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European Assessment Document for

Thermal insulation board made of silica- or polyurethane-aerogel on a carrier material



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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) 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 thermal insulation board made of silica- or polyurethane-aerogel on a carrier material (in the following referred to as thermal insulation board) consists of an open-porous silica- or polyurethane-based aerogel with typically over 90 V.-% of air pores which can be applied to a carrier material during the manufacturing process. As the end product a board is obtained from the carrier material and the raw materials of the aerogel. Polyurethane-based materials are used as carrier materials. The thermal insulation board does not have other facings or coatings than the aforementioned optional carrier material.

The product is not covered by a harmonised European standard (hEN). Already published harmonized standards for insulation products are not applicable to the products covered by the EAD due to the product properties, structure, manufacturing process, chemical composition or a combination of those aspects. In particular, the methods and criteria for assessing the reaction to fire (including propensity to undergo continuous smouldering) and thermal conductivity are specifically adapted to the products covered by this EAD. Even though the product is not covered by a harmonised standard or EAD many of the assessment methods for insulating products are applicable directly or with modifications.

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 boards are intended to be used as thermal insulation of buildings, especially as interior insulation, insulation for window reveals and also for elements such as frames and roller shutter boxes.

The thermal insulation boards are intended to be mechanically fixed with appropriate fixing means, glued to the substrate or substructure or built in between adjacent members of construction elements without any additional fixing means.

The use as part of a thermal insulation composite system and the use for sound insulation and sound absorption are not covered by this EAD.

The assessment of the thermal insulation board only applies, when the product is used in structures, where it is protected from mechanical damage, wetting, weathering and precipitation, and for construction elements with no 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 for the intended use of 50 years when installed in the works, provided that the insulation board 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 works¹.

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.

¹ 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 referred to above.

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

All undated references to standards in this EAD are to be understood as references to the dated versions listed in chapter 4.

2.1 Essential characteristics of the product

Table 2.1.1 shows how the performance of the thermal insulation board is assessed in relation to the essential characteristics.

Table 2.1.1 Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics

No	Essential characteristic	Assessment method	Type of expression of product performance
Basic Works Requirement 2: Safety in case of fire			
1a	Reaction to fire	2.2.1	Class
1b	Propensity to undergo continuous smouldering	2.2.2	Description
Basic Works Requirement 3: Hygiene, health and the environment			
2	Water vapour diffusion resistance	2.2.14	Level
3	Content emission and/or release of dangerous substances	2.2.15	Description/Level
Basic Works Requirement 4: Safety and accessibility in use			
4	Compression strength at 10 % deformation or compressive stress	2.2.3	Level
5	Deformation under specified compressive load and temperature conditions	2.2.4	Level
6	Tensile strength perpendicular to faces	2.2.5	Level
7	Compressive creep	EN 13163, 4.3.8	Level
8	Bending strength	EN 13163, 4.3.5	Level
9	Tensile strength parallel to faces	EN 13171, 4.3.5	Level
10	Point load	EN 13171, 4.3.6	Level
Basic Works Requirement 6: Energy economy and heat retention			
11	Thermal conductivity	2.2.6	Level
12	Deviation from length and width	2.2.7	Level
13	Deviation from thickness	2.2.8	Level
14	Deviation from squareness	2.2.9	Level

No	Essential characteristic	Assessment method	Type of expression of product performance
15	Deviation from flatness	2.2.10	Level
16	Dimensional stability under specified temperature and humidity conditions	2.2.11	Level
17	Short-term water absorption by partial immersion	2.2.12	Level
18	Long-term water absorption by partial immersion	2.2.13	Level

2.2 Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product

This chapter is intended to provide instructions for TABs. Therefore, the use of wordings such as “shall be stated in the ETA” or “it has to be given in the ETA” shall be understood only as such instructions for TABs on how results of assessments shall be presented in the ETA. Such wordings do not impose any obligations for the manufacturer and the TAB shall not carry out the assessment of the performance in relation to a given essential characteristic when the manufacturer does not wish to declare this performance in the Declaration of Performance.

Dimensions, densities and thicknesses of the test specimens for each characteristic shall cover the range of dimensions, density and thickness of the product to be covered by the ETA. I.e., the performance shall be given in the ETA at least for the minimum and maximum dimensions (including the thickness) combined with the minimum and maximum densities to be covered by the ETA.

2.2.1 Reaction to fire

The thermal insulation boards shall be tested, using the test method(s) relevant for the corresponding reaction to fire classes according to EN 13501-1. The product shall be classified according to Commission Delegated Regulation (EU) No 2016/364 in connection with EN 13501-1.

The provisions given in Annex A shall apply for the mounting and fixing conditions of the specimens of the boards in the relevant reaction to fire test methods as well as for the extended application of test results.

The reaction to fire class shall be given in the ETA together with the conditions for which it is valid.

The reaction to fire performance of the thermal insulation boards does not change with time.

2.2.2 Propensity to undergo continuous smouldering

The performance of the propensity to undergo continuous smouldering of thermal insulation boards shall be tested and assessed in accordance with EN 16733.

The conditions and parameters which shall be taken into account within the test as well as the rules for the application of the test results are specified in Annex B.

In accordance with EN 16733, clause 11, the ETA shall specify the following information, depending on the outcome of the assessment:

- “The product does not show propensity to undergo continuous smouldering”;
- “The product shows propensity to undergo continuous smouldering” or
- “Assessment of the propensity to undergo continuous smouldering is not possible”.

2.2.3 Compression strength at 10 % deformation or compressive stress

The compressive strength at 10 % deformation σ_{10} or compressive stress σ_m shall be determined in accordance with EN ISO 29469 with at least 5 cuboid test specimens. For boards with a thickness ≤ 50 mm, the length and width of the specimens shall be 50 x 50 mm. For boards with a higher thickness, the length and width of the specimens shall be 100 x 100 mm.

The compressive strength at 10 % deformation σ_{10} or compressive stress σ_m shall be given in the ETA using levels with steps of 10 kPa.

Durability of compressive strength / stress is covered by 2.2.4 and determination of compressive creep.

2.2.4 Deformation under specified compressive load and temperature conditions

The deformation in thickness under specified compressive load and temperature conditions shall be determined according to EN 1605 with at least 3 cuboid test specimens for test condition 2 (40 kPa; 23 °C / 48 h (stage A) and 70 °C / 168 h (stage B)). For boards with a thickness ≤ 50 mm, the length and width of the specimens shall be 50 x 50 mm. For boards with a higher thickness, the length and width of the specimens shall be 100 x 100 mm.

The difference between the relevant deformation, ε_1 , after stage A and, ε_2 , after stage B as described in EN 1605 shall be given in the ETA using levels with steps of 1 %.

2.2.5 Tensile strength perpendicular to faces

The tensile strength perpendicular to the faces of the thermal insulation boards shall be determined in accordance with EN 1607 with at least 5 cuboid test specimens. For boards with a thickness ≤ 50 mm, the length and width of the specimens shall be 50 x 50 mm. For boards with a higher thickness, the length and width of the specimens shall be 100 x 100 mm.

The tensile strength σ_{mt} shall be given in the ETA using levels with steps of 10 kPa.

2.2.6 Thermal conductivity

The thermal conductivity at a reference mean temperature of 10 °C shall be determined in accordance with EN 12667.

At least 4 measurements shall be performed after drying the specimens at 70°C to constant mass.

The thermal conductivity $\lambda_{10,dry,90/90}$ (representing at least 90 % of the production with a confidence level of 90 %) shall be determined on the basis of the measuring results in accordance with EN ISO 10456 with the equation:

$$\lambda_{10,dry,90/90} = \lambda_{mean} + k_2 \cdot s_\lambda.$$

The coefficient k_2 with $p = 90$ % shall be determined according to table C.1 of EN ISO 10456 (n is the number of specimens, at least 4). The standard deviation s_λ shall be determined in accordance with the equation:

$$s_\lambda = \sqrt{\frac{\sum_{i=1}^n (\lambda_i - \lambda_{mean})^2}{n-1}}.$$

In order to take into account the aging, the thermal conductivity shall be tested in addition after the following ageing procedure using at least 3 specimens:

- storage at a temperature of - 20°C for 48 h
- storage at 23°C / 50 % relative humidity for 48 h
- storage at 50°C / 70 % relative humidity for 90 days.

After the last step the thermal conductivity at a reference mean temperature of 10 °C shall be determined in accordance with EN 12667 (λ_a). The ageing conversion factor F_a shall be calculated using the mean values of thermal conductivity before ageing ($\lambda_{10,dry,mean}$) and after ageing ($\lambda_{a,mean}$):

$$F_a = \lambda_{a,mean} / \lambda_{10,dry,mean}$$

The influence of ageing shall be considered by multiplying $\lambda_{10,dry,90/90}$ by the ageing conversion factor F_a before determining λ_D :

$$\lambda_D = \lambda_{10,dry,90/90} \cdot F_a$$

The calculated value $\lambda_{10,dry,90/90}$ and λ_D shall be rounded upwards to the nearest 0,001 W/(m·K).

The thermal conductivity $\lambda_{10, \text{dry}, 90/90}$ before aging and the thermal conductivity λ_D shall be given in the ETA in levels with steps of 0,001 W/(m·K).

Durability of thermal resistance is covered by 2.2.4, 2.2.11 and the ageing procedure described above.

2.2.7 Deviation from length and width

To decrease the possibilities of thermal bridges the deviations in length and width shall be known.

The length and width shall be determined in accordance with EN ISO 29465 with at least 3 test specimens.

The maximum deviations from length and width shall be given in the ETA (in millimetre).

2.2.8 Deviation from thickness

As the thickness of the thermal insulation has a direct impact of the thermal protection the deviation of thickness shall be known.

The thickness shall be determined in accordance with EN ISO 29466 with at least 3 test specimens.

The maximum deviation from the thickness shall be given in the ETA. No test result shall deviate from the nominal values by more than the tolerances given in the ETA.

2.2.9 Deviation from squareness

To decrease the possibilities of thermal bridges the deviation from squareness shall be known.

The squareness shall be determined in accordance with EN 824 with at least 3 test specimens with delivery dimensions.

The maximum deviation from squareness on length and width, S_b , shall be given in the ETA in millimetre per meter [mm/m], rounded upwards to the nearest millimetre.

2.2.10 Deviation from flatness

To decrease the possibilities of thermal bridges the deviation of flatness shall be known.

The flatness shall be determined in accordance with EN ISO 29468 with at least 3 test specimens with delivery dimensions.

The maximum deviation from flatness, S_{max} , shall be given in the ETA in millimetre, rounded upwards to the nearest millimetre.

2.2.11 Dimensional stability under specified temperature and humidity conditions

To decrease the possibilities of thermal bridges and, therefore, consider the direct impact of the thermal insulation the dimensional stability shall be known.

The dimensional stability under specified temperature and humidity conditions shall be determined in accordance with in EN 1604.

The test shall be carried out with at least 3 test specimens of at least 200 mm x 200 mm after storage of 48 h at (70 ± 2) °C and (90 ± 5) % relative humidity.

The maximum relative changes in % in length, width and thickness shall be given in the ETA.

2.2.12 Short-term water absorption by partial immersion

The short-term water absorption by partial immersion shall be determined with at least 4 cuboid test specimens of 200 mm x 200 mm in accordance with EN ISO 29767, method A. Before testing the test specimens shall be stored for at least 6 hours at (23 ± 5) °C. The test shall be carried out at (23 ± 5) °C using water with a temperature of (23 ± 5) °C.

The short-term water absorption shall be given in the ETA.

2.2.13 Long-term water absorption by partial immersion

The long-term water absorption by partial immersion shall be determined with at least 4 cuboid test specimens of 200 mm x 200 mm in accordance with EN ISO 16535, method 1A. Before testing the test specimens shall be stored for at least 6 hours at (23 ± 5) °C. The test shall be carried out at (23 ± 5) °C using water with a temperature of (23 ± 5) °C.

The long-term water absorption shall be given in the ETA.

2.2.14 Water vapour diffusion resistance

The water vapour diffusion resistance factor shall be determined in accordance with EN 12086 (climatic condition A) with at least 5 test specimens. If the area of the individual specimen is larger than 500 cm², it is sufficient to test at least three specimens.

The water vapour diffusion resistance factor μ shall be given in the ETA.

2.2.15 Content emission and/or release of dangerous substances

The performance of the thermal insulation boards related to the emissions and/or release and, where appropriate, the content of dangerous substances shall be assessed on the basis of the information provided by the manufacturer² after identifying the release scenarios taking into account the intended use of the product and the Member States where the manufacturer intends his product to be made available on the market.

The identified intended release scenarios for this product and intended uses with respect to dangerous substances are:

- IA2: Product with indirect contact to indoor air (covered products) but possible impact on indoor air.
- IA3: Product with no contact to indoor air (e.g., boards intended for external insulation).

² The manufacturer may be asked to provide to the TAB the REACH related information which shall accompany the DoP (cf. Article 6(5) of Regulation (EU) No 305/2011).

The manufacturer is **not** obliged to:

- provide the chemical constitution and composition of the product (or of constituents of the product) to the TAB, or
- provide a written declaration to the TAB stating whether the product (or constituents of the product) contain(s) substances which are classified as dangerous in accordance with Directive 67/548/EEC and Regulation (EC) No 1272/2008 and listed in the "Indicative list on dangerous substances" of the SGDS, taking into account the installation conditions of the construction product and the release scenarios resulting from there.

Any information provided by the manufacturer regarding the chemical composition of the products is not to be distributed to EOTA, to other TABs or beyond.

2.2.15.1 SVOC and VOC

For the intended use covered by the release scenario IA2, semi-volatile organic compounds (SVOC) and volatile organic compounds (VOC) shall be determined in accordance with EN 16516. The respective loading factor [m^2/m^3] used for emission testing shall be taken from the following table:

Table 2.2.15.1.1: Loading factor, depending on the intended use (in accordance with EN 16516)

Intended use	Loading factor [m^2/m^3]
Walls	1,0
Floor, ceiling	0,4

Sampling, transport and storage of the specimen shall be handled in accordance with EN ISO 16000-11. Specimens shall be taken as close as possible to the time of production.

The following product parameters shall be taken into account when testing the boards:

- Each board with a different composition and carrier material shall be tested separately.
- The product with the highest thickness shall be considered.
- In case of doubt, tests shall be performed separately on specimens with different specifications for each characteristic.
- The test specimen shall be prepared by covering the edges and the back of the board.

Once the test specimen has been produced, it shall immediately be placed in the emission test chamber. This time is considered the starting time of the emission test.

The test results shall be reported for the relevant parameters (e.g., chamber size, temperature and relative humidity, air exchange rate, loading factor, size of test specimen, conditioning, production date, arrival date, test period, specimen preparation procedure, test result) after 3 and/or 28 days testing.

The product performance shall be expressed in [$\mu\text{g}/\text{m}^3$ or mg/m^3] and given in the ETA.

3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

3.1 System(s) of assessment and verification of constancy of performance to be applied

For the products covered by this EAD the applicable European legal act is Commission Decision 1999/91/EC, as amended by Commission Decision 2001/596/EC.

The applicable AVCP system 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 regarding reaction to fire³ are 1, or 3, or 4 depending on the conditions defined in the said Decision.

³ Including propensity to undergo continuous smouldering, where relevant

3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of the product in the procedure of assessment and verification of constancy of performance are laid down in Table 3.2.1.

Table 3.2.1 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 ⁴
Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan]					
1	Density	3.4	Control plan	3	once per day
2	Reaction to fire	EN ISO 11925-2 and 2.2.1	Control plan	1	once per month
		EN 13823, EN ISO 1182, EN ISO 1716 and 2.2.1	Control plan	1	once per 2 years
3	Compressive stress / strength at 10 % deformation	2.2.3	Control plan	4	once per day
4	Deformation under specified compressive load and temperature conditions	2.2.4	Control plan	4	once per year
5	Tensile strength perpendicular to faces	2.2.5	Control plan	4	once per year
6	Thermal conductivity	2.2.6	Control plan	1	once per month
7	Length and width	2.2.7	Control plan	4	twice per day
8	Thickness	2.2.8	Control plan	4	twice per day
9	Squareness	2.2.9	Control plan	4	once per day
10	Flatness	2.2.10	Control plan	4	once per day
11	Dimensional stability under specified temperature and humidity conditions	2.2.11	Control plan	4	once per year
12	Short term water absorption by partial immersion	2.2.12	Control plan	4	once per year
13	Long term water absorption by partial immersion	2.2.13	Control plan	4	once per year
14	Water vapour diffusion resistance	2.2.14	Control plan	4	once per year
15	Organic content, where relevant	EN 13820	Control plan	See test standard	each batch
16	Propensity to undergo continuous smouldering	Indirect methods as specified in no. 7, 10 and 15	Control plan	cf. no. 7, 10 and 14	cf. no. 7, 10 and 15
		2.2.2	Control plan	1	Once per two years
17	SVOC and VOC	2.2.15	Control plan	1	With production start and every 5 years

⁴ In case of discontinuous production these minimum frequencies shall be adapted to an equivalent frequency

3.3 Tasks of the notified body

The cornerstones of the actions to be undertaken by the notified body of the product in the procedure of assessment and verification of constancy of performance are laid down in Table 3.3.1.

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 as well as the propensity to undergo continuous smouldering, where relevant, (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.

Table 3.3.1 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
Initial inspection of the manufacturing plant and of factory production control					
1	<p>The notified body shall verify the ability of the manufacturer for a continuous and orderly manufacturing of the product covered by the European Technical Assessment, taking especially into account a limiting of organic material, the addition of fire retardants and/or another clearly identifiable stage in the production process which results in the improvement of the reaction to fire classification and/or the propensity to undergo continuous smouldering (where relevant).</p> <p>In particular the following items shall be appropriately considered</p> <ul style="list-style-type: none"> - presence of suitable test equipment - presence of trained personnel - the suitability of the factory production control established by the manufacturer - full implementation of the prescribed test plan 	Control plan	Control plan	-	Before certification (e.g., before starting the production or starting a new production line or after modifications of the production process)
Continuous surveillance, assessment and evaluation of factory production control					
2	<p>It shall be verified that the system of factory production control and the specified manufacturing process are maintained, taking into account a limiting of organic material, the addition of fire retardants and/or another clearly identifiable stage in the production process which results in the improvement of the reaction to fire classification and/or the propensity to undergo continuous smouldering (where relevant).</p> <p>In particular the following items shall be appropriately considered:</p> <ul style="list-style-type: none"> - Inspection of factory, of the production of the product and of the facilities for factory production control - Evaluation of the documents concerning factory production control - Issuing a report of surveillance 	Control plan - Verification of the controls carried out by the manufacturer on the raw materials, on the process and on the product as indicated in table 3.2.1 concerning reaction to fire and propensity to undergo continuous smouldering (where relevant)	Control plan	-	Annually

3.4 Special methods of control and testing used for the verification of constancy of performance

The density of the thermal insulation product is needed in order to find the worst case for the reaction to fire and thermal conductivity testing of thermal insulation board.

The density shall be determined in accordance with EN ISO 29470 with at least 5 test specimens with delivery dimensions.

4 REFERENCE DOCUMENTS

EN 1604:2013	Thermal insulating products for building applications - Determination of dimensional stability under specified temperature and humidity conditions
EN 1605:2013	Thermal insulating products for building applications - Determination of deformation under specified compressive load and temperature conditions
EN 1607:2013	Thermal insulating products for building applications - Determination of tensile strength perpendicular to faces
EN 12086:2013	Thermal insulating products for building applications – Determination of water vapour transmission properties
EN 12667:2001	Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods – Products of high and medium thermal resistance
EN 13163 2012+A1:2015	Thermal insulation products for buildings – Factory made expanded polystyrene (EPS) products – Specification
EN 13171 2012+A1:2015	Thermal insulation products for buildings – Factory made wood fibre (WF) products – Specification
EN 13501-1:2018	Fire classification of construction products and building elements - Part 1: Classification using test data from fire reaction to fire tests
EN 13820:2003	Thermal insulating materials for building applications - Determination of organic content
EN 13238:2010	Reaction to fire tests for building products – Conditioning procedures and general rules for selection of substrates
EN 13823:2020	Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item
EN 16516:2017+A1:2020	Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air
EN 16733:2016	Reaction to fire tests for building products - Determination of a building product's propensity to undergo continuous smouldering
EN ISO 1182:2020	Reaction to fire tests for products – Non-combustibility test (EN ISO 1182:2020)
EN ISO 1716:2018	Reaction to fire tests for products – Determination of the gross heat of combustion (calorific value) (EN ISO 1716:2018)
EN ISO 10456: 2007 + AC:2009	Building materials and products – Hygrothermal properties – Tabulated design values and procedures for determining declared and design thermal values (ISO 10456+Cor.1:2009)
EN ISO 11925-2:2020	Reaction to fire tests – Ignitability of building products subjected to direct impingement of flame – Part 2: Single-flame source test (ISO 11925-2:2020)
EN ISO 16000-11:2024	Indoor air - Part 11: Determination of the emission of volatile organic compounds from samples of building products and furnishing - Sampling, storage of samples and preparation of test specimens (ISO 16000-11:2024)
EN ISO 16535:2019	Thermal insulating products for building applications - Determination of long-term water absorption by immersion (ISO 16535:2019)
EN ISO 29465:2022	Thermal insulating products for building applications - Determination of length and width
EN ISO 29466:2022	Thermal insulating products for building applications - Determination of thickness
EN 824:2013	Thermal insulating products for building applications - Determination of squareness
EN ISO 29468:2022	Thermal insulating products for building applications - Determination of flatness
EN ISO 29469:2022	Thermal insulating products for building applications - Determination of compression behaviour
EN ISO 29470:2020	Thermal insulating products for building applications - Determination of the apparent density
EN ISO 29767:2019	Thermal insulating products for building applications - Determination of short-term water absorption by partial immersion (ISO 29767:2019)

Annex A Mounting and fixing procedure for reaction to fire tests and application rules for test results

A.1 Principle

Reaction to fire classification shall be determined in accordance with EN 13501-1 and the corresponding test standards, respecting the test conditions laid down in this EAD.

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 ETA and in the declaration of performance.

A.2 Instructions for mounting and fixing of test specimens

A.2.1 General

This clause gives instructions for mounting and fixing for reaction to fire testing of the thermal insulation boards considering the field of application (as far as possible) as described in clause 1.2.1 of this EAD.

A.2.2 Product and installation parameters

The tables A.1 and A.2 give the parameters for the various test methods that shall be considered when determining a product's reaction to fire performance and the field of application of the test results. The following tables are valid for flat products.

Table A.1 - Product parameters ⁵				
Parameter	EN ISO 1182	EN ISO 1716	EN 13823	EN ISO 11925-2
Type of product ⁶	X	X	X	X
Thickness	-	-(i)	X	X
Density / Weight per unit area	X	-(i)	X	X
Organic content ⁽ⁱⁱ⁾	X	X	X	X
Type of carrier material(s), if relevant	-	X	X	X
Thickness/weight per unit area of the optional carrier material	-	X	X	X
Asymmetry	-	-	X	X
Adhesive	-	X	X	X
i. for exceptions see table A.3 ii. relevant for homogenous products and substantial components of non-homogenous products consisting of a mixture of inorganic substances and a clearly limited amount of organic substances				

⁵ To permit the TAB to apply extended application rules for the test results as stated in clause A.3, it is recommended that the manufacturer should provide (but is not obliged to do so) sufficient information (e.g., on the basis of the composition of the product in question), allowing the TAB to determine – with regard to the various product parameters - which products or product variants shall be submitted to testing and to reduce the number of test required..

⁶ as defined by a certain combination of raw materials and produced in a certain type of production process

Table A.2 - Installation parameters		
Parameter	EN 13823	EN ISO 11925-2
Exposure to thermal attack	X	X
Substrate	X	X
Air gaps / Cavities	X	-
Joints/edges	X	X
Size and specimen positioning of test	X	-
Product orientation and geometry	X	X
Fixing of test specimen	X	X

A.2.3 Mounting and fixing

A.2.3.1 Ignitability, EN ISO 11925-2 (Single-flame source test)

This test method is relevant for the determination of classes B to F.

A.2.3.1.1 Exposure to thermal attack

The specimens of the thermal insulation board shall be tested directly exposed to the thermal attack using both surface and edge flame exposure (cf. clauses 7.3.3.1 und 7.3.3.2 of the test standard).

Non-homogenous thermal insulation boards with a more than 1 mm thick carrier material on the surface(s) of the boards as well as all thermal insulation boards glued to the substrate in the end-use application shall be additionally tested with edge exposure on each layer of specimens of the thermal insulation board turned 90 degrees on their vertical axis (cf. clause 7.3.3.2.3 of the test standard).

A.2.3.1.2 Substrate and fixing of the specimens

The test specimens, cut from the samples of the thermal insulation board, shall regularly be mounted in the test apparatus without a substrate.

If these tests fail, the specimens shall be tested mechanically fixed by metal fixing means on a standard substrate according to EN 13238 representing the relevant substrates in the end-use application of the thermal insulation boards.

The use of a standard substrate according to EN 13238 is also required for tests of thermal insulation boards glued to the substrate in the end-use application with an adhesive (except in case of inorganic mortars of reaction to fire class A1)

Other specific substrates (than those specified in EN 13238) may be used for testing purposes alternatively to a standard substrate. But test results on such substrates are only valid for the application of the thermal insulation boards on these specific substrates.

A.2.3.1.3 Product orientation and geometry

Specimens of the homogeneous thermal insulation boards and specimens of the thermal insulation boards with the same type of carrier material on both sides shall be tested on one face only.

If the surfaces of the thermal insulation board are not the same, the thermal insulation boards shall be tested on both faces. In this case, two options exist for the performance declaration:

- either the worse test result shall be used to declare the reaction to fire class of the product (valid for both faces exposed);
- or a declaration of the reaction to fire class of each face shall be made, provided that the identification of the faces is clearly visible in the marking and labeling of the product.

A.2.3.1.4 Joints/ edges

The specimens of the thermal insulation boards shall be tested without any joints. Different types / shapes of edges of the thermal insulation board shall not be considered within testing.

A.2.3.2 Single Burning Item Test (SBI), EN 13823

This test method is relevant for the determination of classes A2 to D and in a certain case for class A1 (cf. EN 13501-1, clause 11.8 and table 1 footnote "c").

A.2.3.2.1 Exposure to thermal attack

The product shall be tested directly exposed to the thermal attack as prescribed in the test standard and without any covering which might exist in end-use applications.

A.2.3.2.2 Substrate

A standard substrate as defined in EN 13238 shall be used for testing purposes representing the relevant substrates in the end-use application of the thermal insulation boards.

Other specific substrates may be used for testing purposes, but test results on such substrates are only valid for the application of the thermal insulation boards on these specific substrates.

If an A1 classification is intended and SBI tests are needed for that, it is recommended to use a standard calcium silicate substrate for the tests. But gypsum plaster board, steel sheet and wooden substrates (particle board, plywood board) as defined in EN 13238 are also permitted to be used instead.

A.2.3.2.3 Air gaps/cavities

The test specimens of the thermal insulation boards shall be mounted in the test apparatus without an air gap/cavity (neither between the product and substrate nor between substrate and backing board).

A.2.3.2.4 Joints/ edges

The specimens of the thermal insulation boards shall be assembled and tested with one vertical and one horizontal joint in the long wing of each specimen. Positioning of the joints shall be in accordance with EN 13823. Testing with a vertical and a horizontal joint in the same test reflects a worst-case situation and gives the widest field of application.

Test specimens taken from samples of the thermal insulation board that are small shall be arranged in the test apparatus in such way that the joints prescribed by EN 13823 are in the correct places. Other joints, resulting from the product size, may also be present. All joints (in the corner and at the long wing) shall be installed without a flashing or a sealant and tightly closed.

Products shall be mounted with the edges as existing; results from testing with butt edges are valid for all types of edges of the thermal insulation boards.

A.2.3.2.5 Size and positioning of the test specimen

The size of the test specimens is given in EN 13823. The test specimens shall be cut from the product sample. Positioning of the test specimens shall meet the following conditions:

- joints/edges shall be considered as prescribed in A.2.3.2.4;
- products having larger dimensions than the SBI test specimens shall be cut to size;
- products having smaller dimensions than the SBI test specimen shall be mounted in such a way that installation of full-size products is started at the bottom corner line between both wings and joints;
- the part of the specimens installed on the short wing shall cover (on their thickness) that part installed at the long wing with a butt joint;
- the maximum thickness of the test specimen including the substrate that can be installed in the SBI is 200 mm.

A.2.3.2.6 Product orientation and geometry

Specimens of the homogeneous thermal insulation boards and specimens of the thermal insulation boards with the same type of carrier material on both sides shall be tested on one face only.

If the surfaces of the thermal insulation board are not the same, the thermal insulation boards shall be tested on both faces. In this case, two options exist for the performance declaration:

- either the worse test result shall be used to declare the reaction to fire class of the product (valid for both faces exposed);
- or a declaration of the reaction to fire class of each face shall be made, provided that the identification of the faces is clearly visible in the marking and labeling of the product.

A.2.3.2.7 Fixing of flat test specimens

Case A) – If the thermal insulation boards are fixed to the substrate in the end-use application by mechanical metal fixings means or inorganic mortars or if they are only clenched between adjacent construction members without any fixing means, the specimens shall be fixed to the substrate using metal screws and washers and the following rules shall be respected:

- the minimum fixing distance from any edge is 25 mm; other distances may be used in accordance with manufacturer's instructions
- position and number of fasteners shall be chosen to achieve sufficient stabilization but shall as less as possible;
- the fastener is composed of a screw (diameter of 2,5 mm to 5,0 mm is recommended), and a washer (recommended thickness up to 1,2 mm and, if necessary to avoid any damage of the specimen, a diameter of 20 mm to 70 mm);
- no fixing shall be positioned below the U profile in the EN 13823 (SBI) test apparatus.

Case B) – If the thermal insulation boards are fixed to the substrate in the end-use application by mechanical plastic fixings means, the specimens shall be fixed to the substrate using mechanical plastic fixing means according to manufacturer's instructions. The other principles (except for the dimensions) as specified above for case A shall also apply.

Case C) – If the thermal insulation boards are glued to the substrate in the end-use application with an adhesive, the specimens shall be glued to the substrate using that adhesive as specified by manufacturer's instructions.

A.2.3.3 Determination of the PCS value(s); EN ISO 1716 tests

This test method is relevant for the determination of classes A1 and A2.

Specimens of homogenous thermal insulation board as well as all components of non-homogenous thermal insulation boards shall be tested as prescribed in the test standard.

Adhesives (except inorganic mortars of reaction to fire class A1) used for fixing purposes of the thermal insulation boards shall also be considered within testing. In opposition to that, mechanical fixing means do not need to be tested. They are identified as small components and their contribution to fire growth and fire spread are considered as negligible.

In case of non-homogenous thermal insulation boards, those combination of components with their specific thickness and weight per unit areas shall be identified leading to the highest total PCS value of the concerned thermal insulation boards.

NOTE: The maximum and/or minimum thickness and weight per unit area together with the maximum mass-related PCS value of each component does not necessarily lead to the highest total PCS-value of a non-homogenous thermal insulation board.

A.2.3.4 Non-combustibility test; EN ISO 1182

This test method is relevant for the determination of classes A1 and A2.

Specimens of homogenous thermal insulation boards as well as specimens of substantial components (for definition see EN 13501-1) of non-homogenous thermal insulation boards shall be tested only as prescribed in the test standard.

A.3 Extended application of test results

The rules given in the following tables shall apply for the application of test results and the classification of the thermal insulation boards.

Table A.3 – application of test results regarding product parameters				
Product parameters	Test method and validity of test results			
	EN ISO 1182	EN ISO 1716	EN 13823 (SBI)	EN ISO 11925-2
Type of product / assembly	for the same type of products of homogenous boards and for the same type of substantial components of non-homogenous boards	<ul style="list-style-type: none"> - for the same type of homogenous products or the same type of components of non-homogenous products and - the same assembly of non-homogenous products (including variations regarding organic content, thickness and density / weight per unit area as specified below) 	for the tested type of product only and with the same assembly in case of non-homogenous products	
amount of organic content	for all variations of the same type homogenous products or substantial components of non-homogenous products with equal or lower organic content	for all variations of the same type homogenous products or components of non-homogenous products with equal or lower organic content	for all variations of the same type of products with equal or lower organic content	
Thickness	not relevant	Not relevant but: highest and lowest thickness (resulting in a range of different weights per unit area) of each component shall be considered when calculating the total PCS value	<ul style="list-style-type: none"> - the tested total thickness only ($\pm 10\%$ tolerance) or - range between highest and lowest total thickness evaluated in case of using standard substrates of class D or a 	<ul style="list-style-type: none"> - the tested total thickness only ($\pm 10\%$ tolerance) or - range between highest and lowest total thickness evaluated in case of testing without a substrate, when using a standard

Table A.3 – application of test results regarding product parameters				
Product parameters	Test method and validity of test results			
	EN ISO 1182	EN ISO 1716	EN 13823 (SBI)	EN ISO 11925-2
		of non-homogenous boards.	<p>specific non-standardized substrate and if an adhesive was used for fixing the specimens respectively</p> <ul style="list-style-type: none"> - equal or lower total thickness than tested in case of using standard substrates of class A1/A2 (except when using an adhesive for fixing the specimens) - any higher thickness if 200 mm thick specimens were tested - Highest and lowest thickness of any non-substantial layers of non-homogenous boards shall be considered within the aforementioned tests 	<p>substrate of class D or a specific non-standardized substrate and if an adhesive was used for fixing the specimens respectively</p> <ul style="list-style-type: none"> - equal or lower total thickness than tested in case of using standard substrates of class A1/A2 (except when using an adhesive for fixing the specimens) - any higher thickness if 60 mm thick specimens were tested - Highest and lowest thickness of any non-substantial layers of non-homogenous boards shall be considered within the aforementioned tests
Density / Weight per unit area	for the tested density ($\pm 10\%$ tolerance) of homogenous boards as well as of each substantial component non-homogenous boards or the range between tested highest and lowest density of	Density: not relevant, but: highest and lowest weight per unit area (considering the possible range of thickness and density) of each component shall be considered when calculating the total PCS value of non-	for homogenous boards as well as for components of non-homogenous composite boards: The result is valid for the tested density $\pm 10\%$ (if only one was tested). or The result is valid for the range between tested highest and lowest density. For non-substantial components of non-homogenous boards, the results are valid for the tested weight per unit area ($\pm 10\%$ tolerance), if only one was tested, or the	

Table A.3 – application of test results regarding product parameters				
Product parameters	Test method and validity of test results			
	EN ISO 1182	EN ISO 1716	EN 13823 (SBI)	EN ISO 11925-2
	homogenous boards as well as of each substantial component non-homogenous boards	homogenous boards.	range between highest and lowest weight per unit area evaluated.	
Type of carrier material(s)	not relevant – if the requirements for non-substantial components are fulfilled; otherwise, see lines before.	for the tested type only (see also lines before)	for the tested type only (regarding thickness and weight per unit area see lines before)	
Asymmetry	not relevant	not relevant	cf. clause A.2.3.2.5	cf. clause A.2.3.1.3
Adhesive	not relevant (fulfilling of the requirements for non-substantial components assumed)	for the tested product only and with the same or lower applied quantity per	cf. table A.4	

Table A.4 – application of test results regarding installation parameters		
Installation parameter	Test method and validity of test results	
	EN 13823 (SBI)	EN ISO 11925-2
Type of exposure to thermal attack	See test standard	See clause A.2.3.1.1
Substrate	valid for the use on substrates as specified in EN 13238, if tested with a standard substrate, or only for the application on the specific non-standardized substrate used in the tests	valid for the use on any substrate, if tested free-hanging without a substrate or on substrates as specified in EN 13238, if tested with a standard substrate, or only for the application on the specific non-standardized substrate used in the tests
Air gaps/cavities	cf. clause A.2.3.2.3 Test results only cover applications of the boards directly mounted on a substrate.	Not applicable

Table A.4 – application of test results regarding installation parameters		
Installation parameter	Test method and validity of test results	
	EN 13823 (SBI)	EN ISO 11925-2
Joints/edges	cf. clause A.2.3.2.4 When tested with butt edges, the test result is valid for all edge types. If tested with any other type of edge, the test results are valid for that type only.	cf. clause A.2.3.1.4
Size and positioning of test specimen	valid for all products sizes.	
Product orientation and geometry	cf. clause A.2.3.2.6	cf. clause A.2.3.1.3
Fixing of test specimens by mechanical fixing means	Test results being obtained for mechanically fixed specimens with metal fixing means are valid for the use of any mechanical, metal fixing means. Inorganic mortars of reaction to fire class A1 may also be used for fixing purposes. Test results being obtained for mechanically fixed specimens with plastic fixing means are valid for the use of the same or similar plastic fixing means with the same or higher distance to each other and the same or lower number per square meter. They are also valid for the use of metal fixing means or inorganic mortars.	Test results being obtained for free-hanging tested specimens or specimens mechanically fixed on a substrate with metal fixing means are valid for the use of mechanical, metal fixing devices. Inorganic mortars of reaction to fire class A1 may also be used for fixing purposes. Test results being obtained for mechanically fixed specimens with plastic fixing means are valid for the use of the same or similar plastic fixing means. They are also valid for the use of metal fixing means or inorganic mortars.
Fixing of test specimens by adhesives	Test results only cover applications of the boards with the tested type of adhesive with the same or lower applied quantity per unit area and with adhesives too, where PCS-value (per mass as well as per unit area) is equal or lower than the value of the adhesive used in the tests.	

Annex B Additional provisions for the determination of the propensity to undergo continuous smouldering of the thermal insulation boards

B.1 Sample taking

In addition to EN 16733, the following conditions and parameters shall be considered when performing sampling and preparing test samples:

- a) Homogeneous products and products with carrier material as non-substantial component
 - product-variations of a product family (as defined by a certain combination of raw materials, e.g., type of chemical basis, binder and additives, and produced in a certain production process)⁵
 - the product or product variant with the highest organic content (in percentage per mass), where relevant⁷, determined according to EN 13820;
 - the product or product variant with the highest density as well as the lowest density, determined by tests according to EN ISO 29470;
 - the product or product variant with the highest thickness or – if greater than 100 mm – highest testable thickness of 100 mm, determined according to EN ISO 29466 on at least three specimens;
 - each different produced orientation of the thermal insulation boards (i.e., lengthwise and crosswise to the length direction of the specimen);
 - without the non-substantial carrier material on the surface(s) or suchlike – existing carrier material shall be removed when preparing the test specimens
- b) Non-homogeneous products with a carrier material as substantial component
 - product-variations of a product family (as defined by a certain combination of raw materials, e.g., type of the chemical basis, binder and additives, possible combinations of the core materials and the external carrier materials, and produced in a certain production process)⁵;
 - the product or product variant with the highest organic content (in percentage per mass) of core material and external carrier material, where relevant⁷, determined by tests according to EN 13820;
 - the product or product variant with the highest as well as lowest density of the core material and the external carrier material;
 - the product or product variant with the highest total thickness as well as the highest thickness of core material and external carrier material;
 - each different produced orientation of the core material and the external carrier material (i.e., lengthwise and crosswise to the length direction of the specimen);

B.2 Preparation of tests specimens

If the total thickness of taken samples is higher than 100 mm, the thickness of the specimens shall be reduced from their unexposed backside to obtain the maximum testable thickness of 100 mm.

The tests of non-homogenous thermal insulation boards shall be done on specimens with only one external carrier material (2-layered assembly of the specimens), which also cover a 3-layered assembly of the thermal insulation boards (with external carrier material on both surfaces).

In case of non-homogenous specimens both layers core material as well as external carrier material of the thermal insulation boards shall be exposed by the ignition source within the tests.

The tests shall be done without consideration of the intended end-use conditions, because propensity to undergo continuous smouldering is hardly affected by end-use conditions. If the paragraph 6.2.5 of EN 16733 applies, a permanent contact between the pieces shall be assured.

⁷ relevant for homogenous products and substantial components of non-homogenous products consisting of a mixture of inorganic substances and a clearly limited amount of organic substance

B.3 Extended application of test results

The determined performance of the tested product shall be expressed in accordance with clause 11 of EN 16733. The results of tests considering the aforementioned parameters in fully are also valid for products:

- of the same defined product-family (as defined by, e.g., type the chemical basis, binder and additives),
- with lower organic content of homogenous products as well as of core material and external carrier material of non-homogenous products, where relevant,
- with all densities of homogenous products as well as of core material and external carrier material of non-homogenous products between those values evaluated,
- with lower total thickness of homogenous products and also with higher thickness of homogenous products when the thickness of the tested specimen was of about 100 mm,
- with lower thickness of the layers core material and carrier material of non-homogenous products and also with higher thickness of these layers when the layer thickness of the tested specimens was of about 100 mm,
- with all orientations of homogenous products as well as of core material and external carrier material of non-homogenous products,
- with any non-substantial carrier materials or suchlike (cf. clause B.1 a) and
- for any end-use conditions.