 Reaction to fire	Euroclasses	—
Durability of thermal resistance against high temperature	4.2.1 Thermal conductivity	—	Declared λ_D curve or table vs. temperature
	4.3.2 Maximum service temperature	—	Declared ST(+)
Durability of thermal resistance against ageing/degradation	4.2.1 Thermal conductivity	—	Declared λ_D curve or table vs. temperature[b]
	4.2.3 Dimensional stability or	—	—
	4.3.2 Maximum service temperature	—	Declared ST(+)
	4.3.3 Minimum service temperature	—	Declared ST(-)
Durability of reaction to fire against high temperature	4.2.5 Durability characteristics	Euroclasses	c
Durability of reaction to fire against ageing/degradation	4.2.5 Durability characteristics	Euroclasses	a
Compressive strength	4.3.4 Compressive stress or compressive strength	—	Declared CS
Rate of release of corrosive substances	4.3.5 Trace quantities of water-soluble ions and the pH-value	—	Levels of ion content and level of the pH-value
Water vapour permeability	4.3.6 Water vapour diffusion resistance	—	Declared MU
Water permeability	4.3.7 Water absorption	—	—
Release of dangerous substances to the indoor environment	4.3.8 Release of dangerous substances	—	d
Continuous glowing combustion	4.3.9 Continuous glowing combustion	—	d

a No change in reaction to fire properties for calcium silicate (CS) products.
The fire performance of calcium silicate (CS) does not deteriorate with time. The Euroclass classification of the product is related to the organic content, which cannot increase with time.

b Thermal conductivity of calcium silicate (CS) products does not change with time.

c The fire performance of calcium silicate (CS) does not deteriorate with high temperature. The Euroclass classification of the product is related to the organic content, which remains constant or decreases with high temperature.

d European test methods are under development.

e Also valid and applicable for multilayers

The declaration of the product performance related to certain essential characteristics is not required in those Member States (MS) where there are no regulatory requirements on these essential characteristics for the intended use of the product. In this case, manufacturers placing their products on the market of these MS are not obliged to determine nor declare the performance of their products with regard to these essential characteristics and the option "No performance determined" (NPD) in the information accompanying the CE marking and in the declaration of performance (see ZA.3) may be used for those essential characteristics.

ZA.2 Procedures for AVCP of factory made calcium silicate (CS)

ZA.2.1 Systems of AVCP

The AVCP systems of factory made calcium silicate (CS) products indicated in Table ZA.1, established by EC Decision 95/204/EC of 31.05.95 (OJ L 129) revised by decision 99/91/EC of 25.01.99 (OJ L 29) amended by the decision 01/596/EC of 08.01.01 (OJ L 209) is shown in Table ZA.2 for the indicated intended use and relevant level(s) or class(es) of performance.

Table ZA.2 — Systems of AVCP

Product(s)	Intended use(s)	Level(s) or class(es) (reaction to fire)	AVCP system(s)
Thermal insulation products (Factory made products)	For uses subject to regulations on reaction to fire	(A1, A2, B, C)[a]	1
		(A1, A2, B, C)[b], D, E	3
		(A1 to E)[c], F	4
	Any	—	3
System 1: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.2 System 3: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.4 System 4: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.5			

[a] Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material).

[b] Products/materials not covered by footnote ([a])

[c] Products/materials that do not require to be tested for reaction to fire (e.g. products/materials of classes A1 according to Commission Decision 96/603/EC, as amended).

The AVCP of the factory made calcium silicate (CS) products in Table ZA.1 shall be according to the AVCP procedures indicated in Tables ZA.3.1 to ZA.3.3 resulting from application of the clauses of this or other European Standard indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

Table ZA.3.1 — Assignment of AVCP tasks for factory made calcium silicate (CS) products under system 1 for reaction to fire and system 3 (see Table ZA.2)

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory Production Control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared.	Clause 5, Annexes B and C of EN 13172:2012 and Clause 7.3 of this standard
	Further testing of samples taken at factory according to the prescribed test plan	Essential characteristics of Table ZA.1 relevant for the intended use which are declared	Annex A of this standard
	Determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product	Essential characteristics of Table ZA.1 relevant for the intended use which are declared and not tested by the notified testing laboratory and by the product certification body involved with reaction to fire	Clause 6 of EN 13172:2012 and Clause 7.2 of this standard
Tasks for notified testing laboratory	Determination of the product-type on the basis of type testing (including sampling carried out by the manufacturer), type calculation, tabulated values or descriptive documentation of the product	— Thermal resistance; — Release of dangerous substances [a]; — Compressive strength (for load bearing applications); — Water permeability*;* — Release of corrosive substances *(if relevant).*	Clause 6 of EN 13172:2012 and Clause 7.2 of this standard
Tasks for the notified product certification body	Determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product [b]	— Reaction to fire	Clause 6 of EN 13172:2012 and Clause 7.2 of this standard
	Initial inspection of manufacturing plant and of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which are declared, namely reaction to fire. Documentation of the FPC.	Annex B and C of EN 13172:2012 and Clause 7.3 of this standard
	Continuous surveillance, assessment and evaluation of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which are declared, namely reaction to fire. Documentation of the FPC.	Annex B and C of EN 13172:2012 and Clause 7.3 of this standard

[a] No test method available yet.

[b] Sampling shall be carried out as defined in 5.1

Table ZA.3.2 — Assignment of AVCP tasks for factory made calcium silicate (CS) products under system 3 (see Table ZA.2)

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory Production Control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared	Clause 5, Annexes C and D of EN 13172:2012 and Clause 7.3 of this standard
	Determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product	Essential characteristics of Table ZA.1 relevant for the intended use which are declared and not tested by the notified testing laboratory	Clause 6 of EN 13172:2012 and Clause 7.2 of this standard
Tasks for a notified testing laboratory	Determination of the product type on the basis of type testing (based on sampling carried out by the manufacturer) or tabulated values	— Reaction to fire; — Thermal resistance; — Release of dangerous substances [a]; — Compressive strength (for load bearing applications); — Water permeability; — Release of corrosive substances *(if relevant).*	Clause 6 of EN 13172:2012 and Clause 7.2 of this standard

[a] No test method available yet.

Table ZA.3.3 — Assignment of AVCP tasks for factory made calcium silicate (CS) products under combined system 4 for reaction to fire and system 3 (see Table ZA.2)

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory Production Control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which is declared	Clause 5, Annexes C and D of EN 13172:2012 and Clause 7.3 of this standard
	Determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product	Essential characteristics of Table ZA.1 relevant for the intended use which are declared and not tested by the notified testing laboratory	Clause 6 of EN 13172:2012 and Clause 7.2 of this standard
Tasks for a notified testing laboratory	Determination of the product type on the basis of type testing (based on sampling carried out by the manufacturer) or tabulated values	— Thermal resistance; — Release of dangerous substances [a]; — Compressive strength (for load bearing applications); — Water permeability; — Release of corrosive substances *(if relevant).*	Clause 6 of EN 13172:2012 and Clause 7.2 of this standard
[a] No test method available yet.			

ZA.2.2 Declaration of Performance (DoP)

ZA.2.2.1 General

The manufacturer draws up the DoP and affixes the CE marking on the basis of the different AVCP systems set out in Annex V of the Regulation (EU) No 305/2011:

In case of products under system 1

— the factory production control and further testing of samples taken at the factory according to the prescribed test plan, carried out by the manufacturer; and

— the certificate of constancy of performance issued by the notified product certification body on the basis of determination of the product type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product; initial inspection of the manufacturing plant and of factory production control and continuous surveillance, assessment and evaluation of factory production control.

In case of products under system 3

— the factory production control carried out by the manufacturer; and

— the determination of the product-type on the basis of type testing (based on sampling carried out by the manufacturer), type calculation, tabulated values or descriptive documentation of the carried out by the notified testing laboratory.

In case of products under system 4

— the factory production control carried out by the manufacturer; and

— the determination by the manufacturer of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product.

ZA.2.2.2 Content

The model of the DoP is provided in Annex III of the Regulation (EU) No 305/2011.

According to this Regulation, the DoP shall contain, in particular, the following information:

— the reference of the product-type for which the declaration of performance has been drawn up;

— the AVCP system or systems of the construction product, as set out in Annex V of the CPR;

— the reference number and date of issue of the harmonized standard which has been used for the assessment of each essential characteristic;

— where applicable, the reference number of the Specific Technical Documentation used and the requirements with which the manufacturer claims the product complies.

The DoP shall in addition contain:

a) the intended use or uses for the construction product, in accordance with the applicable harmonized technical specification;

b) the list of essential characteristics, as determined in the harmonized technical specification for the declared intended use or uses;

c) the performance of at least one of the essential characteristics of the construction product, relevant for the declared intended use or uses;

d) where applicable, the performance of the construction product, by levels or classes, or in a description, if necessary based on a calculation in relation to its essential characteristics determined in accordance with the Commission determination regarding those essential characteristics for which the manufacturer shall declare the performance of the product when it is placed on the market or the Commission determination regarding threshold levels for the performance in relation to the essential characteristics to be declared;

e) the performance of those essential characteristics of the construction product which are related to the intended use or uses, taking into consideration the provisions in relation to the intended use or uses where the manufacturer intends the product to be made available on the market;

f) for the listed essential characteristics for which no performance is declared, the letters “NPD” (No Performance Determined).

Regarding the supply of the DoP, article 7 of the Regulation (EU) No 305/2011 applies.

The information referred to in Article 31 or, as the case may be, in Article 33 of Regulation (EC) No 1907/2006, (REACH) shall be provided together with the DOP.

ZA.2.2.3 Example of DoP

The following gives an example of a filled-in DoP for factory made calcium silicate (CS) for EN 14306

DECLARATION OF PERFORMANCE

No 0123-DoP-2013/10/07

1. Unique identification code of the product-type:

ABCD High Temperature Board

2. Type, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4) of the CPR:

see product label

3. Intended use or uses of the construction product, in accordance with the applicable harmonized technical specification, as foreseen by the manufacturer:

Thermal Insulation for Building Equipment and Industrial Installations (ThIBEII)

4. Name, registered trade name or registered trade mark and contact address of the manufacturer as required under Article 11(5):

Any Co Ltd, PO Box 21, B-1050

5. Where applicable, name and contact address of the authorized representative whose mandate covers the tasks specified in Article 12(2):

not relevant

6. System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR, Annex V:

Systems 1 and 3

7. In case of the declaration of performance concerning a construction product covered by a harmonized standard:

Notified certification body No. 4567 performed, carried out the determination of the product type, the initial inspection of the manufacturing plant and of factory production control and the continuous surveillance, assessment and evaluation of factory production control and issued the certificate of constancy of performance for reaction to fire. Notified testing laboratory No. 7456 performed the test reports for the other relevant declared characteristics

8. Declared performance

<table>
<tr><th colspan="2">Essential characteristics</th><th colspan="8">Performance</th><th>Harmonized technical specification</th></tr>
<tr><td rowspan="3">Thermal resistance</td><td rowspan="2">Thermal conductivity</td><td>ϑ °C</td><td>50</td><td>100</td><td>200</td><td>300</td><td>400</td><td>500</td><td>600</td><td rowspan="14">EN 14306:2015</td></tr>
<tr><td>λ_D W/(m·K)</td><td>0,041</td><td>0,047</td><td>0,060</td><td>0,076</td><td>0,094</td><td>0,114</td><td>0,137</td></tr>
<tr><td>Thickness</td><td colspan="8">d_D = 20 mm – 120 mm</td></tr>
<tr><td colspan="2">Reaction to fire</td><td colspan="8">A1</td></tr>
<tr><td colspan="2">Durability of thermal resistance against ageing/degradation</td><td colspan="8">Maximum service temperature ST(+)600 (=600 °C)</td></tr>
<tr><td colspan="2">Durability of thermal resistance against high temperature</td><td colspan="8">Maximum service temperature ST(+)600 (=600 °C)</td></tr>
<tr><td colspan="2">Durability of reaction to fire against ageing/degradation</td><td colspan="8">Durability characteristics A1</td></tr>
<tr><td colspan="2">Durability of reaction to fire against high temperature</td><td colspan="8">Durability characteristics A1</td></tr>
<tr><td colspan="2">Compressive strength</td><td colspan="8">Compressive stress at 10 % deformation CS(10)20 (≥20 kPa)</td></tr>
<tr><td colspan="2">Rate of release of corrosive substances</td><td colspan="8">Trace quantities of water-soluble chloride ions CL10 (≤10 ppm)
pH-value pH9.5</td></tr>
<tr><td colspan="2">Water permeability</td><td colspan="8">NDP</td></tr>
<tr><td colspan="2">Water vapour permeability</td><td colspan="8">NDP</td></tr>
<tr><td colspan="2">Release of dangerous substances</td><td colspan="8">NPD</td></tr>
<tr><td colspan="2">Continuous glowing combustion</td><td colspan="8">NPD</td></tr>
<tr><td colspan="11">NPD No Performance Determined</td></tr>
</table>

9. The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 8. This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

Signed for and on behalf of the manufacturer by:

……

Name and function)

…… ……

(Place and date of issue) (Signature)

NOTE For characteristics where e.g. the declaration is different for different thickness a Table is needed instead of a single value in the Table above.

ZA.3 CE Marking and labelling

The CE marking symbol shall be in accordance with the general principles set out in Article 30 of Regulation (EC) No 765/2008 and shall be affixed visibly, legibly and indelibly:

— to the factory made calcium silicate (CS) product

or

— to a label attached to it.

Where this is not possible or not warranted on account of the nature of the product, it shall be affixed to the packaging or to the accompanying documents.

The CE marking shall be followed by:

— the last two digits of the year in which it was first affixed;

— the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity;

— the unique identification code of the product-type;

— the reference number of the declaration of performance;

— the level or class of the performance declared;

— the dated reference to the harmonized technical specification applied;

— the identification number of the notified body [only for products under systems 1 and 3];

— the intended use as laid down in the harmonized technical specification applied.

The CE marking shall be affixed before the construction product is placed on the market. It may be followed by a pictogram or any other mark notably indicating a special risk or use.

Figure ZA.1 gives an example of the information related to products subject to AVCP systems 1 and 3 to be given on the product or to a label attached to it.

CE 4567 7456	*CE marking, consisting of the "CE"-symbol* *Identification number of the product certification body* *Identification number of the notified test laboratory/ laboratories*
AnyCo Ltd, PO Box 21, B-1050 13 0123 – DoP – 2013/10/07	*name and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *reference number of the DoP*
EN 14306:2015 ABCD High Temperature Board ThIBEII λ_D DoP RtF A1 d_D 100 mm CS – EN 14306 – ST(+)600 – CS(10)20 – CL10 – pH9.5	*No. of European standard applied, as referenced in OJEU* *Unique identification code of the product-type* *Intended use of the product as laid down in the European standard applied* *Declared thermal conductivity* *Reaction to fire – Euroclass* *Declared Thickness* *Designation code (in accordance with Clause 6 of this standard for the relevant characteristics according to Table ZA.1)* *Level or class of the performance declared*

Figure ZA.1 — Example CE marking information of products under AVCP systems 1 and 3

Bibliography

[1] EN 993-1, *Methods of test for dense shaped refractory products - Part 1: Determination of bulk density, apparent porosity and true porosity*

[2] EN 993-4, *Methods of test for dense shaped refractory products - Part 4: Determination of permeability to gases*

[3] EN 993-9, *Methods of testing dense shaped refractory products - Part 9: Determination of creep in compression*

[4] EN 1602, *Thermal insulating products for building applications - Determination of the apparent density*

[5] EN 1603, *Thermal insulating products for building applications - Determination of dimensional stability under constant normal laboratory conditions (23 °C/ 50 % relative humidity)*

[6] EN 12089, *Thermal insulating products for building applications - Determination of bending behaviour*

[7] EN 13238, *Reaction to fire tests for building products - Conditioning procedures and general rules for selection of substrates*

[8] EN 13470, *Thermal insulating products for building equipment and industrial installations - Determination of the apparent density of preformed pipe insulation*

[9] EN 13471:2001, *Thermal insulating products for building equipment and industrial installations - Determination of the coefficient of thermal expansion*

[10] EN 29053, *Acoustics - Materials for acoustical applications - Determination of airflow resistance (ISO 9053:1991)*

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

[12] ISO 65, *Carbon steel tubes suitable for screwing in accordance with ISO 7-1*

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