



EUROPEAN ASSESSMENT DOCUMENT

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VACUUM INSULATION PANELS
(VIP)

WITH FACTORY APPLIED
PROTECTION LAYERS

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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 consisting of a vacuum insulation panel (VIP) and optional protection layers.

The VIP is made of an evacuated core of presses fumed silica and a multilayer high barrier foil. The core is sealed in the high barrier foil under vacuum.

The protection layers (e.g. EPS, PUR, HPL, rubber, aluminium, plastics, plywood, fibreboards) are glued on the VIP and provide protection against mechanical damage depending on the intended use.

The protection layers are to be described in the European Technical Assessment (ETA) concerning material type, density/mass per unit area, geometry/thickness and – if possible - the relevant specification (e.g. EN standard).

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 is used for insulation of roofs, walls, floors and doors in buildings.

The assessment of the product only applies when the product is used in structures where it is protected from wetting, weathering and precipitation.

When installing the manufacturer's installation instructions shall be observed.

The assessment methods as provided for in this EAD are based on the assumption that the insulation boards have not been damaged, neither during transport or installation (e.g. by cutting or drilling), and they have been protected from humidity, weathering, and sunlight, that the substrate is sufficiently flat, and that they are protected against damage during the working life by suitable constructional arrangements.

In order to ensure the intactness of the boards after installation, it would be advisable that the product should only be installed by special trained companies stated in a list of the manufacturer. These companies should have adequate experience in installing the product. Before installation the thermal insulation boards should be checked by visual control.

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 insulation product for the intended use of 25 years when installed in the works (provided that the insulation product 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

2.1 Essential characteristics of the product

Table 1 shows how the performance of thermal insulation product is assessed in relation to the essential characteristics.

Table 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			
1	Reaction to fire	2.2.1	Class according to EN 13501-1
Basic Works Requirement 6: Energy economy and heat retention			
2	Thermal conductivity *	2.2.2	Level
3	Thickness	2.2.3	Level
4	Water vapour resistance	2.2.4	Level
5	Squareness	2.2.5	Level
6	Flatness	2.2.6	Level
7	Density	2.2.7	Level
8	Mass per square metre of the multilayer high barrier foil of the VIP	2.2.8	Level
9	Length and width	2.2.9	Level
10	Oxygen permeability of the multilayer high barrier foil of the VIP	2.2.10	Level
11	Compressive stress / strength at 10 % deformation	2.2.11	Level
12	Dimensional stability under specified temperature and humidity	2.2.12	Level
13	Deformation under specified load and temperature	2.2.13	Level
14	Tensile strength of the multilayer high barrier foil of the VIP	2.2.14	Level

No	Essential characteristic	Assessment method	Type of expression of product performance
15	Internal pressure	2.2.15	Level
16	Tensile strength perpendicular to the faces of the thermal insulation boards	2.2.16	Level
17	Behaviour under point load	2.2.17	Level
18	Shear strength of the thermal insulation boards	2.2.18	Level

* The protection layers of the VIP shall be omitted from the calculation of the thermal resistance of the building components. When calculating the thermal resistance, the nominal thickness of the vacuum insulation panels (without protection layer) shall be applied.

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

The tests and assessments shall be performed on the VIP unless otherwise stated in the following.

The level and the classification respectively for each characteristic shall be representative for the dimensions, density and thickness range of the product. The samples shall be chosen accordingly. If necessary, the tests shall be performed on samples with different dimensions, densities and thicknesses so that the worst case for each characteristic can be given in the ETA.

2.2.1 Reaction to fire

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

For mounting and fixing, Annex C shall be applied.

The reaction to fire class is given in the ETA.

2.2.2 Thermal conductivity

The thermal conductivity at a mean temperature of 10 °C is determined in accordance with the principles of method described in EN 12667.

At least 4 measurements shall be performed by a notified testing laboratory.

The verification shall take into account the aging, the internal increase pressure of the VIP elements and the linear edge transmittance as defined in Annex A.

The thermal conductivity before aging and without linear edge transmittance and the thermal conductivity λ_D according to Annex A are given in the ETA.

The thermal conductivity before aging and without linear edge transmittance is given as $\lambda_{90/90}$.

The thermal conductivity $\lambda_{90/90}$ is determined on the basis of the measuring results in accordance with EN ISO 10456 (with the coefficient k_2 according to Annex C of EN ISO 10456).

The thermal resistance of the protection layers is to be neglected.

2.2.3 Thickness

The thickness, d , is determined in accordance with the principles of method described in EN 823 with a pressure of 250 Pa (± 5 Pa) and at least 3 test specimen.

The thickness is given in the ETA. No test result shall deviate from the nominal values by more than the tolerances given in the following table 2 in accordance with EN 13171.

Table 2: Tolerances depending on the nominal thickness

Thickness [mm]	Tolerances
< 20 mm	T5 according to EN 13171
20 to 50 mm	T4 according to EN 13171
> 50 mm	T2 according to EN 13171

2.2.4 Water vapour resistance

The water vapour resistance is determined in accordance with the principles of method described in EN 12086.

The water vapour resistance is given in the ETA.

2.2.5 Squareness

The squareness is determined in accordance with the principles of method described in EN 824.

The squareness is given in the ETA. The deviation from squareness on length and width, S_b , shall not exceed 5 mm/m according to EN 13171.

2.2.6 Flatness

The flatness is determined in accordance with the principles of method described in EN 825.

The flatness is given in the ETA. The deviation from flatness, S_{max} , shall not exceed 6 mm/m according to EN 13171.

2.2.7 Density

The density is determined in accordance with the principles of method described in EN 1602.

The range of density is given in the ETA.

Each single value of the density of the VIP (including the multilayer high barrier foil) shall be in the given density-range.

2.2.8 Mass per square meter of the multilayer high barrier foil of the VIP

The mass per unit area of the multilayer high barrier foil is determined with a calibrated scale with an accuracy of 0,01 g on samples at least 200 mm x 200 mm.

The mass per unit area of the multilayer high barrier foil is given in the ETA (including tolerances). Every value shall be within the given range.

2.2.9 Length and width

The length and width are determined in accordance with the principles of method described in EN 822.

The length and width are given in the ETA. No test result shall deviate from the nominal values by more than the following in accordance with EN 13171:

± 2 % in the direction of length (according to EN 13171),

± 1,5 % in the direction of width (according to EN 13171).

2.2.10 Oxygen permeability of the multilayer high barrier foil of the VIP

The oxygen permeability of the multilayer high barrier foil is determined in accordance with the principles of method described in DIN 53380-3:1998 or ASTM D 3985:2002, with the boundary conditions 23 °C and 50 % relative humidity or 23 °C and 0 % relative humidity.

The oxygen permeability of the multilayer high barrier foil is given in the ETA in $\text{cm}^3 (\text{m}^2 \cdot \text{bar} \cdot \text{d})$.

2.2.11 Compressive stress/strength at 10 % deformation

The compressive strength at 10 % deformation or compressive stress is determined in accordance with the principles of method described in EN 826.

The compressive strength at 10 % deformation or compressive stress is given in the ETA in levels using steps given in EN 13171.

2.2.12 Dimensional stability under specified temperature and humidity

The dimensional stability under specified temperature and humidity conditions is determined in accordance with the principles of method described in EN 1604.

The test shall be carried out at 3 test specimen of at least 200 mm x 200 mm after storage of 48 h at $(70 \pm 2)^\circ\text{C}$ and $(90 \pm 5)\%$ relative humidity.

The relative changes in length, width and thickness are given in the ETA using levels according to EN 13171.

2.2.13 Deformation under specified load and temperature

Deformation in thickness under specified load and temperature is determined according to EN 1605 with at least 3 test samples for test condition 2 (40 kPa / 70 °C / 168 h).

The maximum change of the relative deformation in % is given in the ETA.

2.2.14 Tensile strength of the multilayer high barrier foil of the VIP

The tensile strength of the multilayer high barrier foil is determined with test specimen "type 2" according to EN ISO 527-3. The test shall be carried before and after ageing (Annex B).

The value of the tensile strength before and after ageing is given in the ETA.

2.2.15 Internal pressure

The internal pressure is determined 24 h the product has been manufactured using a foil lift-off procedure, in which the VIP is exposed to negative pressure (e.g. in a vacuum chamber or by means of a suction cup) until it is lifted off the VIP core. The distance between the VIP core and the foil can be measured with the help of a laser distance measuring device and used to determine the internal pressure of the VIP.

The internal pressure is given in the ETA.

2.2.16 Tensile strength perpendicular to the faces of the thermal insulation boards

The tensile strength perpendicular to the faces of the thermal insulation boards is determined in accordance with the principles of method described in EN 1607.

The tensile strength is given in the ETA.

2.2.17 Behaviour under point load

The point load, F_p , at 5 mm deformation is determined with 3 test specimens 300 mm x 300 mm in accordance with the principles of method described in EN 12430.

In addition or alternative the deformation under a point load of 1000 N is determined in accordance with EN 12430.

The point load and/ or the deformation are given in the ETA.

2.2.18 Shear strength of the thermal insulation boards

The shear strength of the thermal insulation boards is determined in accordance with the principles of method described in EN 12090.

The shear strength for each kind of protection layer 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 to be applied

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, or 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 procedure of assessment and verification of constancy of performance are laid down in Table 3.

Table 3 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
Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan]*					
1	Reaction to fire	EN ISO 11925-2 and clause 2.2.1	Control plan	1	once per month
		EN 13823, EN ISO 1182, EN ISO 1716 and clause 2.2.1 with Annex C	Control plan	1	once per year
2	Thermal resistance / conductivity	Direct: EN 12667 or EN 12939 and clause 2.2.2	Control plan	1	once per month
		Indirect: see clause 2.2.15	Control plan	1	once per day
3	Thickness	EN 823 and clause 2.2.3	Control plan	see clause 2.2.3 and EN 823	twice per day
4	Squareness	EN 824 and clause 2.2.5	Control plan	see clause 2.2.5 and EN 824	once per day
5	Flatness	EN 825 and clause 2.2.6	Control plan	see clause 2.2.6 and EN 825	once per day
6	Density	EN 1602 and clause 2.2.7	Control plan	see clause 2.2.7 and EN 1602	once per day

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
7	Length and width	EN 822 and clause 2.2.9	Control plan	see clause 2.2.9 and EN 822	once per day
8	Oxygen permeability of the multilayer high barrier foil of the VIP	ASTM D 3985 or DIN 53380-3 and clause 2.2.10	Control plan	see clause 2.2.10 and ASTM D 3985 or DIN 53380-3	once per year
9	Compressive stress / strength at 10 % deformation	EN 826 and clause 2.2.11	Control plan	see clause 2.2.11 and EN 826	once per month
10	Internal pressure	see clause 2.2.15	Control plan	see clause 2.2.15	once per day
11	Tensile strength perpendicular to the faces of the thermal insulation boards	EN 1607 and clause 2.2.16	Control plan	see clause 2.2.16 and EN 1607	once per week

*) 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 the notified body is only necessary in so far as the conditions for the applicability of system 1 as defined in Decision 1999/91/EC are fulfilled.

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance for the product are laid down in Table 4.

Table 4 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 <i>(for systems 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	-	

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Continuous surveillance, assessment and evaluation of factory production control <i>(for systems 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				

** Only relevant for products of class C and higher

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, unless a dated reference is given in clause 2.2 of this EAD.

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 11925-2	Reaction to fire tests – Ignitability of building products subjected to direct impingement of flame – Part 2: Single-flame source test
EN 12086	Thermal insulation products for building applications – Determination of water vapour transmission properties
EN 12090	Thermal insulation products for building applications – Determination of shear 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 13501-1	Fire classification of construction products and building elements - Part 1: Classification using test data from fire 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 13163	Thermal insulation products for buildings – Factory made expanded polystyrene (EPS) products - Specification
EN 13171	Thermal insulation products for buildings – Factory made wood fibre (WF) products - Specification
DIN 53380-3	Prüfung von Kunststoffen - Bestimmung der Gasdurchlässigkeit - Teil 3: Sauerstoffspezifisches Trägergas-Verfahren zur Messung an Kunststoff-Folien und Kunststoff-Formteilen
ASTM D 3985	Standard Test Method for Oxygen Gas Transmission Rate Through Plastic Film and Sheeting Using a Coulometric Sensor

ANNEX A - Determination of the thermal conductivity considering the influence of aging and the effect of thermal bridges

A.1 Aging effects

The aging effects shall cover a time span of 25 years.

The following acceleration test for a set of test specimens shall be performed on a minimum of 3 samples.

If the VIP-boards are available in several thicknesses the minimum and the maximum thickness shall be covered by the tests.

Depending on the intended use the test shall be performed using the aging conditions according to A.1.1 or A.1.2 .

The intended use of the thermal insulation board has to be described and defined in the ETA depending on the aging procedure performed.

A.1.1 External and internal application of the thermal insulation boards

If the intended use is the external and internal insulation of buildings the following aging conditions shall be used:

- Conditioning at least 72 hours at (23 ± 2) °C and (50 ± 5) % relative humidity
- Determination of the initial thermal conductivity
- Cycling in changing climate $(+ 70\pm 3)$ °C / $(- 15\pm 3)$ °C (8 cycling, each cycling 24 hours) *
- Conditioning for 90 days at (70 ± 3) °C *
- Determination of the intermediate thermal conductivity
- Conditioning for 90 (additional) days at (50 ± 3) °C and (80 ± 5) % relative humidity
- Conditioning at least 72 hours at (23 ± 2) °C and (50 ± 5) % relative humidity
- Determination of the thermal conductivity after ageing

* Without relative humidity ("dry"), at most 5 % relative humidity

A.1.2 Internal application of the thermal insulation boards

If the intended use is only the internal insulation of buildings the following aging conditions shall be used:

- Conditioning at least 72 hours at (23 ± 2) °C and (50 ± 5) % relative humidity
- Determination of the initial thermal conductivity
- Conditioning for 90 days at (70 ± 3) °C *
- Determination of the intermediate thermal conductivity
- Conditioning for 90 (additional) days at (50 ± 3) °C and (80 ± 5) % relative humidity
- Conditioning at least 72 hours at (23 ± 2) °C and (50 ± 5) % relative humidity
- Determination of the thermal conductivity after ageing

* Without relative humidity ("dry"), at most 5 % relative humidity

A.1.3 Method of verification

The thermal conductivity shall be determined in accordance with the principles of method described in EN 12667.

The ageing increment $\Delta\lambda_a$ is determined from the difference between the measured aged value and the measured initial value (mean value of the thermal conductivity increase from measurements of 3 specimens), rounded upwards to the nearest 0,0001 W/(mK).

A.2 Linear edge transmittance/thermal bridges

The linear edge transmittance/the effect of thermal bridges of each thickness or thickness range shall be taken into account of the thermal conductivity.

For products with dimensions of length and width of at least 400 mm x 300 mm the effect of thermal bridges can be taken into account using a correction factor of $F_{tb}=1,10$.

For smaller board size and/or for using a better correction factor (smaller than $F_{tb}=1,10$) the determination of the correction factor F_{tb} shall be performed in accordance with EN ISO 10211 or with special measurements in accordance with the principles of method described in EN 12667 on samples with dimensions of length and width of 500 mm x 500 mm including the maximum of joint-proportion depending on the board size (the boards with the smallest dimensions to be covered by the ETA shall be used for testing).

A.3 Thermal conductivity considering the influence of aging and the effect of thermal bridges

The thermal conductivity λ_D shall be determined considering the influence of aging ($\Delta\lambda_a$, see Annex A, clause A.1) and the effect of thermal bridges (F_{tb} , see Annex A, clause A.2).

The thermal conductivity λ_D shall be rounded upwards to the nearest 0,0001 W/(mK).

The thermal conductivity λ_D shall be determined as follows:

$$\lambda_D = (\lambda_{90/90} + \Delta\lambda_a) \cdot F_{tb}$$

ANNEX B - Ageing method for the multilayer high barrier foil of the VIP

B.1 Measurement of initial characteristics

The following measurements are made:

Tensile strength and elongation on the multilayer high barrier foil (of the VIP) which is relevant to avoid internal pressure and oxygen permeability, in accordance to EN ISO 527-3.

The test should be done by 23 °C and 50 % relative humidity.

B.2 Exposure conditions

Five series of test specimens are exposed at 70 °C for 3 days, 7 days, 14 days, 30 days and 90 days. After the exposure the tensile strength and elongation shall be determined in accordance to the mentioned time steps.

B.3 Determination of final characteristics (after aging)

The reduction between the tensile strength and elongation before and after exposure should be diagrammed.

ANNEX C - Mounting and fixing procedure for reaction to fire tests

C.1 Principle

The reaction to fire classification shall be determined in accordance with EN 13501-1, respecting the test conditions laid down in this EAD.

The classification for the product as placed on the market is without any non-integrated installation means, e.g. glues, sealants.

C.2 Instructions for mounting and fixing of test specimens

C.2.1 General

This clause gives instructions for mounting and fixing for reaction to fire testing of the product as placed on the market (product itself) and includes the field of application of the test results in 1.2. This clause is related to 2.2.1 in the main body of the EAD.

C.2.2 Product and installation parameters

The Tables C.1 and C.2 give the parameters that have to be taken into account 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 C.1: Product parameters

Product Parameters	EN ISO 1182 (class A1 and A2)	EN ISO 1716 (class A1 and A2)	EN 13823 (class A1 to D)	EN ISO 11925-2 (class B to E)
Thickness	—	—	X	X
Density	X	—	X	X
Type of product	—	—	—	—
Type of facing(s)	—	X	X	X
Thickness/area weight of facing(s)	—	X	X	X
Type and amount of adhesive for facing(s)	—	X	X	X
Asymmetry	—	—	X	X

Table C.2: Installation parameters

Parameter	EN 13823 (class A1 to D)	EN ISO 11925-2 (class B to E)
Exposure to thermal attack	X	X
Substrate	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	—

C.2.3 Mounting and fixing

All product samples which are required for the specific test methods (size and shape) should be pre-decided with the applicant/manufacturer.

The samples should have the same properties (e.g. facings and/or coatings) as the original product.

C.2.3.1 Ignitability, EN ISO 11925-2 Exposure to thermal attack

The product shall be tested directly exposed to the thermal attack. Both surface and the closed edge shall be exposed to the flame.

C.2.3.1.1 Substrate

The test specimen shall be mounted in the test apparatus without a substrate.

C.2.3.1.2 Product orientation and geometry

Homogeneous products and products with the same facing on both sides shall be tested on one face only.

If the product surfaces are not the same or the product is asymmetrical, two options are open for indication:

- either the worse test result will be used to indicate the reaction to fire class of the product (valid for both faces exposed);

- or a indication of the reaction to fire class of each face is made, provided that the identification of the faces is clearly visible in the marking and labelling of the product.

C.2.3.2 Single Burning Item (SBI), EN 13823

C.2.3.2.1 Exposure to thermal attack

The product shall be tested directly exposed to the thermal attack.

C.2.3.2.2 Substrate

The type of the substrate is defined in EN 13238.

The general substrate to be used to test the product as placed on the market is made of calcium silicate.

For Euroclass A1 classification a calcium silicate substrate is compulsory. Gypsum plaster board, steel, and wooden particle board substrates such as defined in EN 13238 are permitted to be used instead.

C.2.3.2.3 Air gaps/cavities

The test specimen (product itself) shall be mounted in the test apparatus without an air gap/cavity (neither between the product and substrate nor between substrate and backing board).

C.2.3.2.4 Joints/edges

The general test shall be done with one vertical and one horizontal joint in the long wing. Alternatively, testing can be done either with a horizontal or a vertical joint. 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 product samples that are small shall be arranged in the test apparatus such that the joints required 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.

C.2.3.2.5 Size and positioning of the test specimen

The size of the test specimens is given in EN 13823. Positioning of the test specimens shall meet the following conditions:

Joints/edges shall be taken into account;

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 specimens installed on the short wing shall cover (on their thickness) those 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.

C.2.3.2.6 Product orientation and geometry

Homogeneous products and products with the same facing on both sides shall be tested on one face only.

If the product surfaces are not the same or the product is asymmetrical, two options are open for indication:

Either the worse test result will be used to indicate the reaction to fire class of the product (valid for both faces exposed); or an indication of the reaction to fire class of each face is made, provided that the identification of the faces is clearly visible in the marking and labelling of the product.

C.2.3.2.7 Fixing of flat test specimens

The factory made product shall be fixed to the substrate using screws and washers and the following rules shall be respected:

the minimum fixing distance from any edge is 25 mm;

position and number of fasteners shall be chosen to achieve sufficient stabilisation;

the fastener is composed of a screw having a diameter of 2,5 mm to 5 mm, and a washer, with thickness up to 1,2 mm, if necessary to avoid any damage of the specimen having a diameter of 20 mm to 70 mm;

no fixing shall be positioned below the U profile in the EN 13823 (SBI) test apparatus.