



TECHNICAL REPORT

Determination of fire-related  
characteristics of external wall cladding  
in EADs

TR 078

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## 1 SCOPE OF THE TECHNICAL REPORT

This Technical Report provides guidance for the handling of the determination of fire-related characteristic of external wall claddings in EADs.

It deals with model clauses for EADs, provisions for specific aspects to be considered within the necessary fire tests as well as with rules for the assessment and application of test results. In particular, the provisions of Annex B of this guidance document can be seen as 'state of the art' when testing boards/panels of cladding kits or complete cladding kits in the relevant reaction to fire tests.

Investigations after the 'Grenfell disaster 2017' in London had shown the importance of such provisions for appropriate mounting and fixing conditions to simulate the intended end-use of the cladding kits as far as possible.

This amendment of 2023 of TR 078 considers the provisions included in version 01 of EAD 090062-01-0404 *Kits for external wall claddings mechanically fixed*, and in EAD 090097-00-0404 *Kits for external wall claddings glued to the subframe*, as well as the criteria agreed in the document *Common understanding of EOTA-PT4, CEN/TC 127 WG4 and CPE regarding fire testing and assessment of cladding kits for ventilated facades (2023-03-16)*.

## 2 MODEL CLAUSES FOR EAD

### 2.1 Reaction to fire

Reaction to fire of the whole kit shall be assessed by considering the reaction to fire of the components (cladding element, cladding fixings, adhesive system components, subframe components, thermal insulation products, etc.), in order to be classified according to Commission Delegated Regulation (EU) 2016/364.

Where relevant (e.g., asymmetrically composed cladding elements, or relevant surfaces of the kit components of the rear side), reaction to fire of the rear side of the cladding element shall also be assessed in order to be classified according to Commission Delegated Regulation (EU) 2016/364.

For the assessment of reaction to fire of the kit, one of the following options shall apply:

- a) The kit shall be assessed based on the worst reaction to fire class of the kit components obtained according to a CWFT<sup>1</sup> Decision or tested using the method(s) relevant for the corresponding reaction to fire class according to EN 13501-1.

Note: if option a) is followed, the field of application of the individual reaction to fire class of every kit component (i.e., the product and installation conditions for which the reaction to fire of the individual component is valid) shall completely match the end-use conditions of such a component when assembled into the kit.

- b) If option (a) leads to a too onerous classification of the kit, or if classification for one or several components are missing, then the kit shall be tested, using the method(s) relevant for the corresponding reaction to fire class according to EN 13501-1 (reference method in case of dispute).

Criteria indicated in Annex A shall be taken into account. Associated mounting and fixing rules for the SBI test as well as for tests according to EN ISO 11925-2 shall be in accordance with Annex B.

Components fulfilling the conditions as stated in Annex D shall be considered as small components without the need for testing and assessment of their reaction to fire performance, except where it is explicitly prescribed in Annexes A and B.

The kits shall be classified according to the Commission Delegated Regulation (EU) 2016/364 in connection with EN 13501-1.

The obtained reaction to fire classification covers both the application of the kit as vertically mounted external wall cladding as well as horizontal cladding beneath ceilings, provided that the assembly of the kit is identical for both cases. If not, separate testing with different test assemblies shall be considered.

When the thermal insulation products are part of the kit, the individual reaction to fire of the thermal insulation products shall be assessed, depending on the material, according to the relevant thermal insulation product standard. The thermal insulation products shall be classified according to the Commission Delegated Regulation (EU) 2016/364 in connection with EN 13501-1.

When subframe studs made of wood are part of the kit, the individual reaction to fire of these subframe studs shall be assessed according to a CWFT Decision or tested using the method(s) relevant for the corresponding reaction to fire class according to EN 13501-1. The subframe studs made of wood shall be classified according to the Commission Delegated Regulation (EU) 2016/364 in connection with EN 13501-1.

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<sup>1</sup> CWFT: Classified Without Further Testing.

## 2.2 Façade fire performance

If the manufacturer intends to declare the façade fire performance of the product, in absence of a European assessment approach, the ETA shall state the results of the product assessment(s) according to the assessment method(s) required by the regulatory provisions of those countries, in which the manufacturer intends to make the product available on the market, according to the table given in Annex E.

The facade fire performance shall be determined as requested at the place of application in order to demonstrate compliance with the relevant fire safety requirements and shall be stated in the ETA.

## 2.3 Propensity to undergo continuous smouldering

This characteristic is only applicable for cladding kits completely or in parts consisting of components made of mineral wool (MW), wood wool (WW), cork, wood-based boards/panels, wood fibres (WF) or made of any other vegetal or animal fibres or phenolic foam.

The assessment of the kit regarding propensity to undergo continuous smouldering is carried out by means of the assessment of the propensity to undergo continuous smouldering of the concerned kit components. It is considered representative of this essential characteristic for cladding kits.

Propensity to undergo continuous smouldering of concerned kit components shall be tested and assessed according to EN 16733.

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

In accordance with EN 16733, clause 11, the ETA shall specify the following information:

<b>Performance according to EN 16733, clause 11, of the kit component as given in its own DoP or after testing</b>	<b>Description of the performance of the cladding kit regarding the characteristic Propensity to undergo continuous smouldering to be stated in the ETA</b>
The component does not show propensity to undergo continuous smouldering (NoS).	The cladding kit does not show propensity to undergo continuous smouldering.
The component shows propensity to undergo continuous smouldering (S).	The cladding kit shows propensity to undergo continuous smouldering.
Assessment of the propensity to undergo continuous smouldering is not possible (ANP).	Assessment of the propensity to undergo continuous smouldering is not possible

## ANNEX A. REACTION TO FIRE

### A.1 General

#### A.1.1 Principle

The determination of reaction to fire of the cladding kits is based on testing of “the worst case” - the most critical configuration in sense of reaction to fire. According to the rules described further in the text, the classification obtained on the most critical configuration of the cladding kit components is valid for all configurations of cladding components having better performance in sense of reaction to fire.

For testing of the cladding kit, the following principles shall apply regarding the selection of the relevant kit components:

- The kit components' materials with the highest amount of organic content<sup>2</sup> (if there are only differences in the amount of organic content but no difference in the organic component itself) or with the highest gross heat of combustion -  $Q_{PCS}$  [MJ/kg] according to EN ISO 1716 (from now on called “ $Q_{PCS}$ -value”) shall be tested.
- The influences of different colours shall be considered by performing tests on a light, on a dark and on a colour in the middle of the range (e.g., CIELAB 40.51, 59.28, 47.98; RGB 184, 29, 19; Munsell ref. 7.5R 4/13; RAL 3020; or BS04E56).
- In addition, each kit components' material selected for testing according to the previous point shall have the smallest amount of fire-retardants.

Components of a kit which are classified A1 without testing according to Decision 96/603/EC (as amended by Commission Decision 2000/605/EC and Commission Decision 2003/424/EC) do not need to be tested for an assessment according to option "a)" of clause 2.2.1. They also do not need to be tested for an assessment according to option "b)" of clause 2.2.1 if applying those test methods where each component shall be tested separately (e.g., EN ISO 1182, EN ISO 1716). In case of further calculation to determine the total  $Q_{PCS}$ -value of a composite product or a kit, these components do not contribute to the total  $Q_{PCS}$ -value, therefore their individual  $Q_{PCS}$ -value shall be set as zero.

#### A.1.2 Physical properties influencing the reaction to fire behaviour

- Type of cladding elements (e.g., material composition, thickness, density, weight per unit area).
- Organic content (binder and any other additives) of kit components, where applicable, (e.g., cladding elements made of resin mortar, fibre-cement, concrete, cement bonded particle, or agglomerated stone).
- Type and amount of fire-retardant<sup>3</sup>.
- (for glued cladding kits) Type and nature of the adhesive system components, the subframe components and the supplementary mechanical cladding fixings.
- (for mechanically fixed cladding kits) Type and nature of cladding fixings and subframe components.

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<sup>2</sup> The organic content can be checked by providing the formulation or, by performing suitable characterisation tests or by determining the glow loss (loss on ignition or ash content). When information on organic content per unit area is not available, the  $Q_{PCS}$ -value shall be tested to decide about the worst case.

<sup>3</sup> The term “fire-retardant” refers both to chemicals incorporated into a product composition during the manufacturing process (sometimes known as flame-retardant) and to coatings applied onto a finished product, in both cases with the purpose of improving the product's reaction to fire.

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*Note: Fire breaks and cavity barriers are important for the behaviour of the whole facade cladding system and cannot be assessed on the basis of SBI-testing. The influence can only be observed during a large-scale test (see Annex E). Therefore, breaks shall not be included in the mounting and fixing rules for the SBI-test.*

Although the rest of this annex applies the “worst case scenario” for deciding what to test, it is accepted that, where the manufacturer wants to assess a range of cladding kit configurations having different overall classifications, it may group these together into a number of different sub-groups (e.g., each sub-group corresponding to a different overall classification) with the ‘worst case scenario’ being identified for each sub-group.

## **A.2 Testing according to EN ISO 1182**

This test method is relevant for classes A1 and A2 according to Commission Delegated Regulation (EU) 2016/364 in connection with EN 13501-1.

Using this test method, only the substantial components of the cladding kit shall be tested. ‘Substantial components’ are defined by thickness ( $\geq 1$  mm) and/or mass per unit area ( $\geq 1$  kg/m<sup>2</sup>).

Physical properties as given in clause A.1.2 (in particular product type, density, organic content, fire-retardants) and the principles given in clause A.1.1 for the determination of the probable worst case shall be considered for selection of the specimens and the testing purposes.

## **A.3 Testing according to EN ISO 1716 (Q<sub>PCS</sub>-VALUE)**

This test method is relevant for classes A1 and A2 according to Commission Delegated Regulation (EU) 2016/364 in connection with EN 13501-1.

This test method shall be performed to all components of the cladding kit except for cases which are classified as A1 without testing.

Parameters relevant for this test method are composition (when performing calculation of the Q<sub>PCS</sub>-values, density or mass per unit area and thickness are relevant). Discrete and non-continuous mechanical fixings and ancillary materials which fulfil the conditions for small components according to Annex D shall not be considered for testing and for the calculation of the Q<sub>PCS</sub>-values.

It is not necessary to test a cladding element with different grain sizes if the organic content is the same as or lower than that of the tested cladding element.

## **A.4 Testing according to EN 13823 (SBI-test)**

This test method is relevant for classes A2, B, C and D (in some cases also for A1) according to Commission Delegated Regulation (EU) 2016/364 in connection with EN 13501-1.

Mounting and fixing provisions for the SBI-test for cladding kits are indicated in Annex B.

Parameters which are relevant for this test method:

- Type of kit components (e.g., material composition, dimensions, density, weight per unit area).
- Amount of organic content of the kit components.
- Amount of fire-retardant, if any.
- Colour according to the principles as in A.1.1.

In principle, it is desirable to find the test specimen configuration that gives the worst case concerning the reaction to fire test results. In the test procedure according to EN 13823, values for the rate of heat release, total heat release, lateral flame spread, rate of smoke release, total smoke release and burning droplets shall be determined.

The test specimen shall be prepared with the kit components with the highest organic content or Q<sub>PCS</sub>-value per unit area.



#### **A.4.1 Direct application rules of test results**

See section B.3.

#### **A.5 Testing according to EN ISO 11925-2**

This test method is relevant for classes B, C, D, E and F according to Commission Delegated Regulation (EU) 2016/364 in connection with EN 13501-1.

Mounting and fixing provisions for the tests are indicated in Annex B.

Parameters which are relevant:

- Type of kit components (e.g., material composition, dimensions, density, weight per unit area).
- Amount of organic content of the kit components.
- Amount of fire-retardant, if any.
- Colour according to the principles as in A.1.1.

For cladding elements with covered edges, the specimens shall be prepared both with covered edges and edges without covering (cut edges).

The tests shall be performed with surface exposure of the front side, edge exposure and possibly edge exposure of multi-layered test specimen turned 90° on their vertical axis according to the rules of standard EN ISO 11925-2.

Besides, the principles specified in section A.1 shall be applied.

##### **A.5.1. Application of test results**

See section B.3.

## **ANNEX B. MOUNTING AND FIXING PROVISIONS FOR THE SBI TEST (EN 13823) AND SINGLE-FLAME SOURCE TEST (EN-ISO 11925-2)**

### **B.1 Testing of the reaction to fire according to EN 13823 (SBI test)**

Considerations for cladding kits included in clause A.4 shall also be considered for SBI test.

The reaction to fire testing shall be given for the whole assembled kit, in simulating its end-use conditions.

The testing standard EN 13823 gives a general description of the arrangement of the test specimen for SBI test, applicable to classes A2, B, C and D (in some cases also to A1).

This Annex describes specific provisions for cladding kits.

#### **B.1.1 General information**

As a function of the use of the kit, the specimen shall be installed on a substrate in accordance with standard EN 13238:

- Calcium silicate or fibre-cement board or laminated gypsum board simulates a wall made of masonry or concrete.
- Non-fire-retardant-treated particle board or plywood board simulate a frame wall made with an outer planking of wood or wood-based boards.
- Steel sheet simulates a frame wall made with an outer planking of metal sheets with a melting point of at least 1000 °C.
- Aluminium sheet simulates a frame wall made with an outer planking of metal sheets with a melting point of at least 500 °C.
- Additional substrates not covered by EN 13238 for specific uses. In such cases, test results only applicable for the tested configuration.

A necessary subframe shall be formed by vertically directed beams or profiles made of non-fire-retardant-treated timber (spruce recommended, saw-cut, density not less than 350 kg/m<sup>3</sup>), aluminium or steel.

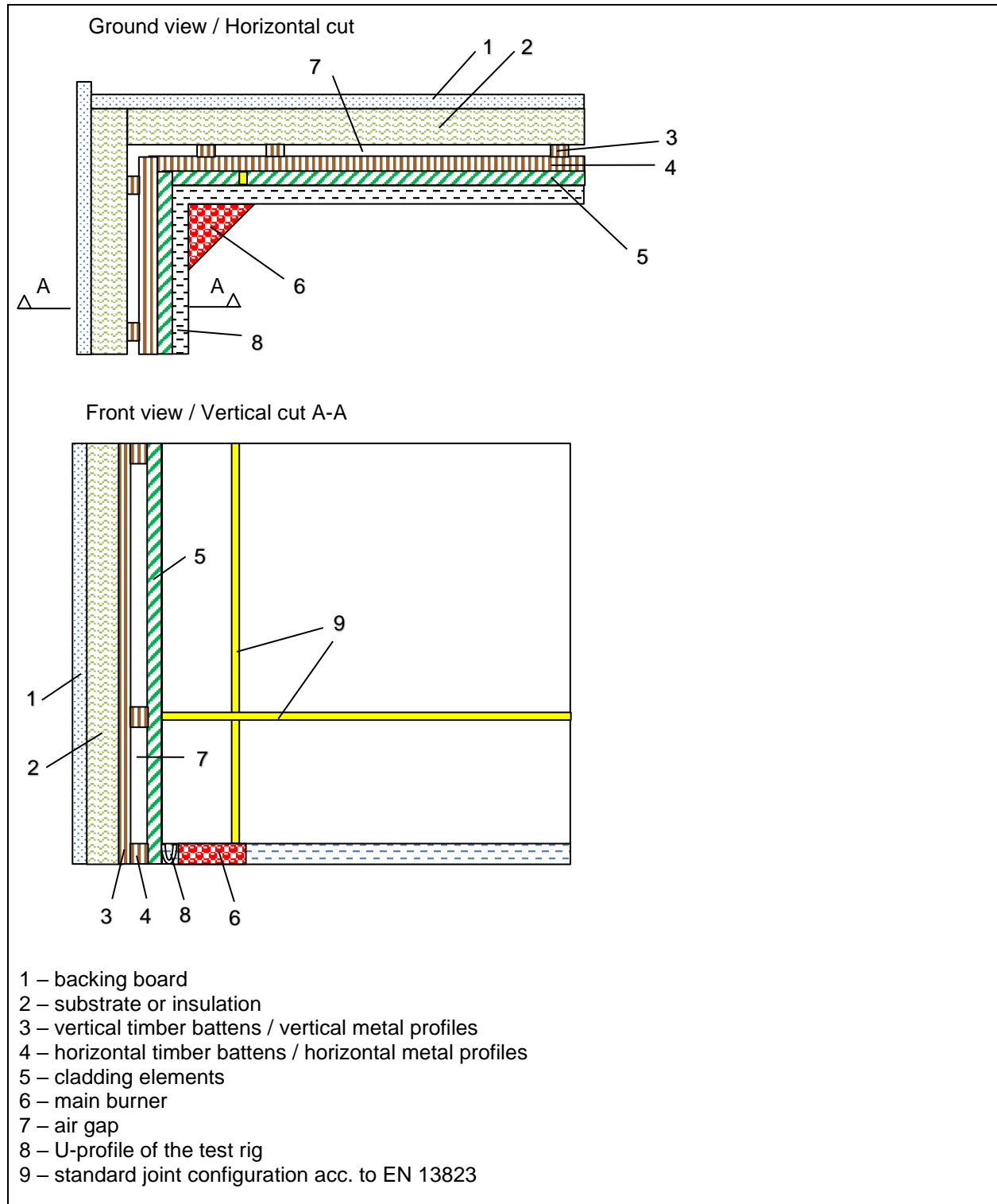
A non-fire-retardant-treated timber subframe also covers metal subframes. Aluminium profiles cover subframes made of metal with a melting point of at least 500 °C. Steel profiles in the tests cover metal subframes with a melting point of at least 1000 °C.

All ancillary components which form part of the kit (e.g., breather membranes, thermal brake pads, gaskets, seals, adhesive strips or double-sided tapes) shall be included in a representative manner in the test specimen unless they may be considered as small components according to Annex D.

An air space is always provided behind the cladding element in accordance with the Manufacturer's Product Installation Instructions (MPII). The air space shall have a depth of minimum 20 mm. The bottom and top edges of the specimen shall also remain opened.

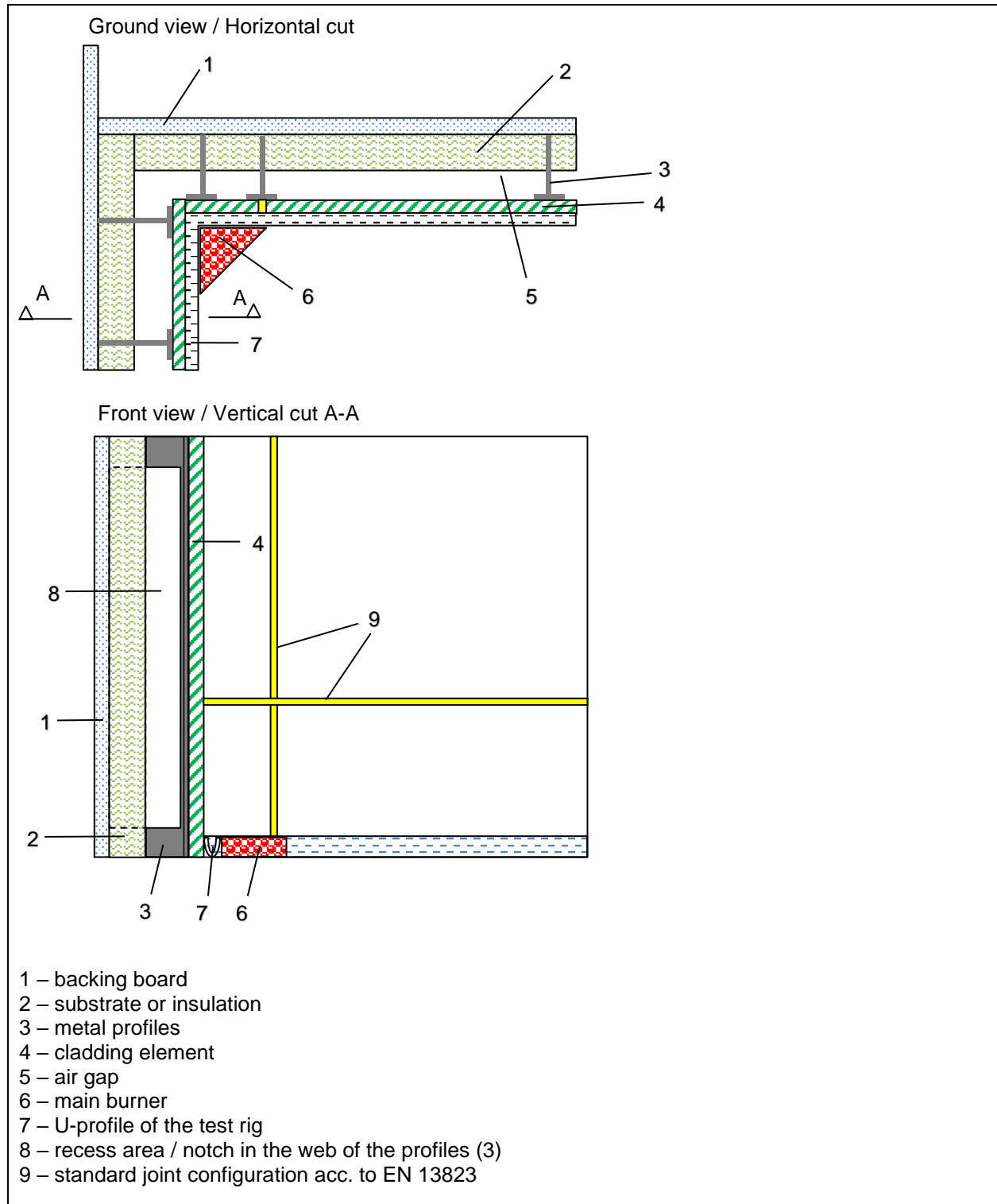
For ventilated cladding kits, a continuous airflow (without any interruption) in the air space shall be ensured. To that end, the provisions to allow a lateral airflow given in EN 13823 shall be considered as the first option. Examples are given in Figures B.1 to B.3 of test assemblies providing the required lateral ventilation of the air gap behind the cladding elements. The size of the openings at the lateral edges of the specimen wings shall be at least 150 cm<sup>2</sup>.

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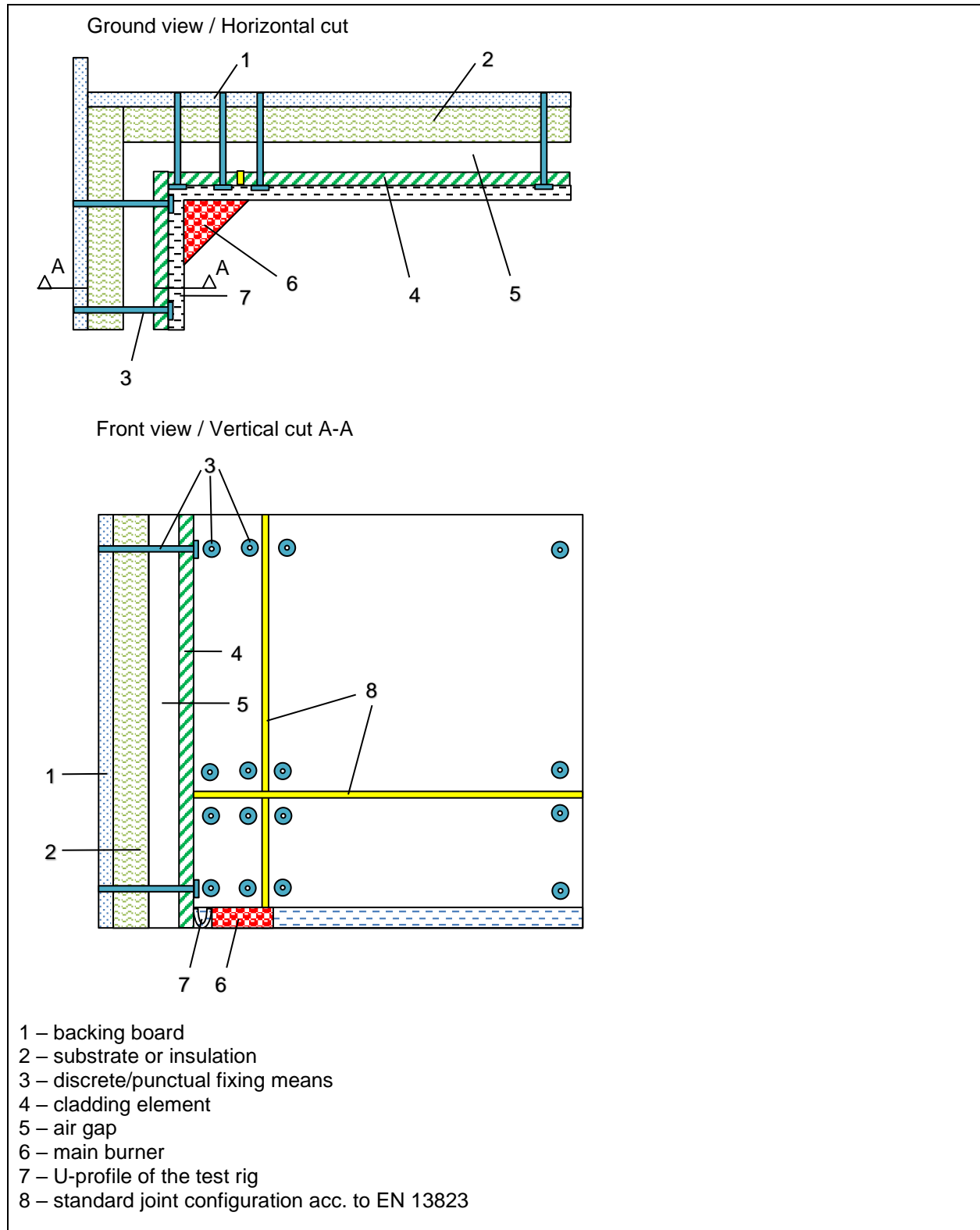


**Figure B.1:** Example of lateral ventilation (cladding kit with doubled sub-construction made of timber battens or metal profiles).

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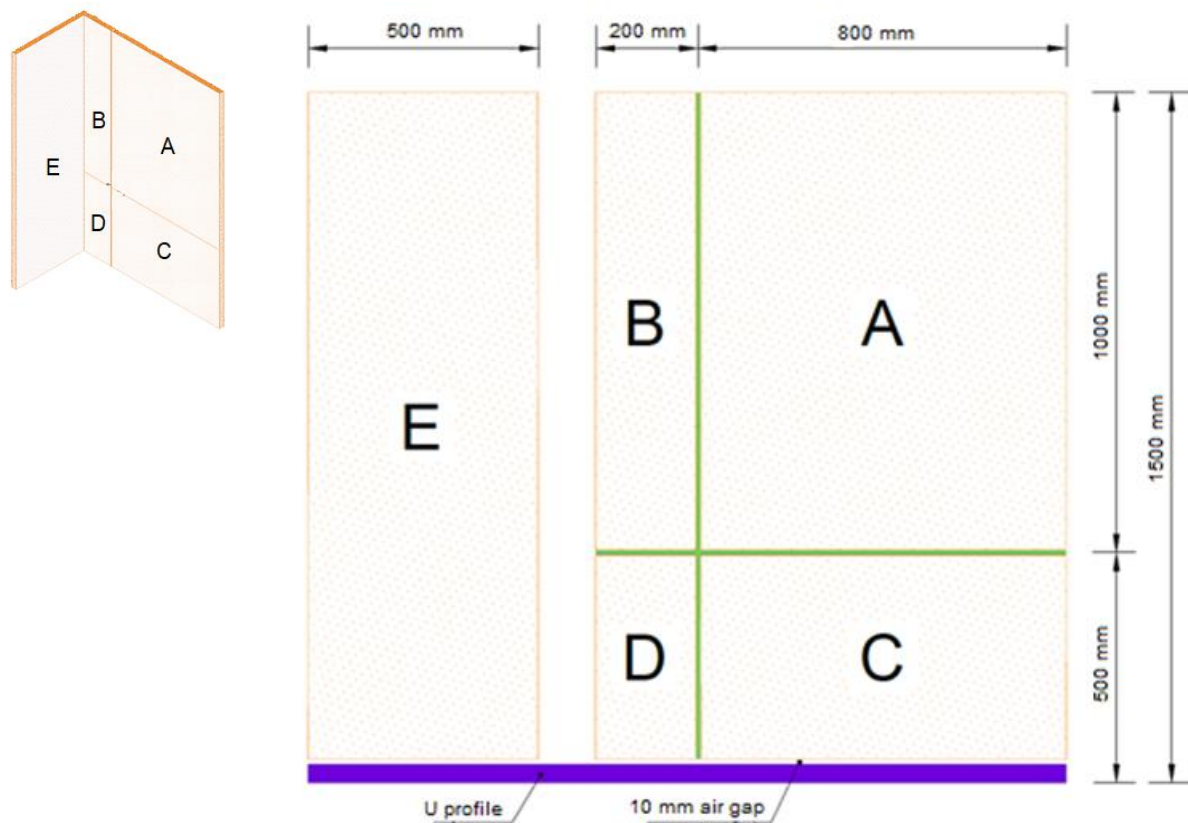
**Figure B.2:** Example of lateral ventilation (cladding kit with metal sub-construction and additional opening in the supporting profiles).



**Figure B.3:** Example of lateral ventilation (cladding kit with discrete/punctual fixing means of the cladding elements).

Only when the subframe profiles or studs (or any other kit component) do not allow this continuous airflow from the outer lateral edges of the test specimen wings, there shall be a gap of 10 mm between the bottom of the specimen and top level of U-profile of the SBI-test device (see Figure B.4).

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Note: 10 mm air gap is only to be included when necessary to ensure continuous airflow (see clause B.1.1).

**Figure B.4:** Schematic representation of SBI test installation (front view).

For cladding kits without thermal insulation products applied to the substrate (supporting wall), two cases regarding the depth of an air gap shall be considered within the tests:

- the minimum air gap depth (between rear surface of the cladding element and the substrate) as stated according to the MPII and allowed by the subframe dimensions and geometry (but not less than 20 mm) and,
- a 40 mm air gap depth between rear surface of the cladding element and the substrate.

First, an indicative test shall be performed for each of both air gap depths. The depth showing the worst results shall be completed (at least two additional tests) in order to obtain the worst classification.

If both indicative tests point to the same classification, any higher depth of the air gap than the tested minimum one shall be classified based on this result, without additional testing.

If the indicative tests point to different classifications, additionally, the case (air gap depth) showing the best results in the indicative test can also be fully tested for classification (two additional SBI test specimens to complete the required three test results) to determine if a better classification is obtained. If so, this better classification will apply only to the best-case air gap depth and the rest of the range will have the classification obtained with the worst-case air gap depth, unless additional intermediate depths are tested to determine the point (air gap depth) where classification changes.

For cladding kits with thermal insulation products applied to the substrate (supporting wall), two cases regarding the depth of an air gap shall be considered within the tests:

- the minimum air gap depth (between rear surface of the cladding element and front surface of the thermal insulation product) as stated according to the MPII and allowed by the subframe dimensions and geometry (but not less than 20 mm) and,

## DETERMINATION OF FIRE-RELATED CHARACTERISTICS OF EXTERNAL WALL CLADDING IN EADS

- a 40 mm air gap depth between rear surface of the cladding elements and front surface of the thermal insulation product.

First, an indicative test shall be performed for each of both air gap depths. The depth showing the worst results shall be completed (at least two additional tests) in order to obtain the worst classification.

If both indicative tests point to the same classification, any greater depth of the air gap than the tested minimum one could be classified based on this worst result, without additional testing.

If the indicative tests point to different classifications, additionally, the case (air gap depth) showing the best results in the indicative test can also be fully tested for classification (two additional SBI test specimens to complete the required three test results) to determine if a better classification is obtained. If so, this better classification will apply only to the best-case air gap depth and the rest of the range will have the classification obtained with the worst-case air gap depth, unless additional intermediate depths are tested to determine the point (air gap depth) where classification changes.

If the kit includes thermal insulation products, for insulation materials of class A1 or A2 as part of the kit a standard mineral wool insulation according to EN 13238, but with a thickness of 50 mm, shall be installed between subframe and substrate.

For other insulation materials, different conditions can be used for testing (e.g., maximum and/or minimum thicknesses, maximum and/or minimum density, unless proven otherwise). In absence of representative insulation materials, the test results shall only be valid for those applications as tested.

Tests on specimen with a total thickness of at least 200 mm (maximum testable thickness according to EN 13823, including cladding element, airgap, subframe, thermal insulation product and substrate) shall be valid for a cladding kit with higher thickness.

The cladding kit is fixed to the subframe. The cladding kit shall be installed with the number of cladding fixings according to the MPII. If no information is available from the manufacturer regarding the number of cladding fixings, each cladding element being part of the specimen shall be fixed with one cladding fixings at each corner of the cladding element.

In the case of glued cladding elements, the first (closer to the corner) adhesive bead of the long wing shall be positioned in accordance with the MPII. If there is a range of installation variations, the vertical middle axis of the first adhesive bead shall be positioned at a distance "d" to the inner edge of the cladding element on the long wing greater than "d" (see Figure B.8.1).

When the kit presents horizontal joints, it shall be tested with, at least, a horizontal joint in the long wing at a height of 500 mm from the bottom edge of the specimen to the centre axis of the joint and when the kit tested presents vertical joints, it shall be tested with, at least, a vertical joint in the long wing at a distance of 200 mm from the corner line to the centre axis of the joint, in accordance with the Figures B.4 to B.7. In the areas A, B, C, D and E, it is possible to have other vertical and/or horizontal joints between cladding elements.

For covering a range of different widths of open joints the test shall be conducted on specimens with the highest possible width of the open joints. If only butt joints are foreseen it is recommended to conduct the test with butt joints in the test assembly.

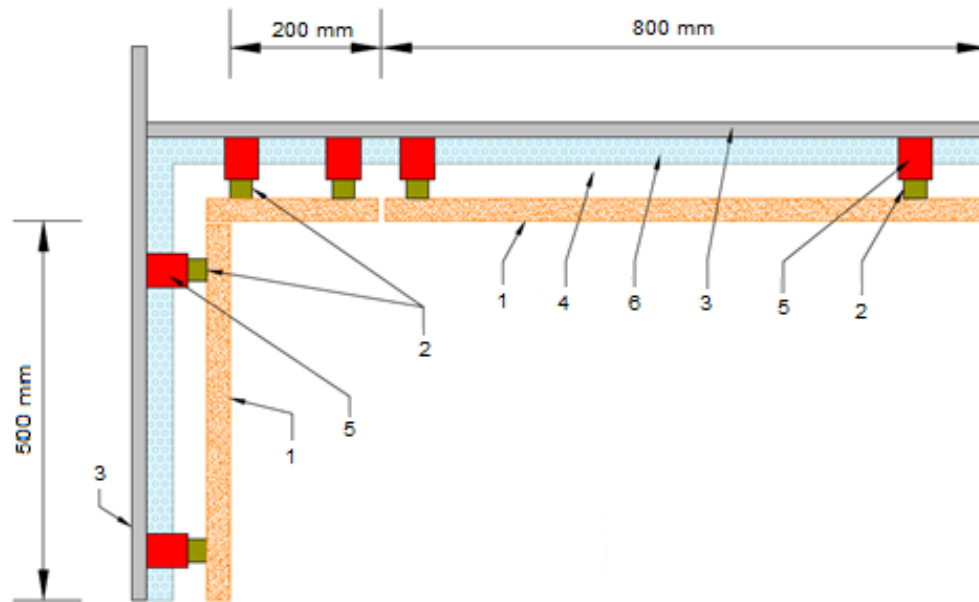
In cases where the cladding element size requires more joints than described before, the minimum and maximum density of joints shall be tested. In the internal vertical angle, no profile shall be used and the cladding elements create a vertical closed joint. Cladding elements shall not be extended up to the substrate board in order to close the air cavity behind and provide additional protection. Air cavity shall be unobstructed.

When tested rear side cladding kit (in case of asymmetrically composed cladding elements), the test shall involve a free-hanging arrangement with the flame impingement to the rear side in accordance with EN 13823 (test arrangement without open joints between the cladding elements and without thermal insulation layer on A1 or A2 substrate, so that the distance between the backing board and the cladding elements amounts to at least 80 mm – see Figure B.9.7).

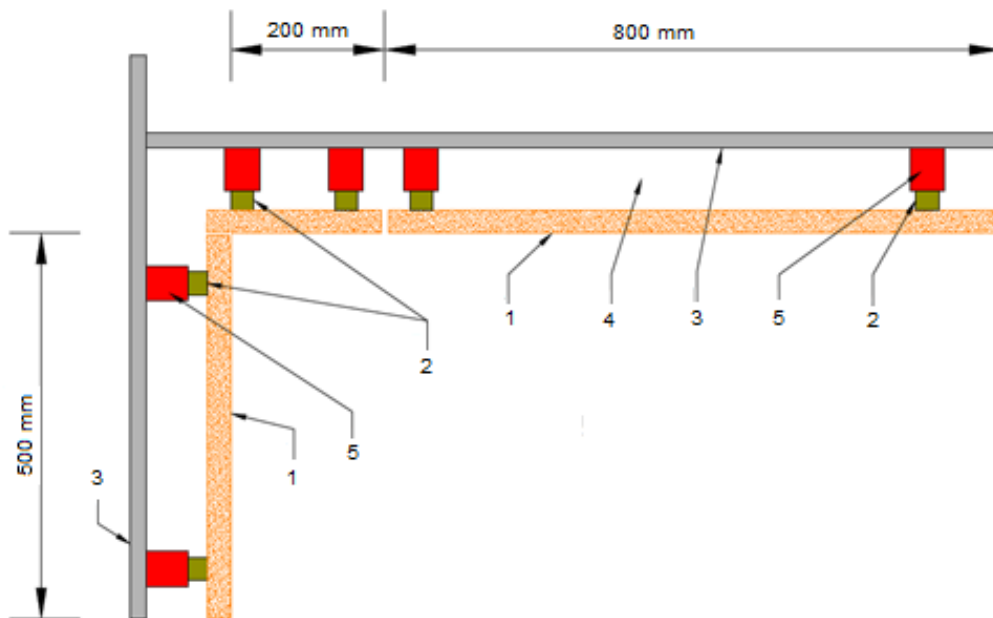
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**Legend for Figures B.5 to B.7:**

- |                      |               |                                |
|----------------------|---------------|--------------------------------|
| 1. Cladding element. | 3. Substrate. | 5. Subframe.                   |
| 2. Cladding fixing.  | 4. Air space. | 6. Thermal insulation product. |

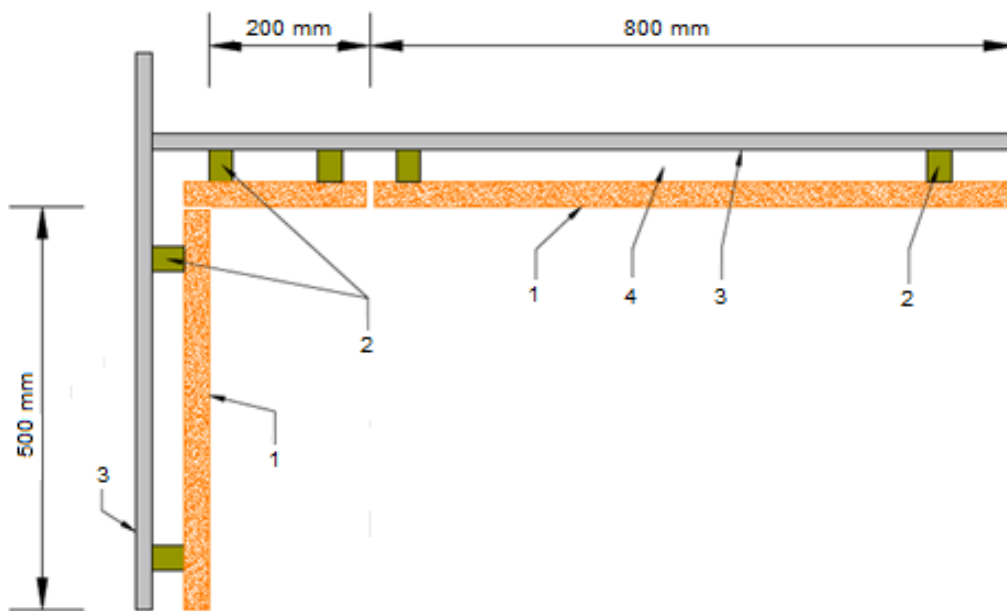


**Figure B.5:** Schematic representation of SBI test installation (top view – test specimen with subframe and thermal insulation product).



**Figure B.6:** Schematic representation of SBI test installation (top view – test specimen with subframe and without thermal insulation product).





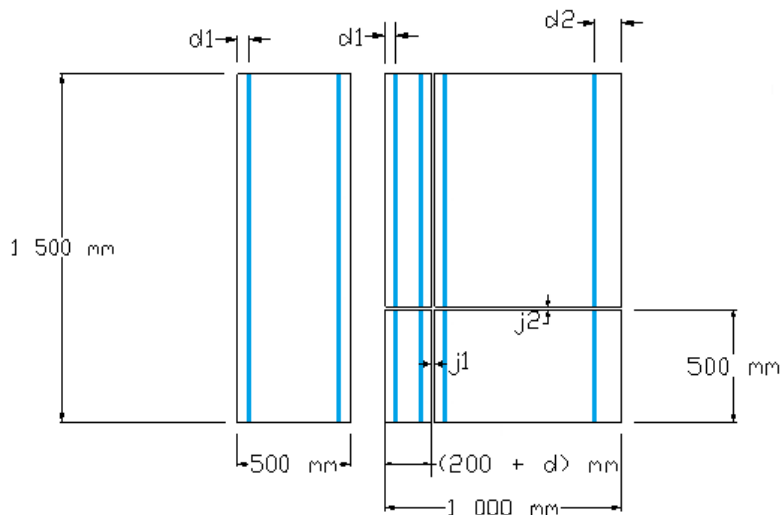
**Figure B.7:** Schematic representation of SBI test installation (top view – test specimen without subframe nor–thermal insulation product).

**B.1.2 Specific information**

The kits are tested in a limited number of configurations to cover the influence of the parameters indicated in clause A.4.

The cladding elements can be cut to size as shown in Figures B.8 and B.9.

The subframe (or the cladding fixings, when the cladding element is fixed directly to the substrate) shall be fixed to the substrate through fixings adapted to the type and material of the substrate.



**Legend:**

j1 = width of vertical joint

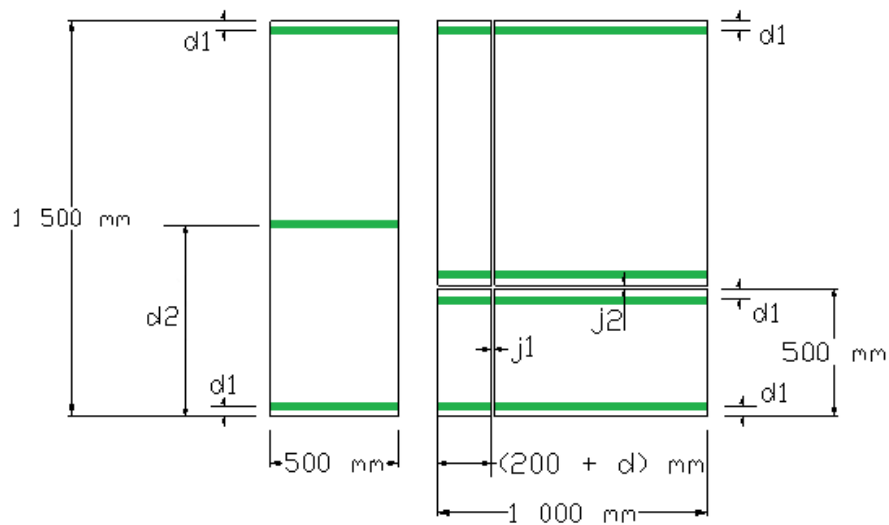
j2 = width of horizontal joint

d1, d2 = distances of the axis of subframe profiles to the edges of the cladding element.

d = short wing cladding element thickness.

**Figure B.8.1:** Example of installation for glued cladding assembled systems with vertical profiles.

DETERMINATION OF FIRE-RELATED CHARACTERISTICS OF EXTERNAL WALL CLADDING IN EADS



**Legend:**

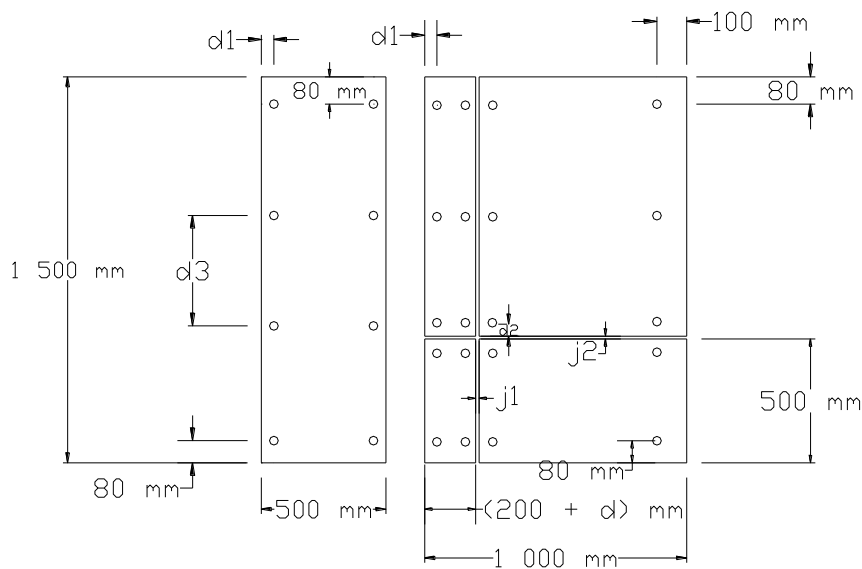
j1 = width of vertical joint

j2 = width of horizontal joint

d1, d2 = distances of the axis of subframe profiles to the edges of the cladding element.

d = short wing cladding element thickness.

**Figure B.8.2:** Example of installation for glued cladding assembled systems with horizontal profiles.



**Legend:**

j1 = width of vertical joint.

j2 = width of horizontal joint.

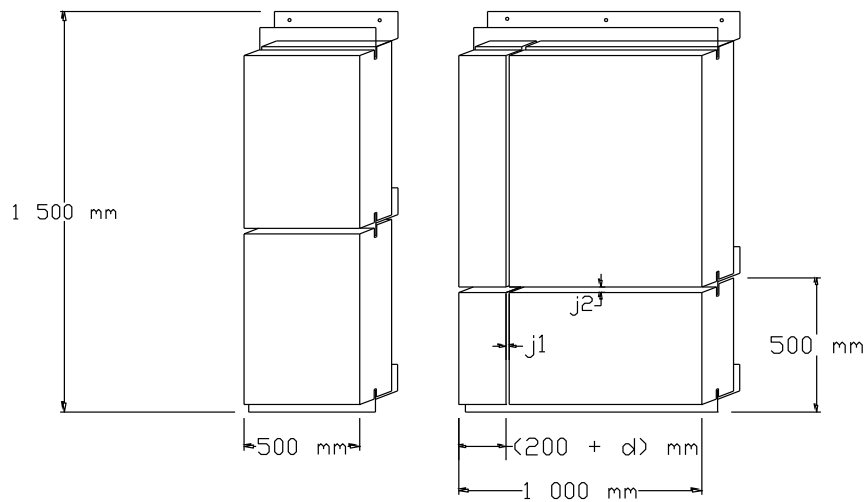
d1, d2 = distances of the axis of cladding fixing to the edges of the cladding element.

d3 = distance between two consecutive cladding fixings.

d = short wing cladding element thickness.

**Figure B.9.1:** Example of installation for mechanically fixed kits family A or B.

DETERMINATION OF FIRE-RELATED CHARACTERISTICS OF EXTERNAL WALL CLADDING IN EADS



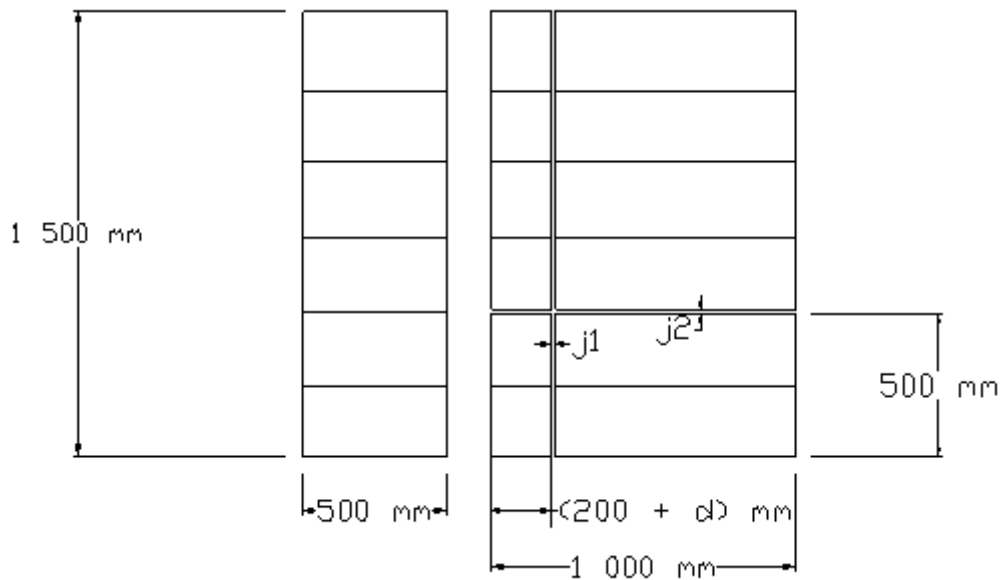
**Legend:**

j1 = width of vertical joint.

j2 = width of horizontal joint.

d = short wing cladding element thickness.

**Figure B.9.2:** Example of installation for mechanically fixed kits family C or D.



**Legend:**

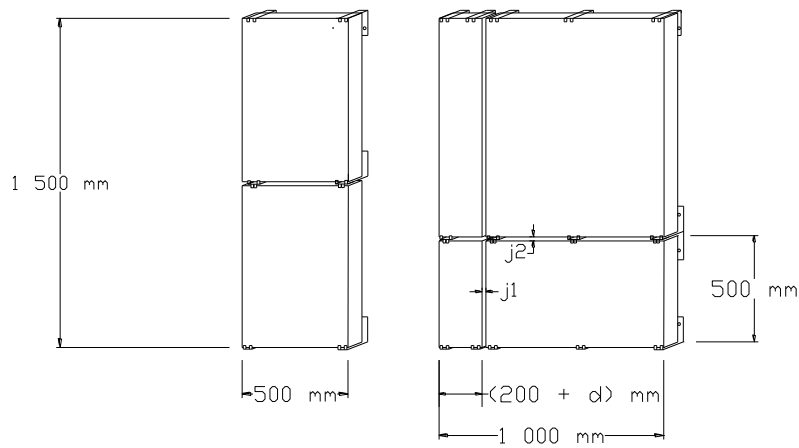
j1 = width of vertical joint.

j2 = width of horizontal joint.

d = short wing cladding element thickness.

**Figure B.9.3:** Example of installation for mechanically fixed kits family E.

DETERMINATION OF FIRE-RELATED CHARACTERISTICS OF EXTERNAL WALL CLADDING IN EADS



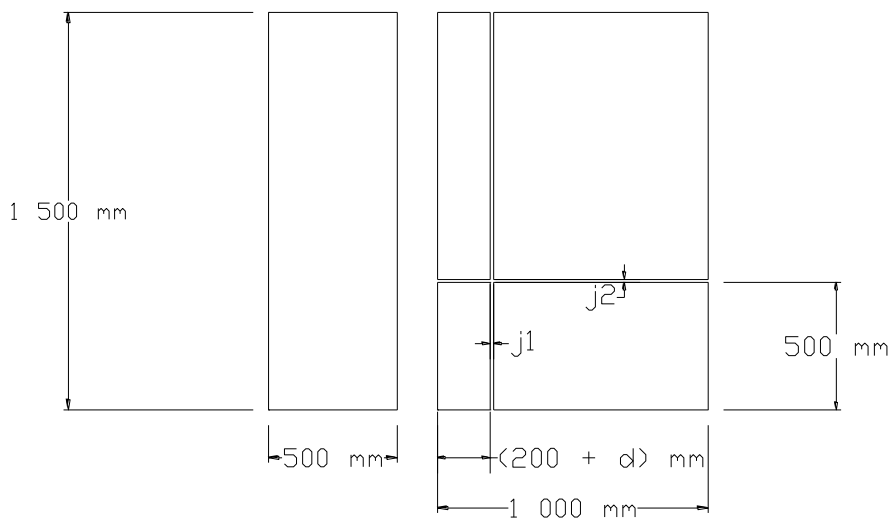
**Legend:**

$j1$  = width of vertical joint.

$j2$  = width of horizontal joint.

$d$  = short wing cladding element thickness.

**Figure B.9.4:** Example of installation for mechanically fixed kits family F.



**Legend:**

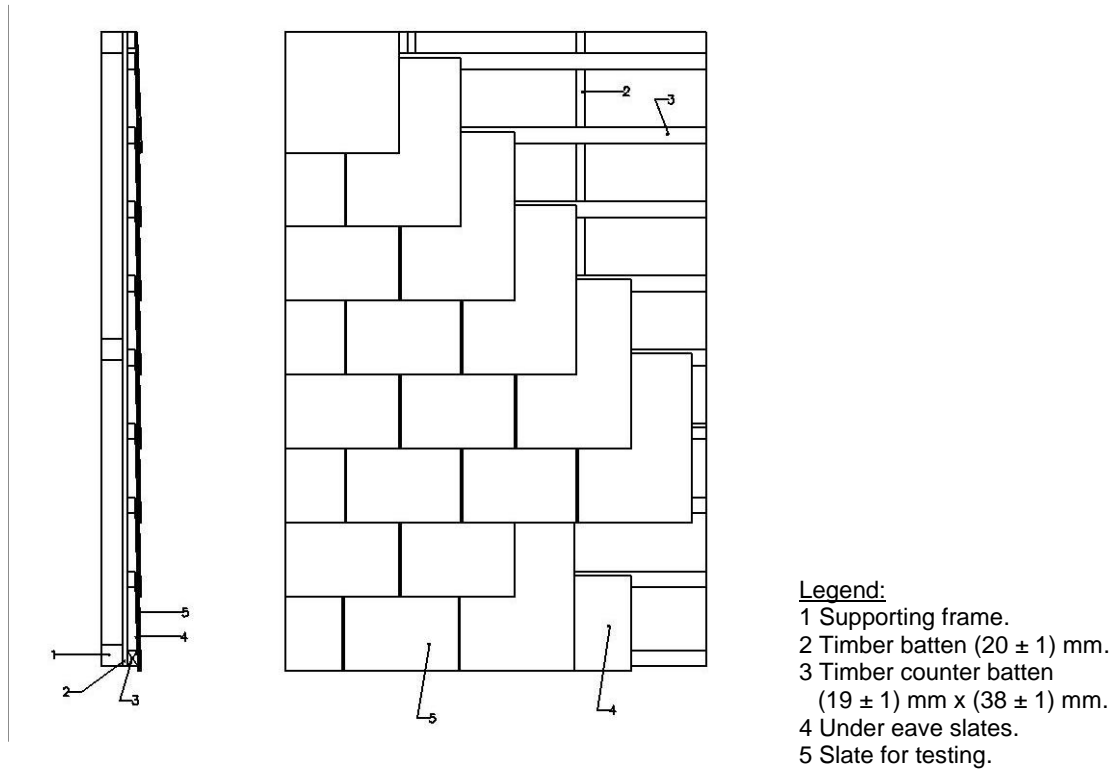
$j1$  = width of vertical joint.

$j2$  = width of horizontal joint.

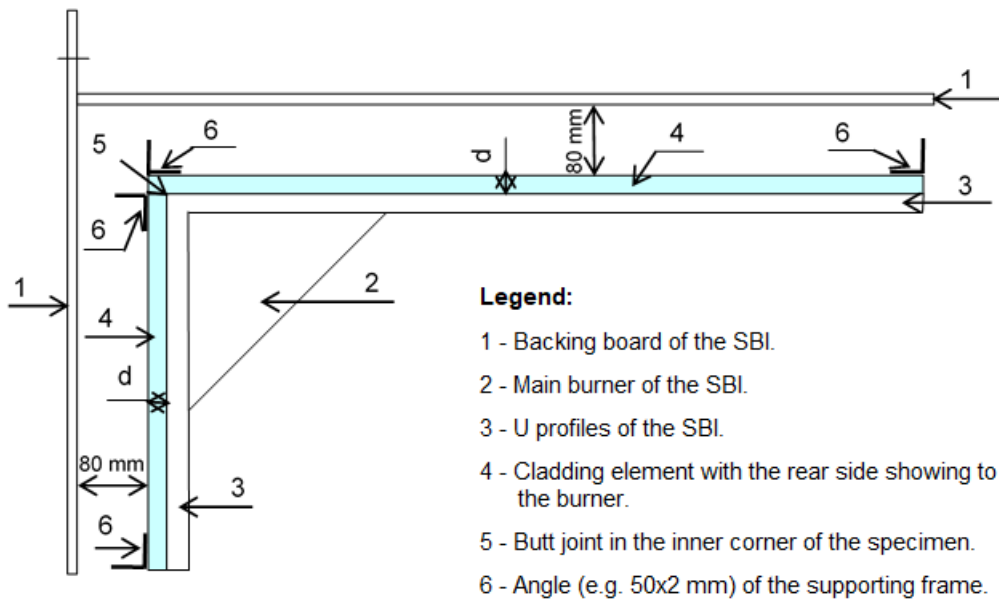
$d$  = short wing cladding element thickness.

**Figure B.9.5:** Example of installation for mechanically fixed kits family G.

DETERMINATION OF FIRE-RELATED CHARACTERISTICS OF EXTERNAL WALL CLADDING IN EADS



**Figure B.9.6:** Example of installation for mechanically fixed kits family H.



**Figure B.9.7:** Principle of testing the rear side.

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**B.1.3 Extension of results**

The test result (classification) shall remain valid, without test:

- For greater dimensions (height and width) of cladding elements.
- For the same adhesive with equal -or lower- applied quantity per unit area (glued cladding kits).
- For other metal mechanical fixings with the same or higher number of cladding fixings (mechanically fixed cladding kits), if metal fixings were used for testing.
- For the same type of plastic fixings as well as for metal fixings, each with the same or higher number of cladding fixings (mechanically fixed cladding kits), if plastic fixings were used for testing.
- For the same type of cladding element used in applications with open vertical joint  $\leq j_1$  (tested value) and open horizontal joint  $\leq j_2$  (tested value) (see  $j_1$  and  $j_2$  in figures B.8.1 to B.9.5).
- For the same density of joints or the range between the minimum and maximum density as tested
- For other higher depth of air gap.
- When the test is carried out without thermal insulation layer, the test result is only applicable to end-use applications without insulation layers.
- When the test is carried out with mineral wool insulation panels, the test results shall be valid for:
  - all other greater thickness of mineral wool insulation layer with the same or higher density and the same or better reaction to fire classification;
  - the same type of panel used without insulation, if the substrate chosen according to EN 13238 is made of panel with Euro-class A1 or A2 (e.g., fibre-cement panel).
- The results of reaction to fire tests, where a combustible thermal insulation material was used, are also valid for end-use applications of the tested product without thermal insulation on solid mineral substrates of class A1 or A2-s1,d0 like masonry or concrete.
- The test result of a test with non-fire-retardant-treated-timber subframe shall be valid, without test, for the same type of cladding element used with aluminium or steel subframe. The test result of a test with an aluminium frame shall be valid, without test, for the same type of cladding element used with aluminium or steel frame. Result of tests with a steel frame are only valid for the same type of cladding elements used with metal frames with a melting point higher than 1000 °C.
- If the classification is the same, the test result of the lowest and highest thickness of the cladding element shall be valid, without test, for all the thickness in between. In other case the worst classification applies to the other thicknesses of the range.
- The result from a test with open joints shall be valid, without test, for the same type of cladding element used in applications with butt joints or joints closed by steel or aluminium profiles.
- The test results are valid for cladding elements with the same composition and same assembly (or alternatively: all product types of the same defined product family) than used in the tests. In addition, the provisions of clause A.1.1 regarding organic content and content of fire-retardants shall be considered.
- The test results are valid for the same density / weight per unit area (if only one value was tested) or the range between those values evaluated in the tests.
- The test results are valid for the same organic coating/finish or any other coatings/finishes with the same or lower  $Q_{PCS}$ -value (related to the mass in dried condition), each with the same or lower applied quantity (in dried condition) than tested.

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- The test results are valid for the same inorganic coating or facing and other inorganic coatings / facings with the same or higher applied quantity per unit area.
- The test results are valid for the same colour of cladding elements than tested or for the entire range of colours, if colours as prescribed in clause A.1.1 were tested.
- The test results are valid for the same or greater size of overlapping of cladding elements than tested.

*Note: other aspects indicated in the relevant hEN standards or EADs for the cladding element material should be also taken into account (see Table 1.1.1.1 of EAD 090062-01-0404).*

## **B.2 Testing of the reaction to fire according to EN ISO 11925-2 (single flame source test)**

### **B.2.1 General**

Due to the very limited size of the specimens as prescribed by the test standard, it is widely impossible to test the cladding kit as whole. Therefore, all essential components of the kit shall be tested separately except in cases prescribed below.

For the relevant flame exposure types to be applied within testing, see clause A.5.

### **B.2.2 Thermal insulation**

When the cladding kit contains thermal insulation products, the following cases shall be considered:

#### **Case 1)**

Thermal insulation products shall not be tested if reaction to fire is declared in their DoP and the given class according to EN 13501-1 is equal to or better than the intended class for the cladding kit (e.g., cladding kits class B or C, then the thermal insulation product shall be classified as class C).

#### **Case 2)**

When the reaction to fire class according to EN 13501-1 of the thermal insulation product is not declared in the DoP, or the declared class is worse than the intended class for the cladding kit, testing of the thermal insulation product shall be carried out, the test shall be performed according to the provisions of the test standard and taking into consideration the specific mounting and fixing provisions of the thermal insulation product standards in connection with EN 15715.

Results and classification according to cases 1 and 2 are valid for the application of the thermal insulation product on any substrate covered by standard substrates according to EN 13238 using mechanical fixing means or adhesives (mortars) with an organic content equal to or lower than 15 % (related to the mass in dried condition; see clause B.2.3).

If an adhesive with an organic content higher than 15 % (related to the mass in dried condition) is used for fixing the thermal insulation product to the substrate, separate testing is required as prescribed in B.2.3.

### **B.2.3 Fixing means**

#### **Case 1:**

Metal linear mechanical fixings or punctual mechanical fixings of the cladding kit (cladding fixings, subframe fixings, anchors or thermal insulation product mechanical fixings) do not need to be tested according to EN ISO 11925-2 within the assessment of the kit, because their contribution to fire spread and fire growth is zero (in case of metal fixings) or low (in case of discrete plastic fixings) due to their limited dimensions and the distance to each other.

## DETERMINATION OF FIRE-RELATED CHARACTERISTICS OF EXTERNAL WALL CLADDING IN EADS

Case 2:

When the cladding kit contains a thermal insulation product fixed by means of an adhesive (mortar) with an organic content of equal or lower than 15 % (related to the mass in dried condition), such an adhesive does not need to be part of the thermal insulation test specimen tested according to EN ISO 11925-2 (see clause B.2.2).

Case 3:

When the cladding kit contains a thermal insulation product fixed by means of an adhesive (mortar) with an organic content of more than 15% (related to the mass in dried condition) used for fixing the thermal insulation product to the substrate, it is necessary to carry out a complete set of six tests on specimens turned at 90 degrees on their vertical axis with edge exposure of the adhesive layer. The specimens consist of the substrate, the adhesive and the thermal insulation product. The following rules shall be applied for preparing the specimens:

- each type of adhesive with a different composition shall be used by selecting the variant with the highest amount of organic content and with the highest thickness,
- the thermal insulation product shall be used with the lowest thickness applied for the assessment,
- the substrate shall be the same as the one used for SBI testing of the external cladding kit as a whole.

When the cladding kit contains ancillary adhesives that are not considered as small components (see Annex D) with an organic content of more than 15% (related to the mass in dried condition) see provisions given in clause B.2.7.

**B.2.4 Breather membranes**

## Case 1)

Products covered by a harmonized product specification do not need to be tested, if reaction to fire is declared in their Declaration of performance (DoP), the given class according to EN 13501-1 of the breather membrane is equal to or higher than the intended class for the external cladding kit (e. g., class B or C shall be determined for the kit, then at least the breather membrane must be classified as class C too) and the field of application of the classification given in the DoP (product parameters and end-use conditions as stated in the MPII) is valid when using the membrane as part of the cladding kit .

## Case 2)

If testing of the breather membrane is required, the test shall be performed according to the provisions of the test standard and taking into consideration the following mounting and fixing provisions:

- free-hanging arrangement of the specimens without any substrate behind -> it covers all end use applications with or without any material behind,
- arrangement of the specimens directly mechanically fixed onto a representative standard substrate according to EN 13238 covering the specific application of the membrane as part of the kit.

The following product parameters are relevant for testing:

- variations of a product family (as defined by a certain combination of raw materials and a certain type of production process),
- organic content - where relevant, the product with the highest organic content shall be tested,
- thickness – where relevant, the highest and lowest thickness shall be tested,
- density / weight per unit area – where relevant, the highest and lowest density as well as the highest and lowest weight per unit area shall be tested,

Breather membranes glued to a thermal insulation product shall be tested and assessed together with the thermal insulation product.



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**B.2.5 Subframe**

## Case 1)

Metal subframe profiles classified as A1 according to Decision 96/603/EC (as amended by Commission Decision 2000/605/EC and Commission Decision 2003/424/EC), as well as subframe profiles made of wood / wood-based materials which are covered by an applicable CWFT Decision, do not need to be tested.

## Case 2)

Subframe components used for mechanically fixed cladding elements and not covered by case 1) shall be tested separately according to the provisions of the test standard and using a free-hanging test arrangement.

## Case 3)

Subframe components used for glue-fixed cladding elements shall be tested together with the relevant cladding element and the adhesive used for its fixing.

**B.2.6 Cladding elements**

Mechanically fixed cladding elements shall be tested in a free-hanging test arrangement without any substrate or subframe profile behind.

Glue-fixed cladding elements shall be tested together with the adhesive and the subframe profile.

If the cladding elements are built-in with a specific type of joints (except open joints) between neighbouring elements, this type of joint shall be considered at the lengthwise centre axis of at least two specimens of both flame exposure types (edge flaming and surface flaming).

**B.2.7 Other ancillary components**

Each different ancillary component of the kit (except small components as defined in Annex D) shall be tested separately according to the provisions of the test standard and their own harmonized product specification, if available.

Otherwise, the component shall be tested using a free-hanging test arrangement. If these tests fail, a test set-up with an appropriate standard substrate according to EN 13238 can be used representing the end-use application of the component in the kit.

## ANNEX C. ADDITIONAL PROVISIONS FOR DETERMINATION THE CHARACTERISTIC PROPENSITY TO UNDERGO CONTINUOUS SMOULDERING

[Note: The following clauses are widely taken from EOTA TR 072 and provide examples for the implementation of appropriate rules when drafting EADs with regard to the determination of propensity to undergo continuous smouldering of the most typical products for which this characteristic may be relevant. However, depending on the current version of TR 072 and the specific product in question for which an EAD is under development these example provisions may need modification.]

This annex specifies the additional provisions for determination the characteristic *Propensity to undergo continuous smouldering* of kit components made of mineral wool, wood wool, cork, wood-based boards/panels, wood fibres, any other vegetable or animal fibres or phenolic foam.

### C.1 Provisions for products made of mineral wool<sup>4</sup>

#### C.1.1 Sample input data

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

- the product variations of a product family (as defined by a certain combination of raw materials and other additives and produced in a certain production process)<sup>5</sup>;
- the product or product variant with the highest organic content (in percentage per mass), determined according to EN 13820;
- the product or product variant with the highest density as well as a density of about 100 kg/m<sup>3</sup> ( $\pm 15\%$ ); if this range is lower than 115 kg/m<sup>3</sup>, then only the product or product variant with the highest density (density determined in accordance with e.g., EN ISO 29470);
- the product or product variant with the highest thickness. If the highest thickness is greater than 100 mm, then the specimen thickness shall be reduced from the backside to the maximum testable thickness of about 100 mm (thickness determined in accordance with e.g., EN ISO 29466 on at least three specimens);
- each different produced fibre orientation, i.e., lengthwise and crosswise to the length direction of the specimen as well as perpendicular to the surface of the specimen front side;
- without any facings, coatings (or similar) – existing facings or coatings shall be removed when preparing the test specimens.

#### C.1.2 Preparation of test specimen

The tests shall be done on free-hanging specimens without consideration of the intended end-use conditions, because propensity to undergo continuous smouldering is hardly affected by end-use conditions, and without any joints (see further).

If the product is only available in lengths lower than 800 mm, the test specimens shall be prepared by using two (or more) smaller pieces of the mineral wool, which shall put together with a butt joint. This joint shall be positioned in the highest possible distance to the bottom edge of the test specimens. Connection of the pieces of the test specimens shall be carried out in such a manner that a permanent and close contact is ensured between both pieces at the joint for the entire testing and monitoring time.

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<sup>4</sup> For products made of mineral wool fibres and aerogel the same provisions shall apply as given in this clause C.1 for factory-made products made of mineral wool.

<sup>5</sup> Manufacturer should provide (but he is not obliged to do so) sufficient information (e.g., on the basis of the composition of the products in question), allowing the TAB to determine which products or product variants should be submitted to testing and so to reduce the number of tests required.

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**C.1.3 Extended application of test results**

The test results considering the aforementioned parameters are also valid for products:

- of the same defined product-family,
- with lower organic content,
- with all lower densities,
- with lower thickness and also with higher thickness when 100 mm thick specimens were tested,
- with all fibre orientations,
- with any facings or coatings and
- for any end-use conditions.

**C.2 Provisions for products made of wood wool or wood chips****C.2.1 Sample input data**

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

## a) Homogeneous products

- product-variations of a product family (as defined by a certain combination of raw materials, e.g., the type of wood, binder and additives, and produced in a certain production process)<sup>5</sup>,
- the product or product variant with the highest organic content (in percentage per mass), 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 e.g., 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 e.g., EN ISO 29466 on at least three specimens;
- each different produced orientation of the wood wool / wood chips (i.e., lengthwise and crosswise to the length direction of the specimen),
- without any facings, coatings or suchlike – existing facings or coatings shall be removed when preparing the test specimens.

## b) Non-homogeneous products (composite boards)

- product-variations of a product family (as defined by a certain combination of raw materials, e.g., the type of wood, binder and additives, possible combinations of wood wool / wood chips and other possible layer materials, and produced in a certain production process)<sup>5</sup>,
- the product or product variant with the highest as well as lowest density of the wood wool / wood chip layer;
- the product or product variant with the highest thickness of the wood wool / wood chip layer
- each different produced orientation of the wood wool / wood chips and the fibres of the second layer in case of materials made of mineral wool, wood fibres, cork or any other animal or vegetable fibres (i. e. lengthwise and crosswise to the length direction of the specimen);
- the product or product variant with the highest organic content (in percentage per mass), determined by tests according to EN 13820;
- the product or product variant with the highest as well as lowest density of the second layer material, in case of combination with material which may also show propensity to undergo continuous smouldering (wood fibre, cork or materials made of any other vegetable or animal fibres);
- the product or product variant with the highest density as well as a density of about 100 kg/m<sup>3</sup> ( $\pm 15\%$ ) of the second layer in case the material is made of mineral wool; if the highest density of the range is equal or lower than 115 kg/m<sup>3</sup>, then only the product or product variant with the highest density. The density shall be determined in accordance with e.g., EN ISO 29470);
- the product or product variant with the highest density of the second layer material, in case of combination with any other products which do not show propensity to undergo continuous smouldering;

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- the product or product variant with the highest thickness of the second layer material, in case of combination with material which may also show propensity to undergo continuous smouldering (wood fibre, cork, mineral wool or materials made of any other vegetable or animal fibres) or
- the product or product variant with the lowest thickness of the second layer material, in case of combination with any other material which do not show propensity to undergo continuous smouldering.

### C.2.2 Preparation of tests specimens

The tests shall be done on specimens taken from 2-layer-composite boards (with one external wood wool / wood chip layer), which also cover 3-layer-composite boards (with two external wood wool / wood chip layers).

In case of composite boards made of wood wool / wood chips and second layer material which may also show propensity to undergo continuous smouldering (wood fibre, cork, mineral wool or materials made of any other vegetable or animal fibres), both layers shall be exposed by the ignition source within the tests.

In case of composite boards made of wood wool / wood chips and any other second layer material which does not show propensity to undergo continuous smouldering, only the wood wool / wood chip layer 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 clause 6.2.5 of EN 16733 applies, a permanent contact between the pieces shall be assured.

### C.2.3 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 of wood, binder and additives),
- with lower organic content of the wood wool / wood chip layer,
- with all densities of the wood wool / wood chip layers between those evaluated,
- with lower densities in case of mineral wool as second layer material or in case of layer material which does not show propensity to undergo continuous smouldering,
- with all densities between those evaluated in case of wood fibre, cork or any other materials made of vegetable or animal fibres as second layer,
- with lower thickness of the wood wool / wood chip layer as well as of the second layer and also with higher thickness of the layers when the layer thickness of the tested specimen was of about 100 mm,
- with all orientations of the wood wool / wood chips and the second layer material in case of materials made of mineral wool, wood fibre, cork or any other animal or vegetable fibres,
- with any facings or coatings or suchlike and
- for any end-use conditions.

## C.3 Provisions for products made of cork

### C.3.1 Sample input data

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

- product-variations of a product family (as defined by a certain combination of raw materials, e.g., type of binder and additives etc., and produced in a certain production process)<sup>5</sup>,
- the product or product variant with the highest and lowest density, determined by tests according to e.g., EN ISO 29470;
- the product or product variant with the highest thickness, determined by tests according to e.g., EN ISO 29466 on at least three specimens;

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- each different produced orientation, if relevant (i.e., lengthwise and crosswise to the length direction of the product),
- without any facings, coatings, or suchlike – existing facings or coatings shall be removed when preparing the test specimens.

**C.3.2 Preparation of tests specimens**

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 clause 6.2.5 of EN 16733 applies, a permanent contact between the pieces shall be assured.

**C.3.3 Extended application of test results**

The results of tests considering the aforementioned parameters in fully are also valid for products:

- of the same defined product-family,
- with all densities between those evaluated,
- with lower thickness and also with higher thickness when 100 mm thick specimens were tested,
- with all orientations, if all relevant orientations (lengthwise and crosswise) had been tested,
- with any facings or coatings or suchlike and
- for any end-use conditions.

**C.4 Provisions for wood-based boards / panels****C.4.1 Sample taking**

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

- product-variations of a product family (as defined by a certain combination of raw material, e.g., binder, additives, wood type of the wood shapes / wood fibres etc., and produced in a certain production process)<sup>5</sup>;
- the product or product variant with the highest as well as the lowest density of the wood-based board / panel, determined by tests according to EN 323;
- the product or product variant with the highest thickness of the wood-based board / panel, determined by tests according to e.g., EN ISO 29466 on at least three specimens;
- each different produced shape / fibre orientation (i.e., lengthwise and crosswise to the length direction of the specimen);
- without any external non-substantial facings, coatings, or suchlike – existing external non-substantial facings or coatings shall be removed when preparing the test specimens.

**C.4.2 Preparation of tests specimens**

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 clause 6.2.5 of EN 16733 applies, a permanent contact between the pieces shall be assured.

### C.4.3 Extended application of test results

The results of tests considering the aforementioned parameters in fully are also valid for products:

- of the same defined product-family,
- with all densities of wood-based boards / panels between those evaluated,
- with lower thickness of wood-based boards / panels and also with higher thickness when 100 mm thick specimens were tested,
- with all shape / fibre orientations, if all relevant orientations had been tested,
- with any external non-substantial facings or coatings or suchlike and
- for any end-use conditions.

Note: The aforementioned provisions refer to homogenous boards / panels or non-homogenous boards / panels only with external non-substantial layers. In case of composite products consisting of wood-based boards / panels and further substantial layers, the provisions given in clause C.2 shall be used as orientation for the development of appropriate provisions.

## C.5 Provisions for products made of wood fibre

### C.5.1 Sample input data

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

- product-variations of a product family (as defined by a certain combination of raw materials, e.g., type of binder and additives, and produced in a certain production process)<sup>5</sup>,
- wood type of the wood fibres,
- type of production process,
- the product or product variant with the highest and lowest density, determined by tests according to e.g., EN ISO 29470;
- the product or product variant with the highest thickness, determined by tests according to e.g., EN ISO 29466 on at least three specimens;
- each different produced fibre orientation (i.e., lengthwise and crosswise to the length direction of the product),
- without any facings, coatings, or suchlike – existing facings or coatings shall be removed when preparing the test specimens.

### C.5.2 Preparation of tests specimens

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 clause 6.2.5 of EN 16733 applies, a permanent contact between the pieces shall be assured.

### C.5.3 Extended application of test results

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., binder type and additives, wood type of the fibres, including the production process),
- with all densities between those evaluated,
- with lower thickness and also with higher thickness when 100 mm thick specimens were tested,
- with all fibre orientations, if all relevant orientations had been tested,
- with any facings or coatings or suchlike,
- for any end-use conditions.

## **C.6 Provisions for products made of vegetable or animal fibre**

### **C.6.1 Sample input data**

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

- product-variations of a product family (as defined by a certain combination of raw materials, e.g., type of fibres, type of binder and additives / treatment, and produced in a certain type of production process)<sup>5</sup>;
- the product or product variant with the highest and lowest density, determined by tests according to e.g., EN ISO 29470;
- the product or product variant with the highest thickness, determined by tests according to e.g., EN ISO 29466 on at least three specimens;
- each different produced fibre orientation (i.e., lengthwise and crosswise to the length direction of the specimen),
- without any facings, coatings, or suchlike – existing facings or coatings shall be removed when preparing the test specimens.

### **C.6.2 Preparation of tests specimens**

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 clause 6.2.5 of EN 16733 applies, a permanent contact between the pieces shall be assured.

### **C.6.3 Extended application of test results**

The results of tests considering the aforementioned parameters in fully are also valid for products:

- of the same defined product-family,
- with all densities between those evaluated,
- with lower thickness and also with higher thickness when 100 mm thick specimens were tested,
- with all fibre orientations, if all relevant orientations had been tested,
- with any facings or coatings or suchlike and
- for any end-use conditions.

## **C.7 Provisions for products made of phenolic foam**

### **C.7.1 Sample input data**

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

- product-variations of a product family (as defined by a certain combination of raw materials, e.g., type of binder and additives / treatment, and produced in a certain type of production process)<sup>Error! Bookmark not defined.</sup>
- the product or product variant with the highest and lowest density, determined by tests according to e.g., EN ISO 29470;
- the product or product variant with the highest thickness, determined by tests according to e.g., EN ISO 29466 on at least three specimens;
- each different produced orientation (i.e., lengthwise and crosswise to the length direction of the specimen),
- without any facings, coatings, or suchlike – existing facings or coatings shall be removed when preparing the test specimens.

### **C.7.2 Preparation of tests specimens**

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 clause 6.2.5 of EN 16733 applies, a permanent contact between the pieces shall be assured.

### **C.7.3 Extended application of test results**

The results of tests considering the aforementioned parameters in fully are also valid for products:

- of the same defined product-family,
- with all densities between those evaluated,
- with lower thickness and also with higher thickness when 100 mm thick specimens were tested,
- with all orientations, if all relevant orientations had been tested,
- with any facings or coatings or suchlike and
- for any end-use conditions.



## ANNEX D. REACTION TO FIRE ASSESSMENT OF SMALL COMPONENTS

The term “small component” is used for a component which satisfies all the following requirements:

- It is not made from class A1/A2 material,
  - its mass is  $\leq 50$  g,
  - its size is  $\leq 50$  mm x  $\leq 50$  mm or its diameter is  $\leq 57$  mm (equal area size as for a rectangular size of  $\leq 50$  mm x  $\leq 50$  mm) and
  - its distance is  $\geq 200$  mm to similar components when:
    - is forming part of a composite kit component (e.g., undercut anchors or anti-vibration ancillary pieces) and being situated on the surface of a component (e.g., cladding element) made of material of classes B, C, D, or E,
- or
- is completely embedded all-round in non-melting material of class A1 when used as small connecting part of kit components and without any possibility to ignite or to propagate fire.

In this case, its reaction to fire performance shall not be tested because contribution to fire growth and fire spread is negligible. Where the conditions are not met regarding the distance to other similar components or the all-round covering by non-melting A1 materials, the component shall be tested as part of the kit. The ETA shall state which components are considered as small components, where the reaction to fire performance can be seen as negligible.

Regarding linear joints (e.g., joints between cladding elements or ancillary components such as adhesive strips or double-sided tapes) might have small sizes on the surface of the elements but can contribute to fire propagation. Fire spread through the linear jointing material on the surface of the element or the façade or into the interior is of concern. Therefore, joints generally shall not be considered as products having small areas and/or surfaces.

DETERMINATION OF FIRE-RELATED CHARACTERISTICS OF EXTERNAL WALL CLADDING IN EADS

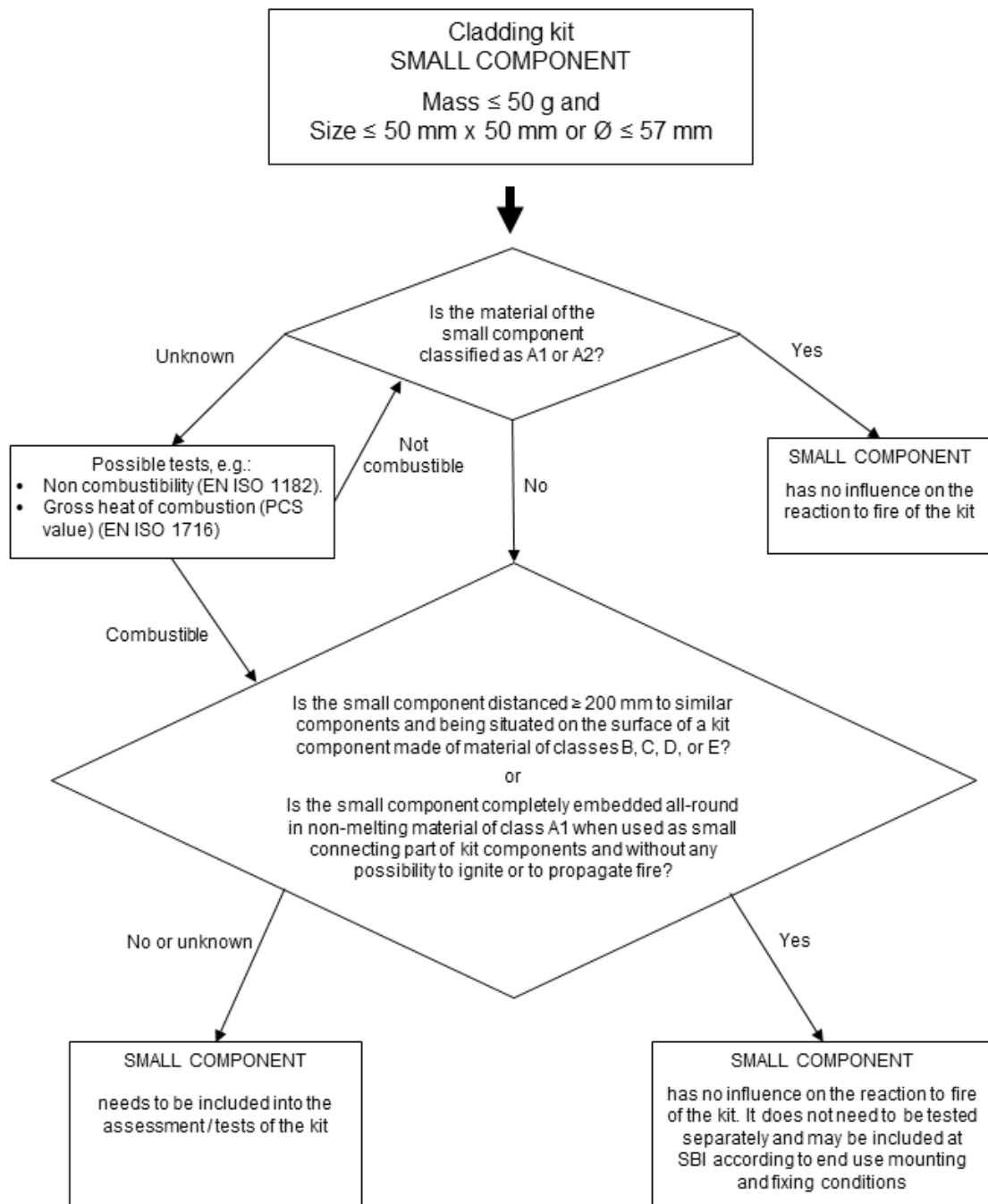


Figure D.1: Synopsis of small components assessment approach.

## ANNEX E. ASSESSMENT METHODS APPLIED IN EU/EFTA MEMBER STATES FOR ASSESSING THE FIRE PERFORMANCE OF FACADES

Country	Assessment method
Austria	ÖNORM B 3800-5
Belgium	<ul style="list-style-type: none"> <li>• BS 8414-1</li> <li>• BS 8414-2</li> <li>• DIN 4102-20</li> <li>• LEPIR 2</li> </ul>
Czech Republic	ČSN ISO 13785-1
Denmark, Sweden, Norway	SP Fire 105
Finland	<ul style="list-style-type: none"> <li>• SP Fire 105</li> <li>• BS 8414</li> </ul>
France	LEPIR 2
Germany	<ul style="list-style-type: none"> <li>• DIN 4102-20 Complementary reaction-to-fire test for claddings of exterior walls,</li> <li>• Technical regulation A 2.2.1.5</li> </ul>
Hungary	MSZ 14800-6:2020 Fire resistance tests. Part 6: Fire propagation test for building façades
Ireland	BS 8414 (BR 135)
Poland	PN-B-02867:2013
Switzerland, Lichtenstein	<ul style="list-style-type: none"> <li>• DIN 4102-20</li> <li>• ÖNORM B 3800-5</li> <li>• Prüfbestimmung für Aussenwandbekleidungssysteme</li> </ul>

*[Note: Consult the latest overview provided by the EC (AG016 - Advisory Group on Construction Products)]*

**ANNEX F. REFERENCE DOCUMENTS**

EN 13501-1:2018	Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests
EN 13823:2020+A1:2022	Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item
EN 16733:2016	Reaction to fire tests for building products - Determination of a building product's propensity to undergo continuous smouldering
EN ISO 1716:2018	Reaction to fire tests for products – Determination of gross heat of combustion (caloric value)
EN ISO 1182:2020	Reaction to fire tests for products – Non-combustibility test
EN ISO 11925-2:2020	Reaction to fire tests — Ignitability of products subjected to direct impingement of flame — Part 2: Single-flame source test
EN 15715:2009	Thermal insulation products - Instructions for mounting and fixing for reaction to fire testing - Factory made products
EN 13820:2003	Thermal insulating materials for building applications - Determination of organic content
EN ISO 29466:2022	Thermal insulating products for building applications - Determination of thickness (ISO 29466:2022)
EN ISO 29470:2020	Thermal insulating products for building applications - Determination of the apparent density (ISO 29470:2020)
EN 323:1993	Wood-based panels. Determination of density
Commission Delegated Regulation (EU) 2016/364 of 1 July 2015	The classification of the reaction to fire performance of construction products pursuant to Regulation (EU) No 305/2011
EC Decision 96/603/EC as amended	Commission Decision of 4 October 1996 establishing the list of products belonging to Classes A 'No contribution to fire' provided for in Decision 94/611/EC implementing Article 20 of Council Directive 89/106/EEC on construction products