



## EUROPEAN ASSESSMENT DOCUMENT

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# THERMAL INSULATION BOARD MADE OF MICROPOROUS SILICA

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This European Assessment Document (EAD) has been developed taking into account up-to-date technical and scientific knowledge at the time of issue and is published in accordance with the relevant provisions of Regulation (EU) No 305/2011 as a basis for the preparation and issuing of European Technical Assessments (ETA).

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# 1 SCOPE OF THE EAD

## 1.1 Description of the construction product

The construction product is a thermal insulation board made of microporous silica. The board consists mainly of fumed silica, if applicable by adding binding fibers and opacifier. The initial materials of the thermal insulation board made of microporous silica are mechanically compressed. The board can have a water-repellent treatment.

The product is not covered by a harmonised European standard (hEN).

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

It is assumed that the product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant manufacturer's stipulations having influence on the performance of the product covered by this European Assessment Document shall be considered for the determination of the performance and detailed in the ETA.

## 1.2 Information on the intended use(s) of the construction product

### 1.2.1 Intended use(s)

The thermal insulation board made of microporous silica is used for the thermal insulation of walls, roofs and ceilings/floors.

The thermal insulation board made of microporous silica can be glued to the substructure with suitable glue. Fixing with suitable anchors is possible.

The EAD provides for assessment methods and criteria for the board only, not for kits made of this board.

The product is intended to be used protected from precipitation, wetting or weathering in built-in state. The product is not intended to be used for construction elements with contact to water and soil.

### 1.2.2 Working life/Durability

The assessment methods included or referred to in this EAD have been written based on the manufacturer's request to take into account a working life of the thermal insulation board made of microporous silica for the intended use of 25 years when installed in the works (provided that the thermal insulation board made of microporous silica is subject to appropriate installation (see 1.1)). These provisions are based upon the current state of the art and the available knowledge and experience.

When assessing the product, the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works<sup>1</sup>.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA when drafting this EAD nor by the Technical Assessment Body issuing an ETA based on this EAD, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

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<sup>1</sup> The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than the working life referred to above.

## 2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

### 2.1 Essential characteristics of the product

Table 1 shows how the performance of thermal insulation board made of microporous silica is assessed in relation to the essential characteristics.

**Table 1 Essential characteristics of the product and assessment methods and criteria for the performance of the product in relation to those essential characteristics**

No	Essential characteristic	Assessment method	Type of expression of product performance
<b>Basic Works Requirement 2: Safety in case of fire</b>			
1	Reaction to fire	See clause 2.2.1	Class
<b>Basic Works Requirement 6: Energy economy and heat retention</b>			
2	Thermal conductivity	See clause 2.2.2	Level
3	Dimensions/Geometry	See clause 2.2.3	Nominal level, tolerances
4	Water absorption	See clause 2.2.4	Level
5	Water vapour transmission	See clause 2.2.5	Level
6	Density	See clause 2.2.6	Level
7	Bending strength	See clause 2.2.7	Level
8	Compressive stress/strength	See clause 2.2.8	Level
9	Dimensional stability	See clause 2.2.9	Level
10	Deformation under specified compressive load and temperature conditions	See clause 2.2.10	Level
11	Tensile strength perpendicular to faces	See clause 2.2.11	Level
12	Behaviour under point load	See clause 2.2.12	Level

### 2.2 Assessment methods and criteria for the performance of the product in relation to essential characteristics of the product

For sampling, conditioning and testing (dimensions of the test specimens, minimum number of measurements, specific conditions), EN 13167 shall apply, unless otherwise is specified in the following. The level to be stated for each characteristic has to be representative for the range of density and thicknesses. The test specimens shall be chosen accordingly (number of test specimens, thickness and density of test specimens).

## 2.2.1 Reaction to fire

### 2.2.1.1 Class A1 product – without testing (only for products with an organic content < 1,0 %)

If the organic content of the product is less than 1,0 % the thermal insulation board made of microporous silica is classified without testing as class A1 product in accordance with Decision 1996/603/EC as amended by Decision 2000/605/EC.

The class A1 is given in the ETA.

### 2.2.1.2 Other classes – with testing (for products with an organic content > 1,0 %)

If the organic content of the product is greater than 1,0 % the thermal insulation board made of microporous silica shall be tested, using the test method(s) according to EN 13501-1 and relevant for the corresponding reaction to fire class. The thermal insulation board made of microporous silica shall be classified according to Commission Delegated Regulation (EU) 2016/364) in connection with EN 13501-1.

The instructions for mounting and fixing according to EN 15715 using the product specific details for calcium silicate (Tables A.48 and A.49) shall be used for reaction to fire testing.

## 2.2.2 Thermal conductivity

The thermal conductivity at a temperature of 10 °C under dry conditions is determined in accordance with EN 12667 or EN 12939 for thick products. At least 4 measurements are performed under dry conditions. The samples shall be dried at a temperature of 70 °C to constant mass.

The influence of humidity on the thermal conductivity is determined by storing the specimen in a climate of 23 °C and 50 % relative humidity and 23 °C and 80 % relative humidity followed by measurements with at least 3 specimens for each climate-condition in accordance with EN 12667 or EN 12939 for thick products.

For each climate the thermal conductivity ( $\lambda_{10,(23,50)} / \lambda_{10,(23,80)}$ ) and the moisture content mass by mass ( $u_{23,50} / u_{23,80}$ ) are to be determined.

The preparation of the specimens shall be in accordance with EN 13167, Annex E.

The thermal conductivity is measured at specimens covering the entire range of density. During the measurement, precaution shall be taken to avoid moisture absorption by the specimen.

The mass-related moisture conversion coefficient  $f_{u,1}$  is calculated by the following formula (derived from EN ISO 10456, formula 4) by using the average values for  $\lambda$  and  $u$ :

$$f_{u,1} = \frac{\ln \frac{\lambda_{10,(23,50)}}{\lambda_{10,dry}}}{u_{23,50} - u_{dry}}$$

$u_{dry}$  is defined to be 0

The mass-related moisture conversion coefficient  $f_{u,2}$  is calculated by the following formula (derived from EN ISO 10456, formula 4) by using the average values for  $\lambda$  and  $u$ :

$$f_{u,2} = \frac{\ln \frac{\lambda_{10,(23,80)}}{\lambda_{10,(23,50)}}}{u_{23,80} - u_{23,50}}$$

*Note: For the determination of the mass-related moisture conversion coefficient  $f_{u,1}$  and  $f_{u,2}$ , the test specimens shall be taken from the same production run.*

The moisture conversion factors  $F_{m1}$  and  $F_{m2}$  shall be calculated according to EN ISO 10456, formula 4.

The determination of the thermal conductivity to be given in the ETA is performed as follows (based on  $\lambda_{90/90}$ ).

The thermal conductivity at 23 °C and 50 % relative humidity  $\lambda_{D(23,50)}$ , representing at least 90 % of the production with a confidence level of 90 %, is determined on the basis of the measuring results in accordance with EN ISO 10456, clause 5 and 7.3 and is given in the ETA.

The mass-related moisture conversion coefficients  $f_{u,1}$  for the conversion of  $\lambda_{10,dry}$  to  $\lambda_{23,50}$  and  $f_{u,2}$  for the conversion of  $\lambda_{23,50}$  to  $\lambda_{23,80}$  as well as the moisture content mass by mass (m/m) at 23 °C and 50 % relative humidity and 23 °C and 80 % relative humidity are given in the ETA.

The moisture conversion factors  $F_{m1}$  for the conversion of  $\lambda_{10,dry}$  to  $\lambda_{23,50}$  and  $F_{m2}$  for the conversion of  $\lambda_{23,50}$  to  $\lambda_{23,80}$  are given in the ETA.

### **2.2.3 Dimensions/ Geometry**

The length and width of the insulation board is determined in accordance with EN 822, with at least 3 test specimens.

The thickness  $d$  is determined according to EN 823 with at least 3 test specimens, using a load equal to  $(50 \pm 1,5)$  Pa or  $(250 \pm 5)$  Pa.

The squareness is determined according to EN 824, the flatness according to EN 825, both with at least 3 test specimens.

The nominal length and nominal width are given in the ETA with the tolerances given for the level, according to EN 13168.

The nominal thickness and the used test-load are given in the ETA with the tolerances given for the level, according to EN 13168.

The squareness and the flatness are given in the ETA with the tolerances given for each deviation, according to EN 13167 (5 mm/m and 2 mm).

### **2.2.4 Water absorption**

#### **2.2.4.1 Short-term water absorption by partial immersion**

Short-term water absorption by partial immersion is determined according to EN 1609, method B.

The water absorption is given in the ETA.

#### **2.2.4.2 Long-term water absorption by partial immersion**

The water absorption by long-term partial immersion is determined according to EN 12087, method 1A.

The water absorption is given in the ETA.

### **2.2.5 Water vapour transmission**

The water vapour permeability (water vapour diffusion resistance factor) is determined according to EN 12086, climatic condition A. The samples shall be stored in accordance with EN 12086 at 23 °C/ 50 % relative humidity till mass is constant.

For largely hygroscopic materials a test according to climatic condition C can in addition be necessary.

The water vapour diffusion resistance factor  $\mu$  is given in the ETA.

## 2.2.6 Density

The density is determined according to EN 1602. The samples shall be dried at a temperature of 70 °C to constant mass.

The density is given in the ETA.

## 2.2.7 Bending strength

Bending strength is determined according to EN 12089, test method B.

The bending strength is given in the ETA.

## 2.2.8 Compressive stress or compressive strength

Compressive stress at 10 % deformation or compressive strength is determined according to EN 826.

The compressive stress is given in the ETA.

## 2.2.9 Dimensional stability

### 2.2.9.1 Dimensional stability under specified temperature

The determination of the dimensional stability under specified temperatures is carried out according to EN 1604. Testing shall be performed after 48h storage at  $(70 \pm 2)$  °C.

The relative change in length  $\Delta\varepsilon_l$  and in width  $\Delta\varepsilon_b$  shall be given in % in the ETA considering the maximum level (0,5 %) according to EN 13168.

The relative change in thickness  $\Delta\varepsilon_d$  is given in % in the ETA considering the maximum level (3 %) according to EN 13168.

### 2.2.9.2 Dimensional stability under specified temperature and humidity conditions

The determination of the dimensional stability under specified temperature and humidity conditions is carried out according to EN 1604. Testing is performed after a 48h storage at  $(23 \pm 2)$  °C and  $(90 \pm 5)$  % or at  $(70 \pm 2)$  °C and  $(90 \pm 5)$  % relative humidity.

The relative change in length  $\Delta\varepsilon_l$  and in width  $\Delta\varepsilon_b$  is given in % in the ETA considering the maximum level (0,5 %) according to EN 13168.

The maximum values of the relative change in thickness  $\Delta\varepsilon_d$  are given in % in the ETA considering the maximum level (3 %) according to EN 13168.

## 2.2.10 Deformation under specified compressive load and temperature conditions

The determination of the deformation under specified compressive load and temperature conditions is carried out according to EN 1605 with 5 test pieces of 200 mm x 200 mm or 3 test pieces of 300 mm x 300 mm for test condition 1 (20 kPa / 80 °C) or test condition 2 (40 kPa / 70 °C).

The relative change in thickness,  $\Delta\varepsilon_d$ , is given in the ETA for test condition 1 (20 kPa / 80 °C) or test condition 2 (40 kPa / 70 °C).

## 2.2.11 Tensile strength perpendicular to faces

The determination of the tensile strength perpendicular to faces,  $\sigma_{mt}$ , is carried out according to EN 1607.

The tensile strength perpendicular to faces is given in the ETA.



### **2.2.12 Behavior under point load**

The determination of the deformation under a point load of 500 N is carried out according to EN 12430.

The deformation under a point load of 500 N is given in the ETA.

### 3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

#### 3.1 System(s) of assessment and verification of constancy of performance

For the products covered by this EAD the applicable European legal act is: Decision 1999/91/EC.

The system to be applied is: 3 for any use except for uses subject to regulations on reaction to fire.

For uses subject to regulations on reaction to fire the applicable AVCP systems are 1, 3 or 4 depending on the conditions defined in the said Decision.

#### 3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of the product in the process of assessment and verification of constancy of performance are laid down in Table 2.

**Table 2 Control plan for the manufacturer; cornerstones**

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control*
<b>Factory production control (FPC)</b> [including testing of samples taken at the factory in accordance with a prescribed test plan]					
1	Reaction to fire	See EN 15715: 2010-04 Table A48 and A49	Control plan	1	See EN 13167: 2013-03/ Annex B
2	Thermal conductivity	See clause 2.2.3.1	Control plan	1	Once a month
3	Dimensions/Geometry	See clause 2.2.4.1	Control plan	See clause 2.2.4.1	Daily
4	Water absorption	See clause 2.2.5.1	Control plan	See clause 2.2.5.1	Annually
5	Density	See clause 2.2.7.1	Control plan	See clause 2.2.7.1	Daily
6	Bending strength	See clause 2.2.8.1	Control plan	See clause 2.2.8.1	Annually
7	Compressive stress/strength	See clause 2.2.9.1	Control plan	See clause 2.2.9.1	Daily
8	Dimensional stability	See clause 2.2.10.1	Control plan	See clause 2.2.10.1	Twice a year
9	Deformation under specified compressive load and temperature conditions	See clause 2.2.11.1	Control plan	See clause 2.2.11.1	Twice a year
10	Behaviour under point load	See clause 2.2.13.1	Control plan	See clause 2.2.13.1	Annually

\* In case of discontinuous production these minimum frequencies should be adapted to an equivalent frequency.

### 3.3 Tasks of the notified body

The intervention of a notified body under AVCP system 1 for this product is only necessary if 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) and the reaction to fire performance class of the product is A1, A2, B or C.

The cornerstones of the actions to be undertaken by the notified body of the product in the process of assessment and verification of constancy of performance are laid down in Table 3.

**Table 3 Control plan for the notified body; cornerstones**

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
<b>Initial inspection of the manufacturing plant and of factory production control</b> <i>(for system 1 only)</i>					
1	Reaction to fire:	-	Control plan	-	When starting the production
	- Presence of suitable test equipment	-	Control plan	-	
	- Presence of trained personnel	-	Control plan	-	
	- Presence of an appropriate quality assurance system an necessary stipulations	-	Control plan	-	
<b>Continuous surveillance, assessment and evaluation of factory production control</b> <i>(for system 1 only)</i>					
2	Reaction to fire	-	Control plan	-	Annually
	- Inspection of factory, of the production of the product and of the facilities for factory production control	-	Control plan	-	
	- Evaluation of the documents concerning the factory production control	-	Control plan	-	
	- Issuing a report of surveillance	-	Control plan	-	

## 4 REFERENCE DOCUMENTS

As far as no edition date is given in the list of standards thereafter, the standard in its current version at the time of issuing the European Technical Assessment is of relevance.

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 1602	Thermal insulating products for building applications - Determination of the apparent density
EN 1604	Thermal insulating products for building applications - Determination of dimensional stability under specified temperature and humidity conditions
EN 1605	Thermal insulating products for building applications - Determination of deformation under specified compressive load and temperature conditions
EN 1607	Thermal insulating products for building applications - Determination of tensile strength perpendicular to faces
EN 1609	Thermal insulating products for building applications - Determination of short term water absorption by partial immersion
EN ISO 10456	Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values
EN 12086	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 13167	Thermal insulation products for buildings - Factory made cellular glass (CG) products – Specification
EN 13168	Thermal insulation products for buildings - Factory made wood wool (WW) products - Specification;
EN 13171	Thermal insulation products for buildings - Factory made wood fibre (WF) products – Specification
EN 13172	Thermal insulation products - Evaluation of conformity
EN 13501-1	Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests
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	Thermal insulation products – Instructions for mounting and fixing for reaction to fire testing – Factory made products