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European Assessment Document for

Kits for external wall claddings with multilayer composite rigid cladding elements



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This European Assessment Document (EAD) has been developed taking into account up-to-date technical and scientific knowledge at the time of issue and is published in accordance with the relevant provisions of Regulation (EU) 305/2011 as a basis for the preparation and issuing of European Technical Assessments (ETA).

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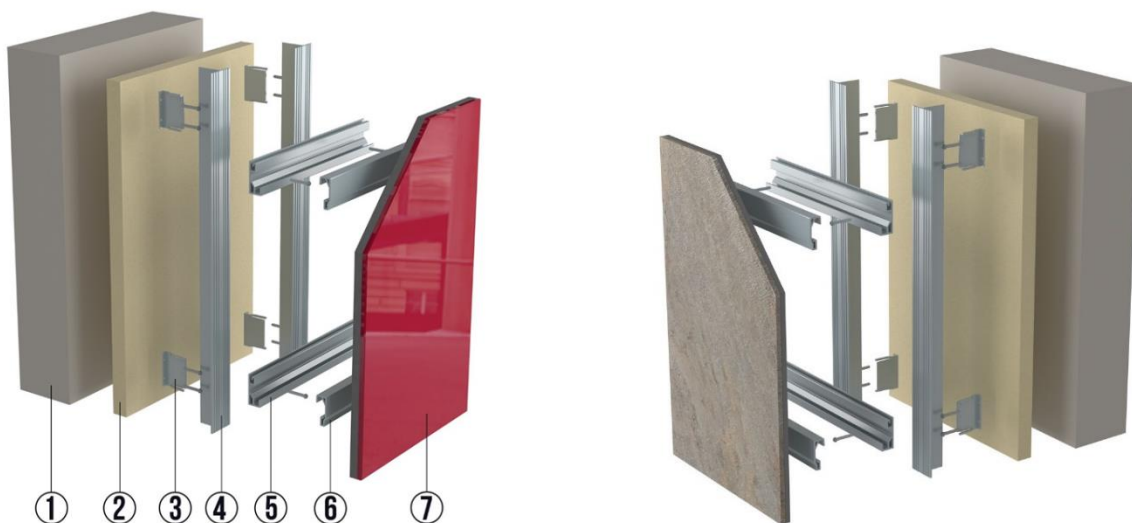
1 SCOPE OF THE EAD

1.1 Description of the construction product

The EAD covers the assessment of kits for external wall claddings with multilayer composite rigid cladding elements (from now on “cladding kit” or “kit”).

The cladding kit consists of the following components¹:

1. Cladding elements made of enamelled rear paint coated toughened safety glass or natural stone and bonded to a cementitious fibre reinforced board (from now on “cement board”). See clause 1.1.1.
2. Cladding fixings for mechanically (not glued) fastening the cladding elements to the subframe by means of special anchors placed in drilled holes or in undercut holes and anchored by mechanical interlock (at least 4 anchors per cladding element). Cladding fixings belong to Family B according to Table 1.1.1 of EAD 090062-01-0404² and it is composed of a group of components (undercut anchor or fastener, horizontal hook rail or clamp and horizontal supporting rail), see Figure 1.1.2a and clause 1.1.2 of EAD 090062-01-0404.
3. Subframe, see clause 1.1.3 of EAD 090062-01-0404.
4. Thermal insulation layer (optional), see clause 1.1.4 of EAD 090062-01-0404.
5. Other ancillary components (optional), see clause 1.1.5 of EAD 090062-01-0404.



Legend (for both figures):

- | | |
|------------------------------|--|
| 1. Substrate. | 5. Cladding fixing (horizontal supporting rail). |
| 2. Thermal insulation layer. | 6. Cladding fixing (horizontal hook rail & fasteners). |
| 3. Subframe brackets. | 7. Cladding element. |
| 4. Subframe profiles. | |

Figure 1.1.1a: Kit with glass/cement cladding elements. **Figure 1.1.1b:** Kit with stone/cement cladding elements.

¹ Any kit component may be produced (manufactured) or not produced (purchased on the market or from a specific supplier) by the kit manufacturer.

² All undated references to standards or to EADs in this EAD are to be understood as references to the dated versions listed in chapter 4.

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

The cladding kit is not fully covered by EAD 090062-01-0404 for the following reason: Multilayer composite cladding elements except for TMCS are not covered by the EAD.

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.

1.1.1 Cladding elements

The cladding elements covered by this EAD are composed of two materials: rear enamelled coloured glass or of natural stone bonded to a cement board. The cladding fixing is connected only in the cement board, the glass/stone layer is bonded on the cement board over the front of the socket fixing for the decorative facing of the cladding element.

The stone in the stone/cement cladding element is natural stone in accordance with EN 1469 and divided into different stone groups according to the Table 1.1.1.

This EAD covers cladding elements in different sizes with glass or stone panes either as a single pane or as several pieces with joints filled with sealant.

Minimum data for describing the cladding elements are type of materials (in the case of natural stone, also name and petrographic designation), dimensions and density or weight per square meter.

Table 1.1.1 Stone groups for cladding elements with natural stone

	Stone group	Natural stone type	Boundary conditions
I	High quality intrusive rocks (plutonic rocks)	Granite, granitite, tonalite, diorite, monzonite, gabbro, other magmatic plutonic rocks	None
II	Metamorphic rocks with "hard stone characteristics"	Quartzite, granulite, gneiss, migmatite, slate ²⁾	None
III	High quality extrusive rocks (volcanic rocks)	Basalt and basaltic lava without harmful ingredients (like sun burner basalt)	Minimum density ρ : basalt: 2,7 kg/dm ³ basaltic lava: 2,2 kg/dm ³
IV	Sedimentary rocks with "hard stone characteristics" ⁽¹⁾	Sandstone, limestone and marble	Minimum density ρ : sandstone: 2,1 kg/dm ³
¹⁾ For cladding elements with natural stones with planes of anisotropies where the difference between the flexural strength determined parallel to the planes of anisotropy and perpendicular to the edges of the planes of anisotropy is not more than 50 %. ²⁾ For cladding elements with slate where the mean value of tensile bond strength is larger than 0,5 N/mm ² and the minimum value of tensile bond strength is larger than 0,25 N/mm ² .			

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

1.2.1 Intended use(s)

This EAD covers the intended use of cladding kits as coverings of external walls (rainscreens):

- in ventilated façades, and/or
- in non-ventilated façades.

Cladding kits are mechanically fixed to external walls (vertical or sloped with respect to the vertical plane made of masonry (clay, concrete or stone), concrete (cast on site or as prefabricated panels), timber or metal frame in new or existing buildings (retrofit).

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 cladding kits for the intended use of 25 years when installed in the works (provided that the cladding kits are subject to appropriate installation (see clause 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 works³.

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.

1.3 Specific terms used in this EAD

Specific terms and symbols included in clauses 1.3.1 to 1.3.3, 1.3.5 to 1.3.14 of EAD 090062-01-0404 apply.

1.3.1 Multilayer composite cladding element

Cladding element that is composed of two parallel layers (regarding the thickness) of different materials bonded to each other that work together as a single panel.

³ 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 2.1.1 shows how the performance of kits for external wall claddings with laminated multilayer composite rigid cladding elements is assessed in relation to the essential characteristics.

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

No	Essential characteristic	Assessment method	Type of expression of product performance
Basic Works Requirement 2: Safety in case of fire			
1	Reaction to fire	EAD 090062-01-0404, clause 2.2.1	Class
2	Façade fire performance	EAD 090062-01-0404, clause 2.2.2	Description
3	Propensity to undergo continuous smouldering	EAD 090062-01-0404, clause 2.2.3	Description / Class / Level (as relevant)
Basic Works Requirement 3: Hygiene, health and the environment			
4	Watertightness of joints (protection against driving rain)	EAD 090062-01-0404, clause 2.2.4	Description (for open joints) Level (for closed joints)
5	Water absorption (water impermeability)	2.2.1	Description/Level
6	Water vapour permeability (for non-ventilated façades)	EAD 090062-01-0404, clause 2.2.6	Level
7	Drainability	EAD 090062-01-0404, clause 2.2.7	Description
8	Content, emission and/or release of dangerous substances	EAD 090062-01-0404, clause 2.2.8	Description

No	Essential characteristic	Assessment method	Type of expression of product performance
Basic Works Requirement 4: Safety and accessibility in use			
9	Wind load resistance	EAD 090062-01-0404, clause 2.2.9	Level
10	Resistance to horizontal point loads	EAD 090062-01-0404, clause 2.2.10	Description
11	Impact resistance	EAD 090062-01-0404, clause 2.2.11	Description
12	Bending strength (*)	2.2.2	Level
13	Bond strength (*)	2.2.3	Level
14	Shear strength (*)	2.2.4	Level
15	Axial tension resistance (*)	EAD 090062-01-0404, clause 2.2.12.7	Level
16	Shear load resistance (*)	EAD 090062-01-0404, clause 2.2.12.8	Level
17	Combined tension and shear load resistance (*)	EAD 090062-01-0404, clause 2.2.12.9	Level
18	Pull-through resistance of fixings from profile (*)	EAD 090062-01-0404, clause 2.2.12.12	Level
19	Resistance of profiles (*)	EAD 090062-01-0404, clause 2.2.12.14	Description
20	Tension/pull-out resistance of subframe fixings (*)	EAD 090062-01-0404, clause 2.2.12.15	Level
21	Shear load resistance of subframe fixings (*)	EAD 090062-01-0404, clause 2.2.12.16	Level
22	Bracket resistance (horizontal and vertical load) (*)	EAD 090062-01-0404, clause 2.2.12.17	Level
23	Resistance to seismic loads. Out-of-plane fundamental vibration period	EAD 090062-01-0404, clause 2.2.13.1	Level
24	Resistance to seismic loads. Out-of-plane acceleration	EAD 090062-01-0404, clause 2.2.13.2	Level
25	Resistance to seismic loads. In-plane displacement	EAD 090062-01-0404, clause 2.2.13.3	Level

No	Essential characteristic	Assessment method	Type of expression of product performance
Basic Works Requirement 5: Protection against noise			
25	Airborne sound insulation	EAD 090062-01-0404, clause 2.2.14	Level
Basic Works Requirement 6: Energy economy and heat retention			
26	Thermal resistance	EAD 090062-01-0404, clause 2.2.15	Level
Aspects of durability (**)			
27	Hygrothermal behaviour	EAD 090062-01-0404, clause 2.2.16.1	Description
28	Behaviour after pulsating load	EAD 090062-01-0404, clause 2.2.16.2	Level
29	Freeze-thaw resistance	EAD 090062-01-0404, clause 2.2.16.3	Level
30	Behaviour after immersion in water	EAD 090062-01-0404, clause 2.2.16.4	Level
31	Dimensional stability by humidity	2.2.5	Level
32	Linear thermal expansion	EAD 090062-01-0404, clause 2.2.16.5.2	Level
33	Chemical and biological resistance	EAD 090062-01-0404, clause 2.2.16.6	Level
34	UV radiation resistance	EAD 090062-01-0404, clause 2.2.16.7	Level
35	Corrosion	EAD 090062-01-0404, clause 2.2.16.8	Description
(*) Mechanical resistance of the kit is assessed by means of the mechanical characteristics of the relevant kit components and their connexions. See clause 2.2.12 of EAD 090062-01-0404.			
(**) Durability of the kit is assessed by means of relevant component durability.			

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

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

If for any components covered by harmonised standards or European Technical Assessments the manufacturer of the component has included the performance regarding the relevant essential characteristic in the Declaration of Performance, retesting of that component for issuing the ETA under the current EAD is not required.

2.2.1 Water absorption (water impermeability)

The assessment of the kits' water absorption is carried out by means of the assessment of the water absorption of the relevant kit components (cladding elements and thermal insulation products) that are representative of this essential characteristic for cladding kits.

The water absorption of the cladding elements is governed by the cement board and shall be assessed according to clause 2.2.7 of EAD 210024-00-0504.

One of the following descriptions shall be stated in the ETA:

- “Water impermeable” when it is not observed any formation of drops of water in the under face of the cement board. Traces of moisture without drops of water may appear.
- “Non water impermeable” when it is observed any formation of drops of water in the under face of the cement board.

When the thermal insulation products are part of the kit, paragraphs related to this material in clause 2.2.5 of EAD 090062-01-0404 apply.

2.2.2 Bending strength

The assessment of the kits mechanical resistance is carried out by means of the assessment of the mechanical resistance of the relevant kit components (cladding elements, cladding fixings and subframe components) and the connections between them (see Table 2.1.1, rows 12 to 22), which are representative of this essential characteristic for cladding kits.

The bending strength of the cladding elements is governed by the cementitious fibre reinforced board shall be tested according to clause 2.2.11 in EAD 210024-00-0504.

At least the worst case (the mechanically weakest case, i.e., weakest materials and minimum thickness) shall be tested.

Based on the test results in accordance with clause 2.2.11 of EAD 210024-00-0504, the arithmetic average value $R_{m, \text{bend}}$ [in N/mm²] and the characteristic value $R_{C, \text{bend}}$ in [N/mm²] according to equation (N.1) in annex N of EAD 090062-01-0404 shall be stated in the ETA.

The value and the assessment method of this characteristic is also to be used for the following durability characteristics:

- Freeze-thaw resistance. See clause 2.2.16.3 of EAD 090062-01-0404.
- Behaviour after immersion in water. See clause 2.2.16.4 of EAD 090062-01-0404.

2.2.3 Bond strength

The assessment of the kits' mechanical resistance is carried out by means of the assessment of the mechanical resistance of the relevant kit components (cladding elements, cladding fixings and subframe components) and the connexions between them (see Table 2.1.1, rows 12 to 22), which are representative of this essential characteristic for cladding kits.

The bond strength of the cladding elements shall be assessed according to clause A.2.

The characteristic value $R_{C,bond}$ in [N/mm²] according to equation (N.1) of EAD 090062-01-0404 shall be stated in the ETA.

2.2.4 Shear strength

The assessment of the kits' mechanical resistance is carried out by means of the assessment of the mechanical resistance of the relevant kit components (cladding elements, cladding fixings and subframe components) and the connexions between them (see Table 2.1.1, rows 12 to 22), which are representative of this essential characteristic for cladding kits.

The shear strength of the cladding elements shall be assessed according to clause A.3.

The characteristic value $R_{C,Shear}$ in [N/mm²] according to equation (N.1) of EAD 090062-01-0404 shall be stated in the ETA.

2.2.5 Dimensional stability by humidity

The dimensional variations of the cladding element associated with changes in relative humidity shall be assessed according to EN 1170-7 in conjunction with clause 2.2.16.5.1 of EAD 090062-01-0404..

For the other kit components, clause 2.2.16.5.1 of EAD 090062-01-0404 applies.

The maximum values in [mm/m] shall be stated in the ETA.

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3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

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

For the products covered by this EAD the applicable European legal act is Commission Decision 2003/640/EC.

The applicable AVCP system is 2+ for any use except for uses subject to regulations on reaction to fire.

For uses subject to regulations on reaction to fire⁴ the applicable AVCP systems regarding reaction to fire 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 3.2.1.

The manufacturer (regarding the components he buys from the market with DoP) shall take into account the Declaration of Performance issued by the manufacturer of that component. No retesting is necessary.

Table 3.2.1 Control plan for the manufacturer; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan]					
1	Reaction to fire (i)				
	▪ Reaction to fire (for any classification)	Indirect tests as specified in Table 3.2.2 and Tables 3.2.3 to 3.2.5 of EAD 090062-01-0404	See Table 3.2.2 and Tables 3.2.3 to 3.2.5 of EAD 090062-01-0404	See Table 3.2.2 and Tables 3.2.3 to 3.2.5 of EAD 090062-01-0404	See Table 3.2.2 and Tables 3.2.3 to 3.2.5 of EAD 090062-01-0404
	▪ Reaction to fire (for class A1)	Direct test according to EN ISO 1182	According to Control Plan	According to test method and Control Plan (v)	(iv)
	▪ Reaction to fire (for class A1 or A2)	Direct test according to EN ISO 1716	According to Control Plan	According to test method and Control Plan (v)	At least once each two years
	▪ Reaction to fire (for class A2 to D)	Direct test according to EN 13823 (ii)	According to Control Plan	According to test method and Control Plan (v)	(iv)
	▪ Reaction to fire (for class B to F)	Direct test according to EN ISO 11925-2	According to Control Plan	According to test method and Control Plan (v)	(iv)

⁴ Including propensity to undergo continuous smouldering, where relevant.

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
2	When applicable, Propensity to undergo continuous smouldering	Direct control method based on relevant clause 2.2.3 of EAD 090062-01-0404	According to Control Plan	One (v)	At least once each two years
		Indirect tests as specified in Table 3.2.2 and Tables 3.2.3 to 3.2.5 of EAD 090062-01-0404	See Table 3.2.2 and Tables 3.2.3 to 3.2.5 of EAD 090062-01-0404	See Table 3.2.2 and Tables 3.2.3 to 3.2.5 of EAD 090062-01-0404	See Table 3.2.2 and Tables 3.2.3 to 3.2.5 of EAD 090062-01-0404
3	Components <u>produced by the manufacturer himself</u> :				
	▪ Cladding elements	See Table 3.2.2	See Table 3.2.2	See Table 3.2.2	See Table 3.2.2
	▪ Cladding fixings and subframe components	See Table 3.2.3 of EAD 090062-01-0404	See Table 3.2.3 of EAD 090062-01-0404	See Table 3.2.3 of EAD 090062-01-0404	See Table 3.2.3 of EAD 090062-01-0404
	▪ Thermal insulation products	See Table 3.2.4 of EAD 090062-01-0404	See Table 3.2.4 of EAD 090062-01-0404	See Table 3.2.4 of EAD 090062-01-0404	See Table 3.2.4 of EAD 090062-01-0404
	▪ Ancillary components	According to Control Plan	According to Control Plan	According to Control Plan	According to Control Plan
4	▪ Components not produced by the manufacturer himself (iii)	See Table 3.2.5 of EAD 090062-01-0404	See Table 3.2.5 of EAD 090062-01-0404	See Table 3.2.5 of EAD 090062-01-0404	See Table 3.2.5 of EAD 090062-01-0404
<p>(i) Indirect tests shall be applied to all components independent from the source of their classification (Testing, Decision 96/603/EC as amended or any other applicable CWFT decision). Direct tests within the FPC shall only apply to those components where the classification is based on the prescribed tests for the corresponding class(es) according to Commission Delegated Regulation (EU) 2016/364 and EN 13501-1.</p> <p>(ii) If it is necessary to perform SBI tests within the FPC, the test set-up that was classified as the worst case within the ETA procedure shall be tested.</p> <p>(iii) Components produced by the supplier under the specifications of the manufacturer.</p> <p>(iv) The tests shall always be carried out whenever the performance is not verified by means of indirect tests (see Tables 3.2.2 to Table 3.2.5) or, at least, once each five years when the indirect tests verify the performance. For this minimum frequency, the sufficient correlation between the foreseen system of indirect FPC measures and the direct tests shall be stated in the Control Plan. Otherwise, the minimum frequency of direct tests within the FPC shall be at least once per two years.</p> <p>(v) The necessary number of specimens shall be detailed in the Control Plan depending on the test method and the class to be verified within the FPC. The tests shall be performed on randomly taken specimens from the production process.</p>					

Table 3.2.2: Control plan when the cladding element is produced by the manufacturer himself; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of specimens	Minimum frequency of control
Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan]					
Incoming materials					
1	Receipt materials	Delivery ticket or label on the package	Conformity with the order	---	Each delivery
		Checking of supplier certificates or supplier tests	Conformity with the order	---	Each delivery
Process					
2	When relevant, fire-retardant quantity (i)	Quantity measurement	According to Control Plan	---	Each batch
Finished component					
3	Geometry (form and dimensions) (i)	Measuring, visual check or testing based on EN 13373	According to Control Plan	According to Control Plan	Daily(ii)
4	Density or mass per unit area or per unit (i)	Testing based on EN 1936	According to Control Plan	According to Control Plan	Daily (ii)
5	Bending strength	Testing based on clause 2.2.2	According to Control Plan	According to Control Plan	According to Control Plan (ii)
	Bond strength	Testing based on clause 2.2.3	According to Control Plan	According to Control Plan	According to Control Plan (ii)
6	PCS value (for class B to D) (i)	Test according to EN ISO 1716	According to Control Plan	According to Control Plan	Monthly (ii)
7	Organic content (i)	Ash content / loss on ignition based on EN 13820 Otherwise, Thermogravimetry test based on EN ISO 11358-1	According to Control Plan	According to Control Plan	Once per batch (ii)
(i) Indirect characteristic related to reaction to fire and, when applicable, propensity to undergo continuous smouldering.					
(ii) Deviations from the given cornerstones (higher or lower frequencies) shall be agreed between manufacturer and TAB and laid down in the Control Plan case by case depending on the type of production process, the variation in the volume produced and the production process control.					

3.3 Tasks of the notified body

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

Table 3.3.1 Control plan for the notified body; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Initial inspection of the manufacturing plant and of factory production control					
1	Notified Body will ascertain that the factory production control with the staff and equipment are suitable to ensure a continuous and orderly manufacturing of the cladding kit.	Verification of the complete FPC as described in the control plan agreed between the TAB and the manufacturer	According to Control plan	According to Control plan	When starting the production or a new line
Continuous surveillance, assessment and evaluation of factory production control					
2	The Notified Body will ascertain that the system of factory production control and the specified manufacturing process are maintained taking account of the control plan.	Verification of the controls carried out by the manufacturer as described in the control plan agreed between the TAB and the manufacturer with reference to the raw materials, to the process and to the product as indicated in Table 3.2.1	According to Control plan	According to Control plan	Once per year

The intervention of the notified body under AVCP system 1 is only necessary for reaction to fire⁵ for products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g., an addition of fire retardants or a limiting of organic material).

In this case the cornerstones of the actions to be undertaken by the notified body under AVCP system 1 are laid down in Table 3.3.2.

⁵ Including propensity to undergo continuous smouldering, where relevant.

Table 3.3.2 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 carried out by the manufacturer regarding the constancy of performance related to reaction to fire and taking into account a limiting of organic material and/or the addition of fire-retardants					
1	Where the intervention of the Notified Body is necessary only because the conditions for the applicability of system 1 are fulfilled for reaction to fire, the notified body will consider especially the clearly identifiable stage in the production process which results in an improvement of the reaction to fire classification (e.g., an addition of fire-retardants or a limiting of organic material).	As defined in clause 2.2.1 of EAD or Verification of the complete FPC as described in the control plan agreed between the TAB and the manufacturer	As defined in the control plan agreed between the TAB and the manufacturer	As defined in the control plan agreed between the TAB and the manufacturer	When starting the production, after starting a new production line or after modifications of the production process
Continuous surveillance, assessment and evaluation of factory production control carried out by the manufacturer regarding the constancy of performance related to reaction to fire and taking into account a limiting of organic material and/or the addition of fire-retardants					
2	Where the intervention of the Notified Body is necessary only because the conditions for the applicability of system 1 in the Decisions regarding reaction to fire are fulfilled, the notified body will consider especially the clearly identifiable stage in the production process which results in an improvement of the reaction to fire classification (e.g., an addition of fire-retardants or a limiting of organic material)	Verification of the controls carried out by the manufacturer as described in the control plan agreed between the TAB and the manufacturer with reference to the raw materials, to the process and to the product as indicated in Table 3.2.1	As defined in the control plan agreed between the TAB and the manufacturer	As defined in clause 2.2.1 of EAD or As defined in the control plan agreed between the TAB and the manufacturer	Once per year

4 REFERENCE DOCUMENTS

EAD 090062-01-0404	Kits for external wall claddings mechanically fixed.
EN 13373:2020	Natural stone test methods – Determination of geometric characteristics on units.
EN 13501-1:2018	Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests.
EN 13820:2003	Thermal insulating materials for building applications – Determination of organic content.
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 1469:2015	Natural stone products – Slabs for cladding – Requirements.
EN 1936:2006	Natural stone test methods – Determination of real density and apparent density, and of total and open porosity.
EN 318:2002	Wood based panels – Determination of dimensional changes associated with changes in relative humidity.
EN ISO 11358-1:2022	Plastics – Thermogravimetry (TG) of polymers – Part 1: General principles.
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 ISO 1716:2018	Reaction to fire tests for products – Determination of the gross heat of combustion (calorific value).
EAD 210024-00-0504	Cement-bonded board.
EN 1170-7:1998	Precast concrete products – Test method for glass-fibre reinforced cement – Part 7: Measurement of extremes of dimensional variations due to moisture content

ANNEX A: BOND STRENGTH AND SHEAR STRENGTH TESTS

A.1 Introduction

Testing shall be in accordance with the procedures below to determine the bond strength and shear strength of the cladding elements (see clause 1.1.1).

At least five test specimens for each type of test shall be produced.

Test specimens shall be prepared according to Table A.1.1.

Table A.1.1 Test specimens

Test Type	Specimen description	Test description
Bond strength	Cladding element made of 200 mm x 300 mm glass- or stone-faced layer upon cement board.	See clause A.2 and Figure A.2.1 below
Shear strength	Cladding element made of 200 mm x 300 mm glass- or stone- faced layer upon 400 mm x 300 mm cement board.	See clause A.3 and Figure A.3.1 below

A.2 Bond strength test

Testing shall be carried out under ambient laboratory conditions ($(23 \pm 3)^\circ\text{C}$, RH $(50 \pm 2)\%$). Test specimen dimensions are given in Table A.1.1. Steel plates shall be bonded to both the lower surface (cement board substrate) and to the upper surface (glass or stone layer). The bonding material shall be such that failure does not occur between the steel plates and the cement board or glass/stone layer respectively. A suitable bonding material shall be identified prior to testing to ensure this. The surface of the glass layer, which is bonded to the steel plates, shall be pre-roughened/sand blasted to allow the plates to key to the glass.

If the failure occurs between the steel plates and the cement board or glass/stone layer respectively, the tests results shall be considered not valid and the tests shall be repeated using a more suitable material (more resistance and/or with better adhesion) for bonding the steel plates.

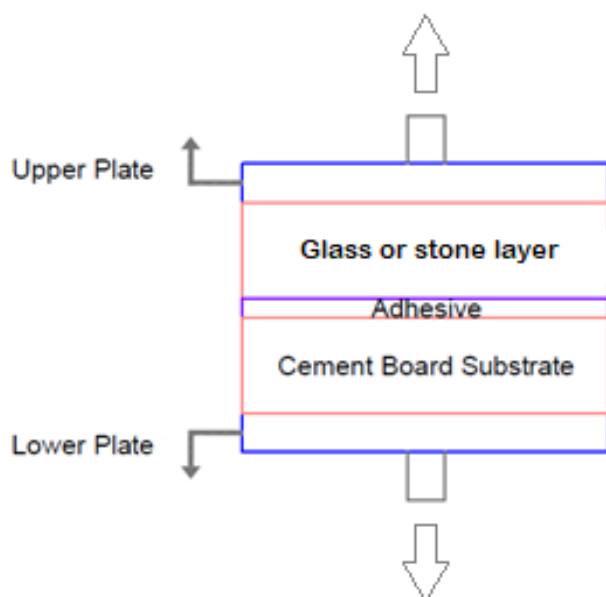


Figure A.2.1: Bond strength test set-up.

The prepared test specimens shall be placed into a universal test machine load frame and a load shall be applied axially through the composite specimen until the test specimen breaks or a maximum load as specified by the manufacturer is observed. The displacement rate for test shall be $(5 \pm 0,5)$ mm/min.

A.3 Shear strength test

Testing shall be carried out under ambient laboratory conditions ($(23 \pm 3)^\circ\text{C}$, RH $(50 \pm 2)\%$). Test specimen dimensions are given in Table A.1.1. The substrate (cement board) shall be bolted to a larger steel plate and positioned vertically between the cross head of the universal test machine. A steel plate shall be bonded on the glass or stone layer and overlap the uppermost edge up to the interface between glass or stone and the cement board. The bonding material shall be such that failure does not occur between the steel plates and the cement board or glass/stone layer respectively. A suitable bonding material shall be identified prior to testing to ensure this.

If the failure occurs between the steel plates and the cement board or glass/stone layer respectively, the test result is not considered valid and the tests shall be repeated using a more suitable material (more resistance and/or with better adhesion) for bonding the steel plates.

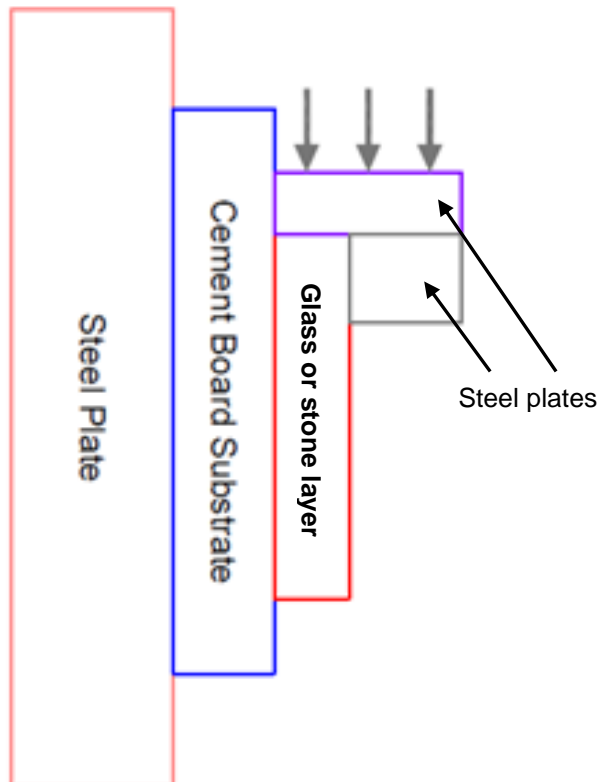


Figure A.3.1: Shear strength test set-up.

The prepared test specimens shall be placed into a universal test machine load frame and a load shall be applied according to Figure A.3.1 until the test specimen breaks or a maximum load as specified by the manufacturer is observed. The displacement rate for test shall be $(5 \pm 0,5)$ mm/min.

A.4 Reporting

The test report shall include the maximum load [in N], the maximum strength [in MPa] per bonded area and the location and the type of the failure for each test specimen.