BS EN 14305:2015

BSI Standards Publication

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

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National foreword

This British Standard is the UK implementation of EN 14305:2015. It supersedes BS EN 14305:2009+A1:2013 which is withdrawn.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 cellular glass (CG) products - Specification

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Produits manufacturés en verre cellulaire (CG) - Spécification

Wärmedämmstoffe für die technische Gebäudeausrüstung und für betriebstechnische Anlagen in der Industrie - Werkmäßig hergestellte Produkte aus Schaumglas (CG) - 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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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 14305:2015) 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 14305:2009+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 14305 are the following:

a) an addition to the foreword;

b) an addition in 3.2.2;

c) a new 4.3.14;

d) modification of 5.3.2;

e) modification of Clause 7;

f) modification of Clause 8;

g) modification of Annex A;

h) 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 four annexes:

— Annex A (normative), Factory production control;

— Annex B (informative), Determination of minimum service temperature;

— Annex C (informative), Additional properties;

— Annex D (informative), Preparation of the flat test specimens to measure thermal conductivity;

— 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 cellular glass products which are used for the thermal insulation of building equipment and industrial installations with an operating temperature range of approximately - 265 °C to + 430 °C.

Below an 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 faced or unfaced 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 performance of systems incorporating these products is not covered.

This European Standard does not specify the required level 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 0,065 W/(m·K) at 10 °C are not covered by this standard.

This European Standard does not cover products for the insulation of the building structure.

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

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

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

EN 1607, *Thermal insulating products for building applications - Determination of tensile strength perpendicular to faces*

EN 1608, *Thermal insulating products for building applications - Determination of tensile strength parallel to faces*

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

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

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

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

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

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

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 13172:2012, *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 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 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 14706, *Thermal insulating products for building equipment and industrial installations - Determination of maximum service temperature*

EN 14707, *Thermal insulating products for building equipment and industrial installations - Determination of maximum service temperature for preformed pipe insulation*

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

EN ISO 354, *Acoustics - Measurement of sound absorption in a reverberation room (ISO 354:2003)*

EN ISO 1182, *Reaction to fire tests for products - Non-combustibility test (ISO 1182:2010)*

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

EN ISO 11654, *Acoustics - Sound absorbers for use in buildings - Rating of sound absorption (ISO 11654)*

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)*

ISO 7884-7, *Glass — Viscosity and viscometric fixed points — Part 7: Determination of annealing point and strain point by beam bending*

3 Terms and definitions

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

For the purposes of this document, most of the terms and definitions given in EN ISO 9229:2007 apply.

3.1.1.1
cellular glass
rigid insulation material made from expanded glass with a closed-cell structure

3.1.1.2
faced cellular glass board
board of cellular glass with facing(s) with a maximum of 3 mm on one or two faces which may be roofing felt or metal foil or paper, cardboard, plastic foil, rendering or similar materials

Note 1 to entry: The core may consist of either one board, a part of a board or a number of boards bonded edge to edge in the factory, with an appropriate adhesive.

Note 2 to entry: Bitumen is a suitable adhesive which may be used to bond both the joints and the facings. Of course there are alternative adhesives available depending the end use.

3.1.1.3
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 may also be supplied in tapered form.

3.1.2 Additional terms and definitions

3.1.2.1
level
given value which is the upper or the 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
pipe section
section
(insulation) product in the shape of a cylindrical annulus which may be split to facilitate application

3.1.2.4
lag
segment
rigid or semi-rigid insulation product for application to large diameter cylindrical or spherical equipment

3.1.2.5
block
billet
(insulation) product generally of rectangular cross section and with a thickness not significantly smaller than the width

Note 1 to entry: In English, some industries define a large block as a billet.

3.1.2.6
prefabricated ware
pieces cut, abraded or otherwise formed from a board or block of product, e.g. elbows, T-pieces, etc

Note 1 to entry: These several pieces are glued together to the required form.

3.1.2.7
production line
assemblage of equipment that produces products using a continuous process

3.1.2.8
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

α_p	is the practical sound absorption coefficient	—
α_w	is the weighted sound absorption coefficient	—
b	is the width	mm

D_i	is the inside diameter	mm
D_o	is the outside diameter	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	%
L	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	—
P_d	is the deformation under a point load of 1 000 N	mm
S_b	is the deviation from squareness on length and width	mm/m
S_d	is the deviation from squareness on thickness	mm
s_d	is the water vapour diffusion equivalent on air layer thickness	m
S_{max}	is the deviation from flatness	mm
σ_m	is the compressive strength	kPa
σ_b	is the bending strength	kPa
σ_{mt}	is the tensile strength perpendicular to faces	kPa
σ_t	is the tensile strength parallel to faces	kPa
v	is the deviation from squareness for pipe sections	mm
W_{lp}	is the long term water absorption by partial immersion	kg/m^2
W_p	is the short-term water absorption	kg/m^2
X_{ct}	is the compressive creep	mm
X_t	is the deformation at time t	mm
Z	is the water vapour resistance	m^2 h Pa/mg
AP	is the symbol of the declared level of practical sound absorption coefficient	
AW	is the symbol of the declared level of weighted sound absorption coefficient	
BS	is the symbol of the declared level for bending strength	
CC(i_1/i_2 /y) σ_c	is the symbol of the declared level for compressive creep	
CL	is the symbol of the declared level for soluble chlorides	
CS(Y)	is the symbol of the declared level for compressive strength	
F	is the symbol of the declared level of soluble fluoride ions	

L	is the symbol of the declared level for linearity
MU	is the symbol of the declared value for water vapour diffusion resistance factor
NA	is the symbol of the declared level of soluble sodium ions
pH	is the symbol of the declared level of the pH-value
PL(P)	is the symbol of the declared level for penetration under point load
SI	is the symbol of the declared level of soluble silicate ions
ST(+)	is the symbol of the declared level for maximum service temperature
ST(–)	is the symbol of the declared level for minimum service temperature
TP	is the symbol of the declared level for tensile strength parallel to faces
TR	is the symbol of the declared level for tensile strength perpendicular to faces
WL(P)	is the symbol of the declared level for long term water absorption
WS	is the symbol of the declared level for short-term water absorption
Z	is the symbol of the declared value for water vapour resistance

3.2.2 Abbreviated terms used in this standard

AVCP	is **A**ssessment and **V**erification of **C**onstancy of **P**erformance (previously named attestation of conformity)
CG	is **C**ellular **G**lass
DoP	is **D**eclaration of **P**erformance
FPC	is **F**actory **P**roduction **C**ontrol
PTD	**P**roduct **T**ype **D**etermination (previously named ITT for Initial Type Test)
RtF	**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 C.

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

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 or EN 12939 for thick products. For cylindrical specimens EN ISO 8497 shall be used as specified in 5.3.2.

In both cases, 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 measurement standards above covering the product service temperature range. The following conditions apply:

— the measured values shall be expressed with three significant figures;

— the declared thermal conductivity curve shall be given as a 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 required is - 170 °C.

The declared equation/limit curve is the 'declared reference' with three significant figures, that is to 0,000 1 W/(m·K) for λ values below 0,1 W/(m·K) and in 0,001 W/(m·K) for λ values above 0,1 W/(m·K). 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, the 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 flat products shall be determined in accordance with EN 822 and EN 823. Length, thickness, and inside diameter D_i, of pipe sections, segments and prefabricated ware shall be determined in accordance with EN 13467.

No test result shall deviate from the declared values by more than the tolerances given in Table 1.

Table 1 — Dimensional tolerances

Dimensions in millimetres

Form of delivery	Length	Width	Thickness	Inside diameter	Squareness		Flatness	Pipe section linearity
					Length and width	Thickness		
Unfaced board	±2	±2	±2		±5 mm/m	±2	±2	
Faced board	±5	±2	±2 [a]		±5 mm/m	±2	±2	
Pipe section	±2		±2	– 0 to + 4	±3			±2

[a] The tolerances apply only to unfaced boards. The thickness of any facing exceeding 3 mm shall be indicated in the manufacturer's literature.

4.2.2.2 Squareness

Deviation from squareness, S_b, of boards and slabs shall be determined in accordance with EN 824.

Deviation from squareness, *v*, of pipe sections shall be determined in accordance with EN 13467.

No test result shall exceed the corresponding tolerance given in Table 1.

4.2.2.3 Flatness

Deviation from flatness, S_{max}, of boards and slabs shall be determined in accordance with EN 825.

No test result shall exceed the corresponding tolerance given in Table 1.

4.2.2.4 Pipe section linearity

Deviation from linearity, *L*, of pipe sections, shall be determined in accordance with EN 13467.

No test result shall exceed the corresponding tolerance given in Table 1.

4.2.3 Dimensional stability

Dimensional stability under specified conditions shall be carried out for the conditions given in Table 2.

The relative changes in length, $\Delta\varepsilon_l$, and width, $\Delta\varepsilon_b$, and the relative reduction in thickness, $\Delta\varepsilon_d$, shall not exceed the values given in Table 2 for the declared level.

Table 2 — Dimensional stability under specified conditions

Designation	Test condition	Test method	Requirement (%)	
			Length $\Delta\varepsilon_l$ and width $\Delta\varepsilon_b$	Thickness, $\Delta\varepsilon_d$
DS(70,-)	48 h, 70 °C	EN 1604	0,5	1
DS (23,90)	48 h, 23 °C, 90 % R.H.	EN 1604	0,5	1
DS(70,90)	48 h, 70 °C, 90 % R.H.	EN 1604	0,5	1

The test DS(70,-) and DS (23,90) shall not be performed when the test DS (70,90) is used.

4.2.4 Reaction to fire classification 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, no further classification is required.

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.

NOTE 3 In Annex C, additional properties with regards to fire behaviour is given.

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 CG 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 CG 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 or 4.3.3 minimum service temperature (dimensional stability).

4.2.5.4 Durability of thermal resistance against high temperature

The thermal conductivity of CG 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.

NOTE Cellular glass pipe sections and prefabricated ware are sawn or abraded from flat slabs or billets. If not specified here-after, the declarations for the specific characteristics corresponds to the flat slabs used for their fabrication.

4.3.2 Maximum service temperature

The maximum service temperature, ST(+), for flat products shall be determined in accordance with EN 14706.

At the maximum service temperature, ST(+), no test result shall have a variation of dimensions exceeding 2 mm.

The strain point of the glass shall be determined in accordance with ISO 7884-7.

No test result shall have a strain point of the glass lower than the maximum service temperature increased by 50 °C.

The maximum service temperature, ST(+), shall be declared below 100 °C in centigrades in steps of not less than 5 °C and above 100 °C in steps of not less than 10 °C.

Cellular glass pipe sections and prefabricated ware are sawed or abraded from flat boards or billets. Consequently, the maximum service temperature, ST(+), should be determined only on flat boards, in accordance with EN 14706. In case of need, direct determination of maximum service temperature for pipe sections should be carried out in accordance with EN 14707, choosing a temperature gradient of 50 °C/h. If a full pipe section cannot be taken from the sample, the maximum service temperature should be determined in accordance with ISO 7884-7.

4.3.3 Minimum service temperature

The minimum service temperature, ST(–), shall be declared in levels with steps of 10 °C from + 20 °C down to the declared minimum service temperature and shall be confirmed by testing in accordance with European test standards:

a) thermal conductivity as a function of the temperature;

b) coefficient of thermal expansion as a function of the temperature;

c) in cases of load bearing applications, compressive strength as a function of the temperature.

Using these temperature-dependent physical data, the suitability of any specific insulation can be estimated at a given low operational temperature for industrial installations in relation to application-related design features.

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

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

No test result shall have a variation of dimensions exceeding 0,5 % for length and width and 1,0 % for thickness.

4.3.4 Compressive strength

Compressive strength, σ_m, shall be determined in accordance with EN 826, method A – load controlled (2 kN/s after preliminary loading of 5 kN during 5 s) for boards and slabs.

No test result for the compressive stress strength shall be less than the value, given in Table 3, for the declared level:

Table 3 — Levels for compressive strength

Level	Requirement kPa
CS(Y)400	≥ 400
CS(Y)500	≥ 500
CS(Y)600	≥ 600
CS(Y)700	≥ 700
CS(Y)800	≥ 800
CS(Y)900	≥ 900
CS(Y)1000	≥ 1 000
CS(Y)1200	≥ 1 200
CS(Y)1400	≥ 1 400
CS(Y)1600	≥ 1 600
CS(Y)1800	≥ 1 800
CS(Y)2000	≥ 2 000
CS(Y)2200	≥ 2 200
CS(Y)2400	≥ 2 400
CS(Y)2500	≥ 2 500
CS(Y)2750	≥ 2 750
CS(Y)3000	≥ 3 000

4.3.5 Bending strength

Bending strength, σ_b, shall be determined in accordance with EN 12089 for boards and slabs. No test result shall be less than the value, given in Table 4, for the declared level.

Table 4 — Levels for bending strength

Level	Requirement kPa
BS 200	≥ 200
BS 250	≥ 250
BS 300	≥ 300
BS 350	≥ 350
BS 400	≥ 400
BS 450	≥ 450
BS 500	≥ 500
BS 550	≥ 550
BS 600	≥ 600
BS 700	≥ 700
BS 800	≥ 800
BS 900	≥ 900
BS 1000	≥ 1 000
BS 1100	≥ 1 100
BS 1200	≥ 1 200
BS 1300	≥ 1 300
BS 1400	≥ 1 400

4.3.6 Point load

Deformation under a point load of 1 000 N, P_d, of boards and slabs, shall be determined in accordance with EN 12430. No test result shall exceed the value, given in Table 5, for the declared level.

Table 5 — Levels for deformation under point load

Level	Requirement mm
PL(P)2	≤ 2,0
PL(P)1,5	≤ 1,5
PL(P)1	≤ 1,0
PL(P)0,5	≤ 0,5

4.3.7 Tensile strength parallel to faces

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

4.3.8 Tensile strength perpendicular to faces

Tensile strength perpendicular to faces, σ_{mt}, shall be determined in accordance with EN 1607. No test result shall be less than the declared level, TR, chosen from the following value: 100 kPa; 125 kPa; 150 kPa; 175 kPa; 200 kPa; 250 kPa; 300 kPa; 350 kPa; 400 kPa; 500 kPa; 600 kPa; 700 kPa.

4.3.9 Compressive creep

Compressive creep, X_{ct}, and total thickness reduction, X_t, shall be determined after at least one hundred and 20 two days of testing at a declared compressive stress, σ_c, given in steps of at least 1 kPa and the results extrapolated 30 times corresponding to 10 years to obtain the declared levels in accordance with EN 1606. Compressive creep shall be declared in levels, i_2, and the total thickness reduction shall be declared in levels, i_1, with steps of 0,1 mm at the declared stress. No test result shall exceed the declared levels at the declared stress.

NOTE 1 Examples for declaration of levels for compressive creep.

Level	Test time days	Extrapolation time years	Declared stress kPa	Requirement [a] mm
CC(i_1/i_2/10) σ_c	122	10	σ_c	$i_1/i_2 \le i$
CC(i_1/i_2/25) σ_c	304	25	σ_c	$i_1/i_2 \le i$
CC(i_1/i_2/50) σ_c	608	50	σ_c	$i_1/i_2 \le i$
[a] The creep of the bitumen used for the facings is not taken into account in these values.				

NOTE 2 Referring to the designation code CC($i_1/i_2/y$)σ_c, according to Clause 6, a declared level CC(1,5/1/10)450, as for example, indicates a value not exceeding 1 mm for compressive creep and 1,5 mm for total thickness reduction after extrapolation at 10 years (i.e. 30 times one hundred and 22 days of testing) under a declared stress of 450 kPa.

4.3.10 Water absorption

4.3.10.1 Short-term water absorption

Short-term water absorption by partial immersion, W_p shall be determined in accordance with EN 1609 for flat products. No test result of the water absorption W_p, shall exceed 0,5 kg/m^2.

NOTE A direct measure of the short-term water absorption on preformed pipe insulation can be made in accordance with EN 13472.

4.3.10.2 Long term water absorption

Long term water absorption by partial immersion, W_{lp}, shall be determined in accordance with EN 12087. No test result of the water absorption shall exceed 0,5 kg/m^2.

4.3.11 Water vapour diffusion resistance

The water vapour transmission shall be determined in accordance with EN 12086, and declared as the water vapour diffusion resistance factor, μ, for homogeneous products and as the water vapour resistance, Z, for faced or non-homogeneous products. No test result of μ shall be less than 40 000. No test result of Z shall be less than the declared value.

Alternatively, for the declaration of water vapour resistance properties (μ), the value quoted in EN ISO 10456 (for CG $\mu \approx \infty$), may be used.

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

Trace quantities of water soluble chloride, fluoride, silicate and sodium ions and the pH-value shall be determined in accordance with EN 13468. The manufacturer shall declare one or more as appropriate 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, no 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.

4.3.13 Sound absorption

Sound absorption coefficient shall be determined in accordance with EN ISO 354 but always without a plenum. The sound absorption characteristics shall be calculated according to EN ISO 11654 using the values for the practical sound absorption coefficient, α_p, at the frequencies: 125 Hz, 250 Hz, 500 Hz, 1 000 Hz, 2 000 Hz and 4 000 Hz and the single number value for the weighted sound absorption coefficient, α_w (weighted sound absorption coefficient).

α_p and α_w shall be rounded to the nearest 0,05 ($\alpha_p > 1$ shall be expressed as $\alpha_p = 1$) and declared in levels with steps of 0,05. No result (α_p and α_w) shall be lower than the declared level.

4.3.14 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/*

4.3.15 Continuous glowing combustion

Where subject 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 with a total area of not less than 5 m^2 and sufficient to cover the needed tests. The shorter side of the sample shall not be less than 300 mm or the 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.

5.2 Conditioning

No special conditioning of the test specimens is needed unless otherwise specified in the test standard. The outside surface of the test specimens shall be free from dust and water. In case of dispute, the test specimens shall be stored at (23 ± 2) °C and (50 ± 5) % relative humidity for at least 6 h prior to testing.

For FPC no special conditioning of the test specimens are needed.

5.3 Testing

5.3.1 General

Table 6 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.

The test methods given below in the column flat apply to unfaced cellular glass boards. They also apply to core material used to produce faced cellular glass boards or to cut or abrade pipe insulation or prefabricated ware.

The test may be performed on the unfaced/uncoated product, if the facing/coating is known to have no influence on the property.

Since cellular glass pipe sections and prefabricated ware are sawed or abraded from flat products, only dimensions, squareness, pipe linearity, short-term water absorption and trace quantities of water soluble chlorides and the pH-value shall be tested on preformed pipe sections, when relevant. This does not concern the factory production control, except for dimensions (see Annex A).

5.3.2 Thermal conductivity

For flat test specimens, thermal conductivity shall be determined in accordance with EN 12667 or EN 12939 for thick products. For cylindrical 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 12667 or EN 12939 for thick products, provided that it has been demonstrated that the results are safe (higher) values.

The thermal conductivity shall be determined for the full temperature range of the product. The lowest reference mean test temperature required is - 170 °C. For factory production control, see Annex A.

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

For FPC one dimension only is used.

NOTE 1 Suitable sizes are 48 mm and 194 mm internal diameter.

The guarded hot plate method, EN 12667 or EN 12939 for thick products shall be deemed to be a suitable method for measurement of pipe sections having an internal diameter exceeding 500 mm. Flat slabs shall be prepared having the same thickness and density as the sections. If the guarded hot plate method is used the fact shall be stated in the test report.

NOTE 2 An example of test specimen preparation is given in Annex D.

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/line;

— and it can be demonstrated that the thermal conductivity, λ, does not vary more than 2 % 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.

Table 6 — Test methods, test specimens and conditions

Dimensions in millimetres

Clause		Test method		Test specimen dimensions [a]	Minimum number of measurements to get one test result	Specific conditions
No.	**Title**	**Flat**	**Cylindrical**			
4.2.1.	Thermal conductivity	EN 12667 or EN 12939	EN 12667 or EN 12939 for D_i > 500 mm		1	
			EN ISO 8497	Full-size	1	Remark- test includes joints
4.2.2	Dimensions and tolerances					
4.2.2.1	Length and width	EN 822	EN 13467	Full-size	1	
	Thickness	EN 823	EN 13467	Full-size	1	Load: (250 ± 5) Pa
	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		200 × 200	3	—
4.2.4	Reaction to fire	See EN 13501–1				EN 15715:2009
4.3.2	Maximum service temperature	EN 14706	EN 14707	150 × 150 For pipe sections see EN 14707	3	Temperature gradient 50 °K/h Edge insulation ≥ 10 0 mm
4.3.3	Minimum service temperature	Annex B and EN 12667			1	Annex B of this EN
4.3.4	Compressive strength	EN 826		Quarter board or 200 × 200	3 (for CS(Y) 400–1000) 4 (for CS(Y)1200–3000)	Annex A
4.3.5	Bending strength	EN 12089			4	Method B
4.3.6	Point load	EN 12430		Full-size	1	Annex A
4.3.7	Tensile strength parallel to faces	EN 1608		500 × 250	5	—
4.3.8	Tensile strength perpendicular to faces	EN 1607		150 × 150	5	—

Clause		Test method		Test specimen dimensions [a]	Minimum number of measurements to get one test result	Specific conditions
No.	**Title**	**Flat**	**Cylindrical**			
4.3.9	Compressive creep	EN 1606		200 × 200	3	Test specimen preparation: see EN 826:2013, Annex A. Use of reference points on the edges.
4.3.10	Water absorption	EN 1609 EN 12087	 EN 13472	200 × 200 200 × 200	4 4	Method B Method 1B
4.3.11	Water vapour diffusion resistance	EN 12086		See EN 12086:2013, 6.1	5	Set A of test conditions shall be chosen unless the application imposes set B or C
4.3.12	Trace quantities of water soluble ions and the pH-value	EN 13468	EN 13468		3	20 g
4.3.13	Sound absorption	EN ISO 354		Minimum 10 m^2	1	To be reported
4.3.14	Release of dangerous substances	b	b			
4.3.15	Continuous glowing combustion	b	b			

[a] Full-size product thickness, except for 4.2.4.

[b] Not yet available.

5.3.3 Reaction to fire

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

Rules for mounting and fixing are given in EN 15715:2009, Tables 26 to 30 for product and installed parameters for flat products and pipe insulation products as placed on the market. Installation parameters for standardised assemblies are only given for flat products.

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 cellular glass abbreviated term	CG
— This European Standard number	EN 14305
— Maximum service temperature	$ST(+)_i$
— Minimum service temperature	$ST(-)_i$
— Compressive strength	CS(Y)i
— Bending strength	BSi
— Point load	PL(P)i
— Tensile strength parallel to faces	TPi
— Tensile strength perpendicular to faces	TRi
— Compressive creep	$CC(i_1/i_2/y)\sigma_c$
— Short-term water absorption	WS
— Long term water absorption	WL(P)
— Water vapour diffusion equivalent air layer thickness	MU
— Weighted sound absorption coefficient	AWi
— Trace quantities of water soluble chlorides ions	CLi
— Trace quantities of water soluble fluorides	Fi
— Trace quantities of water soluble silicate ions	SIi
— Trace quantities of water soluble sodium ions	NAi
— Level of the pH	pHi
— Practical sound absorption coefficient	APi

where "i" shall be used to indicate the relevant class or level, "σ_c" shall be used to indicate the compressive stress and "y" to indicate the number of years.

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

CG – EN 14305 – ST(+) 430 – ST(–) (–190) – CS(Y)700 – BS 400 – PL(P)1,5 – WS – WL(P) – MU

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 by the manufacturer, including product assessment.

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

The manufacturer or his authorized representative shall make available, in response to a request, a certificate or declaration of conformity as appropriate.

NOTE For the EC certificate and declaration of conformity, as appropriate, see ZA.2.2.

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 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.

For the relevant characteristics, PTD on products corresponding EN 13167 may be used for the purpose of PTD and Declaration of Performance (DoP) according to this standard.

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.

For the relevant characteristics, FPC on products corresponding EN 13167 may be used for the purpose of FPC and DoP according to this standard.

8 Marking and labelling

Products conforming to this standard shall be clearly marked, either on the product or on the label 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 ThlBEll;

— 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

Clause		Minimum testing frequency [a]	
No.	**Title**		
4.2.1	Thermal conductivity – at 10 °C – full temperature range	1 per 24 h [b] 1 per 2 years	
4.2.2	Dimensions and tolerances	Flat products	Pipe sections
	Length and width	1 per 4 h	
	Thickness	1 per 4 h	
	Length, thickness, inside diameter		1 per 4 h
	Squareness	1 per 4 h	
	Flatness	1 per 4 h	
	Pipe section linearity		1 per 4 h
4.2.4	Reaction to fire as placed on the market	See Table A.2	
4.2.3	Dimensional stability under specified temperature and humidity conditions	1 per 5 years	
4.3.2	Maximum service temperature	1 per 5 years	
4.3.3	Minimum service temperature	1 per 5 years	
4.3.4	Compressive strength	CS(Y) 400 to 1 000: 1 per 8 h CS(Y) 1 200 to 3 000: 1 per 4 h	
4.3.5	Bending strength	1 per 5 years	
4.3.6	Deformation under point load	1 per 8 h	
4.3.7	Tensile strength parallel to faces	1 per 5 years	
4.3.8	Tensile strength perpendicular to faces	1 per 5 years	
4.3.9	Compressive creep	1 per 5 years	
4.3.10	Water absorption	1 per 5 years	
4.3.11	Water vapour diffusion resistance	1 per 5 years	
4.3.12	Trace quantities of water soluble chloride, fluoride, silicate and sodium ions and the pH-value	1 per 5 years	
4.3.13	Sound absorption	1 per 5 years	
4.3.14	Release of dangerous substances	c	
4.3.15	Continuous glowing combustion	c	

[a] The minimum testing frequencies, expressed in test results required per period, shall be understood as the minimum 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 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 in every 24 h where there has been production.

[c] Frequencies are not given.

NOTE FPC and PTD on products corresponding also to EN 13167 may be used for the purpose of FPC and declaration according to this standard.

Table A.2 — Minimum product testing frequencies for the reaction to fire of the product as placed on the market

Clause		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	Frequency	Test method	Frequency	Test method	Frequency
	A1 without further fire testing [e]	EN 13820	1 per 3 months [f] or	—	—	—	—	—	—
			1 per 2 years and indirect testing	Determination of total carbon content by burning in pure oxygen	1 per week	—	—	—	—
	A1	EN ISO 1182 and EN ISO 1716 and EN 13823 where applicable	1 per 2 years and indirect testing	Determination of total carbon content by burning in pure oxygen	1 per week	—	—	—	—
	A2	EN ISO 1182 or EN ISO 1716 and EN 13823	1 per 2 years and indirect testing	Determination of total carbon content by burning in pure oxygen	1 per week	—	—	—	—

	B C D	EN 13823 and EN ISO 11925-2	1 per 2 years and indirect testing	Determination of total organic content by weighing	1 per week	—	—	—	—
			1 per 2 years and indirect testing	Determination of total organic content by weighing	1 per week	—	—	—	—
	E	EN ISO 11925-2	1 per 2 years and indirect testing	Determination of total organic content by weighing	1 per week	—	—	—	—

NOTE Not all Euroclasses may apply for the products conforming to this standard.

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. For PTD and FPC, units using the same process are considered together as one production line.

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.

– In case of a certified component, the frequency is once per delivery of the 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).

f Only for unfaced products.

Annex B
(normative)

Determination of minimum service temperature

B.1 Definitions

For the purpose 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 can 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 can be 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.

NOTE The procedure can 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.

NOTE For practical reasons, the lowest temperature corresponds to liquefied nitrogen.

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

B.3.2 Pressure plate, with the same dimensions as the test specimen exerting the requested load on the test specimen.

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 with dimensions corresponding to those foreseen for the used guarded hot plate apparatus.

They shall not be less than 200 mm × 200 mm × 25 mm or exceed 500 mm × 500 mm × 50 mm.

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

NOTE Testing can be performed on one layer of a multilayer system with the corresponding difference of temperature between the two main faces to simulate the conditions existing in the application.

B.4.2 Number of test specimens

The number of test specimens shall correspond to the number of determination of the thermal conductivity curve in the low temperature range.

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 Table 5, 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 measurement recording the lowest temperature of the coldest plate and the temperature of the less cold plate at the same time.

After the measurement – usually consisting of several points – shut off the cooling and heating systems of the guarded hot plate apparatus and wait until the apparatus is back to within 10 °C of the 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 Table 5, 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 formulas:

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

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

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

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.

If the change in the mean value for any of the dimensions exceeds the value specified in 4.3.3, the test shall be repeated at a less cold temperature of the coldest plate until the dimensional changes are smaller than or equal to the specified value. This temperature is then considered as the minimum service temperature, providing that the requirements given in C.6 are also fulfilled.

B.6.2 Additional tests and/or observations

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

NOTE For cellular glass, there is no additional requirement.

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. declared dimensions, declared 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;

   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 main body of this standard or any other European technical specification.

Annex C
(informative)

Additional properties

C.1 General

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

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

C.2 Fire protection

Besides fire reaction properties, fire protection behaviour of installed materials is in general evaluated according the following methods:

Fire exposures and heating conditions within buildings, the petrochemical and oil/gas industries can be considered according respectively to the ISO 834 series (standard curve cellulose fire); EN 1363-2 (hydrocarbon curve) and ISO 22899-1 (jet fire).

Fire protection for pipe work or flat products as part of a fire-wall penetration can be considered according EN 1366-3.

C.3 Compressive strength

The estimated standard deviation of compressive strength can be needed. In this event, it should be calculated from at least five test results.

EN 826 compressive behaviour test method calls for a capping made of bitumen and a well defined foil; the results can be used directly where cellular glass is installed with hot bitumen or bitumen based cold adhesive. For some applications, different cappings or no cappings are used, for instance when the operating temperature does not allow for bitumen application. In these cases, compressive strength will be different and tests should be run simulating the actual application conditions.

Due to its chemical composition, compressive strength of cellular glass is not substantially affected by temperature, up to the maximum service temperature.

C.4 Shear strength

Shear strength, τ, if voluntarily declared, may be determined in accordance with EN 12090.

NOTE As indicated in EN 12090, this test method does not determine pure shear stresses but a composition of various types of stress including shear and for which the type of glue, and its deformation, can influence the result.

As an alternative test, method A of EN 826:2013 can be applied in which the test specimens of 200 mm × 100 mm × 150 mm (height, width and depth) are in the middle of the height foreseen of two horizontal oppositely halfway cutted slots, with an inter distance (shear plane) of 30 mm.

C.5 Dimensional stability under constant normal laboratory conditions

The dimensional stability under constant normal laboratory conditions, DS(T), if voluntarily declared, will be determined in accordance with EN 1603.

C.6 Coefficient of thermal expansion

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

The coefficient of thermal expansion of cellular glass normally ranges from 8×10^{-6}/K to 10×10^{-6}/K at 23 °C.

C.7 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 cellular glass products.

Apparent density of slabs and boards, if voluntarily declared by manufacturer will be determined in accordance with EN 1602, *Thermal insulating products for building applications — Determination of the apparent density*.

Apparent density of pipe sections, if voluntarily declared by manufacturer, will be determined in accordance with EN 13470, *Thermal insulating products for building equipment and industrial installations — Determination of the apparent density of preformed pipe insulation*.

Table C.1 — Test methods, test specimens, conditions and minimum testing frequencies

Dimensions in millimetres

Clause		Test methods	Test specimen dimensions[a]	Minimum number of measurements to get one test result	Specific conditions	Factory production control
No.	Title					Minimum product testing frequencies [b]
						Direct testing
D.3	Shear strength	EN 12090	200 × 100	10	Double specimen test assembling. Bitumen as adhesive	1 per 5 years
D.4	Dimensional stability under constant normal laboratory conditions	EN 1603	Full-size	1	Method A	1 per 5 years
D.5	Coefficient of thermal expansion	EN 13471	See 6.1 in EN 13471	3	Test specimen dimensions adapted to the chosen equipment	1 per 5 years

[a] Full size product thickness.

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

Annex D
(informative)

Preparation of the flat test specimens to measure thermal conductivity

D.1 Introduction

In the case of rigid materials, such as cellular glass, it is particularly important to achieve flatness and parallelism of the faces to obtain close contact between the test specimens and the plates.

To achieve this result, the size of the specimen should preferably not exceed 300 mm × 300 mm.

Any facing should be removed before preparing the test specimen. As indicated in EN 12667, the faces of the specimens should be parallel over the total surface area within 2 % of the specimen thickness and should be made as flat as the apparatus surfaces.

Specimens made from several pieces of cellular glass should be avoided. Any joints should be prohibited in the central measuring area and should be minimised in the guard area. In this last case, it should be ensured that all parts have the same thickness and that the joints are as tight as possible. This should be achieved by grinding the specimen parts against each other. The specimen should be large enough to correspond to the central part and the guard. Other insulation materials should not be used in the guard.

If the test specimens do not have the flatness of the faces corresponding to the requirements of EN 12667, the method given in D.2 should be used to obtain the required flatness.

This method is also recommended when the temperature sensors, usually thermocouples, for the determination of the temperature difference across the specimens are permanently mounted in the heating or cooling units.

NOTE For maximum accuracy, it is advised 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 temperature difference of 15 K.

D.2 Procedure to get flat test specimen faces: method of the three rulers

A specimen should be prepared by sawing from the original board at the required dimensions with its thickness 2 mm or 3 mm greater than the final thickness.

The specimen should be placed on a flat metal plate slightly larger than the specimen itself and two machined metal bars should be positioned on the metal plate near two opposite sides of the specimen. A uniform sheet of paper with a thickness about 0,25 mm should be inserted between the flat base plate and the metal bars but not under the test specimen. Metal bars as thick as the final thickness of the specimen and machined so that their top and bottom surfaces are flat and parallel should be used.

The upper face of the specimen should be carefully rubbed off with a third straight metal bar long enough to lap metal bars on each side until the scraping bar just contacts the metal bars.

The surface of the specimen and the table should be cleaned. The specimen should be inverted and the rubbing operation should be repeated as described previously, this time without the sheet of paper under each metal bar.

NOTE As an alternative to machined bars, cold-rolled steel bars can be used.

Annex ZA
(informative)

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

ZA.1 Scope and relevant characteristic

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 cellular glass 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

Table ZA.1 — Relevant clauses for factory made cellular glass and intended use

Product:	Factory made cellular glass CG products		
Intended use:	Thermal Insulation for Building Equipment and Industrial Installations (ThlBEll)		
Essential Characteristics	**Clauses in this and other European standard(s) related to essential characteristics**[f]	**Regulatory classes**	**Notes**
Thermal resistance	4.2.1 Thermal conductivity	—	Declared λ_D curve or table vs temperature
	4.2.2. Dimensions and tolerances Thickness	—	*Flat products:* Declared thickness d_D and tolerance class *Linear products:* Inner diameter D_{i_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	—	—
	4.3.2 Maximum service temperature 4.3.3 Minimum service temperature	—	Declared ST(+) Declared ST(-)

1) As amended by mandates M126, M130 and M367

Durability of reaction of fire against high temperature	4.2.5 Durability characteristics	Euroclasses	a c
Durability of reaction of fire against ageing/degradation	4.2.5 Durability characteristics	Euroclasses	a c
Compressive strength	4.3.4 Compressive strength	—	Declared CS
	4.3.6 Point load	—	Declared PL(P)
Tensile/Flexural strength	4.3.5 Bending strength	—	Declared BS
	4.3.7 Tensile strength parallel to faces	—	Declared TP
	4.3.8 Tensile strength perpendicular to faces	—	Declared TR d
Durability of compressive strength against ageing/degradation	4.3.9 Compressive creep	—	Declared CC
Water permeability	4.3.10.1 or 4.3.10.2 Short-term water absorption / Long term water absorption	—	Declared WS or Declared WL(P)
Water vapour permeability	4.3.11 Water vapour resistance	—	Declared MU or Z
Rate of release of corrosive substances	4.3.12. Trace quantities of water soluble ions and the pH-value	—	Levels of ion content and level of the pH-value
Acoustic absorption index	4.3.13 Sound absorption	—	Declared AP and AW
Release of dangerous substances to the indoor environment	4.3.14 Release of dangerous substances	—	e
Continuous glowing combustion	4.3.15 Continuous glowing combustion	—	e

a Thermal conductivity of CG products does not change with time, experience has shown the cell structure to be stable.

b For dimensional stability thickness only.

c No change in reaction to fire properties for CG products.

The fire performance of CG does not deteriorate with time. The Euroclass classification of the product is related to the organic content, which cannot increase with time.

d This characteristic also covers handling and installation.

e European test methods are under development.

f 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 cellular glass products

ZA.2.1 Systems of AVCP

The AVCP systems of factory made cellular glass 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 cellular glass 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 cellular glass 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 *(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 cellular glass 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 (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 cellular glass 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 (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 cellular glass for EN 14305

DECLARATION OF PERFORMANCE

No 0123-DoP-2013/10/07

1. Unique identification code of the product-type:

ABCD Extreme Temp Slab

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 (ThlBEll)

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

Essential characteristics			**Performance**							**Harmonized technical specification**
Thermal resistance	Thermal conductivity	ϑ °C	−200	−100	−50	0	50	100	400	EN 14305:2015
		λ_D W/(m·K)	0,024	0,029	0,035	0,042	0,051	0,060	0,125	
	Thickness	d_D = 40 mm - 120 mm								
Reaction to fire		Reaction to fire A1								
Durability of thermal resistance against ageing/degradation		Dimensional stability DS(70,90) Maximum service temperature ST(+)400 (=400°C) Minimum service temperature ST(-) −200 (=-200°C)								
Durability of thermal resistance against high temperature		Maximum service temperature ST(+)400 (=400°C)								
Durability of fire reaction against ageing/degradation		Durability characteristics A1								
Durability of fire reaction resistance against high		Durability characteristics A1								
Compressive strength		Compressive stress CS(Y)600 Point load PL(P)1.5								
Tensile/ Flexural strength		Bending strength BS 400								
		Tensile strength parallel to faces TP100								
		Tensile strength perpendicular to faces TR150								
Durability of compressive strength against ageing/ degradation		Compressive creep CC(1.5/1/50)200								
Water permeability		Short-term water absorption WS Long term water absorption WL(P)								
Water vapour permeability		Water vapour resistance MU1								
Rate of release of corrosive substances		Trace quantities of water-soluble chloride ions CL2 (≤2 ppm); pH-value pH9.5								
Acoustic absorption index		Sound absorption AP1; AW1								
Release of dangerous substances to the indoor environment		Release of dangerous substances NPD								
Continuous glowing combustion		Continuous glowing combustion NPD								
NPD No Performance Determined										

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 cellular glass (CG) 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	*CE marking, consisting of the "CE"-symbol*
4567	*Identification number of the product certification body*
7456	*Identification number of the notified test laboratory/ laboratories*
AnyCo Ltd, PO Box 21, B-1050	*name and the registered address of the manufacturer, or identifying mark*
13	*Last two digits of the year in which the marking was first affixed*
0123 – DoP – 2013/10/07	*reference number of the DoP*
EN 14305:2015	*No. of European standard applied, as referenced in OJEU*
ABCD	*Unique identification code of the product-type*
High Temperature Slab ThIBEll	*Intended use of the product as laid down in the European standard applied*
λ_D DoP	*Declared thermal conductivity*
RtF A1	*Reaction to fire – Euroclass*
d_D 100 mm	*Declared thickness*
CG — EN 14305 — ST(+)400 — ST(-)-200 — DS(70,90) — CS(Y)600 — PL(P)1.5 — BS 400 — TP100 TR150 — CC(1.5/1/50)200 — WS —WL(P) — MU— CL2 — pH9.5	*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 1602, *Thermal insulating products for building applications - Determination of the apparent density*

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

[3] EN 12090, *Thermal insulating products for building applications - Determination of shear behaviour*

[4] EN 13167, *Thermal insulation products for buildings - Factory made cellular glass (CG) products - Specification*

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

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

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

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

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

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