EAD **040914-00-0404**

www.eota.eu

January 2022

European Assessment Document for

Veture kits – prefabricated units for external wall insulation and their fixing devices

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

Contents

1 SCOPE OF THE EAD

1.1 Description of the construction product

This EAD covers veture kits – prefabricated units for external wall insulation and their fixing devices – (in the following referred to as "veture kits") for the thermal insulation of external vertical and slightly inclined walls, and inaccessible ceilings. This EAD is applicable to the veture kits belonging to the families given in table 1.1.1. They consist of the following components:

- **Veture unit**: Prefabricated component to be delivered on site as a factory-made unit composed of:
  - Factory-made thermal insulation products: Those made of materials given in table 1.1.2.

    Thermal insulation product may or may not present superficial treatments.

    Thermal insulation products, type of material, dimensions, density or weight per square meter and water absorption shall be stated in the ETA.
  - Skin: Factory-applied coverings such as claddings (sheets, tiles, boards, panels, brick slips, shingles) or renders (reinforced or not) made of the materials given in table 1.1.2.

    The type of skin material, (in the case of natural stone, denomination), dimensions (when relevant, also grooves and dowel holes dimensions) and density or weight per square meter shall be stated in the ETA.
  - Skin-attachment: Factory-applied attachment of the skin to the thermal insulation product. Three types of attachments are covered by this EAD:
    - Adhesively attached: with adhesive (specific adhesive or organic/inorganic mortar) or without adhesive (skin attached during the forming process of insulation). Type of adhesive material, range of thickness application, water quantity ratio (if relevant), coverage and density shall be stated in the ETA.
    - Mechanically attached by means of:
      - ✓ Mechanical fixings as indicated in table 1.1.1, or
      - ✓ Special geometry between the cladding skin and the thermal insulation, e.g., tongue-groove form, dovetail joint form, or other specific geometries.

        Mechanical fixings geometric and physical parameters (such as form and dimensions, weight, cross section, distance between fixings, geometry between cladding skin and thermal insulation) and material parameters (such as type of material, density, and material mechanical properties) shall be stated in the ETA.
    - A combination between both attachment modes (adhesively and mechanically attached) is also possible.
    - Exceptionally, for veture kits family C and family D (see table 1.1.1) there may not be any skin-attachment as such but directly the veture fixing device.
- **Veture unit attachment devices**: Three main types of attachments are covered by this EAD:
  - Mechanical attachment: Devices such as rails, profiles or punctual fixings as indicated in table 1.1.1 are covered. Optional retaining devices are also be covered (mainly for veture kits family A or family B). For fixing or retaining devices, geometric and physical parameters (such as form and dimensions, weight, cross section, distance between fixings) and material parameters (such as type of material, density, material mechanical properties) shall be stated in the ETA.

    Anchors between the veture fixing device and the substrate are optional. For anchors, geometric parameters (such as form and dimensions) and material parameters (such as type of material, mechanical properties) shall be stated in the ETA.

- Bonding attachment: Specific adhesives or organic/inorganic mortars. Type of material, range of thickness application, water quantity ratio (if relevant), coverage and density shall be stated in the ETA.
- Combined attachment: A combination between mechanically attachment and adhesive to substrate is possible.

Depending on the attachment method of the veture units, the EAD covers the following types of veture kits:

- Veture units purely mechanically fixed to substrate.
- Veture units mechanically fixed to substrate with supplementary adhesive: The adhesive is used primarily to ensure the flatness of the installed veture kit. Depending on the bonded area, two situations can be distinguished:
  - Bonded area less than 20% of the rear side of the insulation: it is considered as purely mechanically fixed.
  - Minimum bonded 20% of the area of the rear side of the insulation: it is considered as fixed using a combination of mechanically fixture and bonding.
- Veture units bonded to substrate with supplementary mechanical fixings: The mechanical fixings are used primarily to provide the stability and flatness of the veture unit until the adhesive has dried and has reached the final mechanical strength and act as a temporary connection to avoid the risk of detachment. Supplementary mechanical fixings can also provide the stability in case of fire. Veture units purely bonded to substrate.
- For these last two cases, the load is totally distributed by the bonding layer: Veture units may be fully bonded (over the entire surface) or partially bonded (minimum bonded area 40% of the area of the rear side of the insulation).

- **Other ancillary components** (optional):
  - Grout or sealant for the joints between the veture units (e.g., for tiles): The type of material, range of thickness application, water quantity ratio (if relevant), coverage and density shall be stated in the ETA.
  - Supplementary thermal insulation products: Factory-made thermal insulation products, to be used in specific details of the kit, usually made of the same material than the considered in the veture unit, which may require the use of supplementary adhesive and/or fixings to substrate and/or to the veture unit (figure 1.1). The type of material, dimensions, density or weight per square meter and water absorption shall be stated in the ETA.
  - Any other supplementary component used in the kit: Those to fulfil specific function (e.g., to form joints such as sealant, corner strips, etc.; or to achieve continuity such as mastic, joint-covers, gaskets, trims, etc.; or to keep the position of the veture unit such as springs, groove protectors, etc.).

Ancillary components, geometric parameters (such as form and dimensions) and material parameters (such as type of material, mechanical properties) shall be stated in the ETA.

Table 1.1.2 indicates the materials related to these components and the possible associated component harmonized technical specifications.

The veture kits covered by this EAD always include the veture unit (skin and thermal insulation product).

There may be a non-ventilated air space between the veture unit and the substrate.

Two categories of veture kits, classified according to the degree of protection against driving rain, are considered:

- Type I: A veture kit which significantly limits the amount of water that can reach the substrate and also includes arrangements for collecting and expelling infiltrating water (for instance, veture kits with open joints with a pressure equilibrium space and drainage arrangements).
- Type II: A veture kit in which the outer skin avoids the penetration of water, and, therefore, protects the inner part of the veture kit and the joints between the veture units from water penetration.

The product (veture kit) is not covered by:

- Harmonised European standard (hEN).
- EAD 040083-01-0404 nor EAD 040287-00-0404, for the following reason: these EADs cover external thermal insulation composite systems (ETICS) the components of which are only installed in-situ (skin-renders) to become a system. The EAD for veture kits covers prefabricated insulation units with protective skin already included (bonded and or fixed to the insulation board) and without any continuous protective nor finishing layers applied in situ. One of the main differences between ETICS and veture kits are the fixing devices, which requires different assessment methods. Therefore, contribution of kit including, for example, discontinuous joints to reaction to fire, watertightness, thermal behaviour of the kit are essential characteristics requiring particular technical assessments.
- EAD 090062-01-0404, for the following reason: This EAD covers kits for external wall claddings mechanically fixed which may include the cladding alone and components for product assembly in situ, plus optionally, a sub-frame, a thermal insulation layer, filling a ventilated or not air gap between it and the cladding element. The EAD for veture kit, consists of prefabricated insulation units with protective skin of the kit already included attached to the insulation board and without any air gap between them. Therefore, compatibility between components has a real influence on it. Also closed discontinuous joints influence on essential characteristics like, for example the reaction to fire, watertightness, and thermal behaviour of the kit. The main differences are:
    - External wall claddings are installed on a subframe whereas veture kits not.
    - External wall claddings have an air gap whereas veture kits not.
    - Veture kits have factory applied skin whereas external wall claddings are fixed on site.

Compared to the previous version of the EAD (EAD 040914-00-0404), the following changes are introduced:

- New component :
    - Final decorative layer made of ultra-thin natural stone veneer sheets for external wall finishes (covered by EAD 210195-00-0404) on fibrocement skin.
    - Thin metallic composite sheet (covered by EAD 210046-01-1201) as skin.
    - Autoclaved aerated concrete masonry units, covered by standard EN 771-4[1].
    - Self-supporting double skin metal faced insulating panels covered by EN 14509.
    - Other insulation products (cellular glass (CG), wood wool (WW), expanded perlite board (EPB), insulation cork board (ICB), and wood fibres (WF)).
- Fundamental clarifications and introduction of related issues for certain aspects:
    - The recommendation for the maximum level of water vapour permeability has been deleted.
- Update regarding current state of the art: Veture units fixed to the substrate purely bonded or by means of adhesive with supplementary mechanical fixings.
    - The mechanical skin-attachment by means of other geometries between the skin-cladding and the thermal insulation.
    - Slightly inclined surfaces / horizontal surfaces, e.g., external ceilings, cornices, not roofs.

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 (e.g., with regard to the intended end use conditions, 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 as long as the details of the assessment methods as laid down in this EAD are respected.

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

Table 1.1.1: Description of the veture kit families

Veture kit	Description of the veture kit	Type of veture attachment device
Family A (see figure 1.1.1a)	Kits in which the veture unit is fixed through the insulation layer by means of the grooves available on it	Rail profiles, small rails, clips, clamps pins or other similar punctual or linear fixings, with or without supplementary adhesive
Family B (see figure 1.1.1b)	Kits in which the veture unit is fixed through the insulation layer by means of punctual fixings	Nails, screws, anchors or other similar punctual fixings, with or without supplementary adhesive
Family C (see figure 1.1.1c)	Kits in which the veture unit is fixed through the skin layer by means of the grooves available on it	Rail profiles, small rails, clips, clamps pins or other similar punctual or linear fixings, with or without supplementary adhesive
Family D (see figure 1.1.1d)	Kits in which the veture unit is fixed through the skin layer by means of punctual fixings	Nails, screws, anchors or other similar punctual fixings, with or without supplementary adhesive
Family E (see figure 1.1.1e)	Kits in which the veture unit is bonded to the substrate	Adhesive with or without supplementary fixings

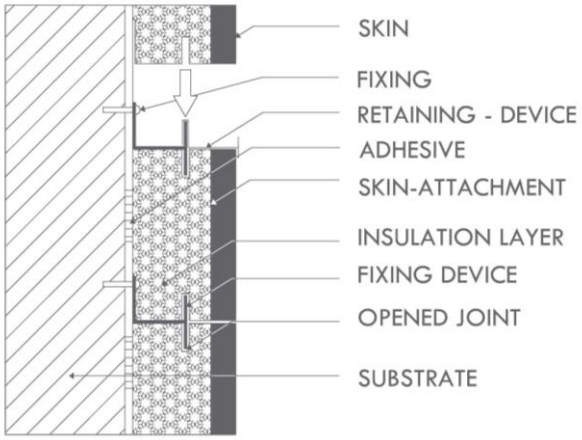

Figure 1.1.1a: Veture kit family A.

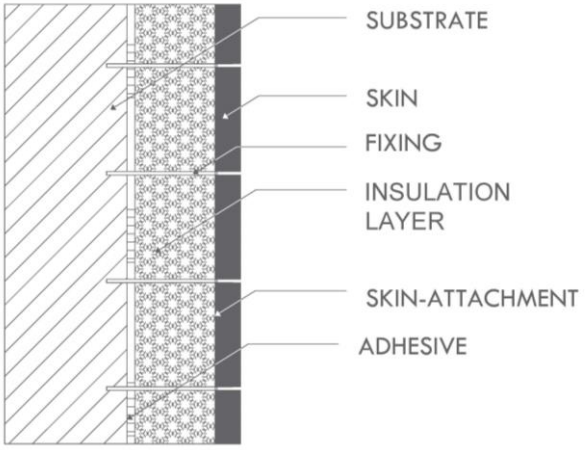

Figure 1.1.1b: Veture kit family B.

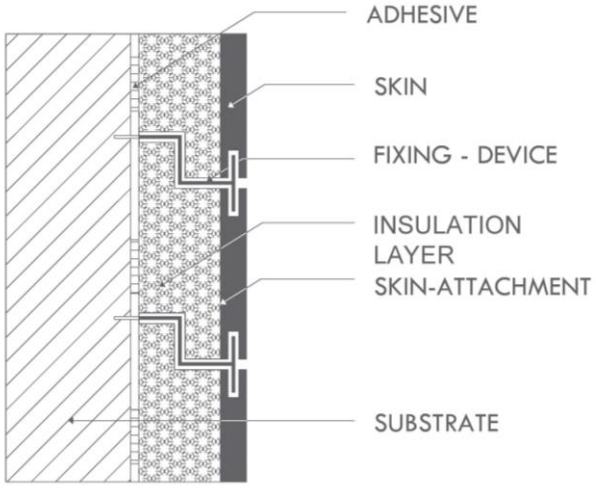

Figure 1.1.1c: Veture kit family C.

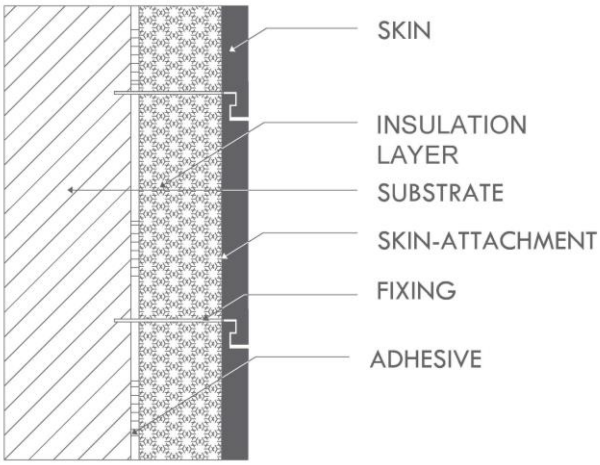

Figure 1.1.1d: Veture kit family D.

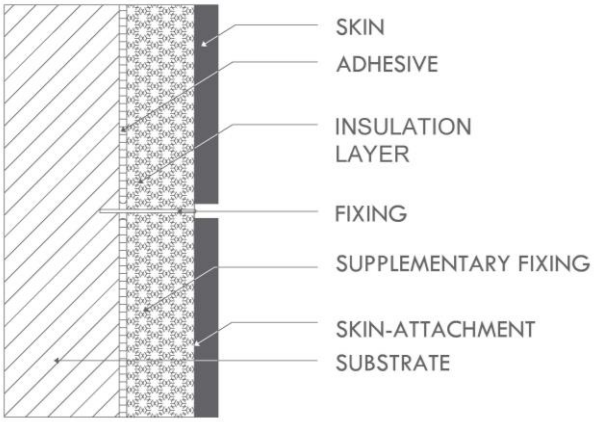

Figure 1.1.1e: Veture kit family E.

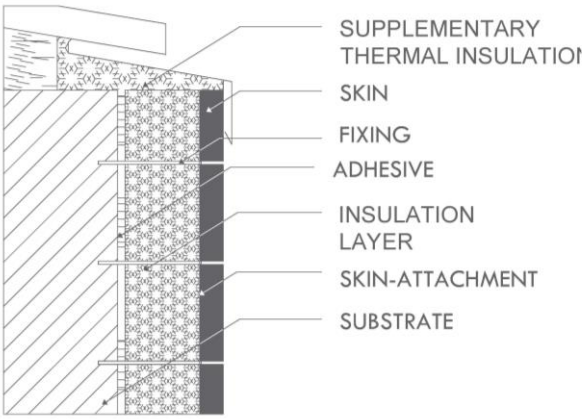

Figure 1.1.1f: Example of veture kit family (example based on veture kit family B) with supplementary thermal insulation products.

Table 1.1.2: Possible components, materials and associated technical specifications

Generic component	**Component material**	**Technical specifications for the components**	
		Harmonised specification (harmonised standard or EAD)	Non-harmonised specifications
Veture kit unit	Self-supporting double skin metal faced insulating panels	EN 14509	---
Veture unit component			
Skin-cladding	Wood based	EN 13986	---
	Fibre cement Fibre reinforced cement	EN 12467 EN 492 EN 494 EN 14992	EN 15191
	Concrete	EN 490 EN 14992 EN 771-4	---
	Natural stone	EN 1469 EN 12057 EN 12326-1	---
	Terra cotta or ceramic	EN 1304 EN 14411	---
	Metal	EN 14782 EN 14783	---
	HPL Laminates	EN 438-7	---
	Plastic	EN 16153 EN 1013 EN 13245-2	---
	Bituminous shingles or tiles	EAD 030016-00-0402 EAD 220020-00-0402	---
	Brick slips	EN 14411	---
	Agglomerated stone	EN 15286	---
	Wood-polymer composite (WPC) and natural fibre composite (NFC)	---	EN 15534-5
	Ultra-thin natural stone veneer sheets for internal and external wall finishes and roof coverings	EAD 210195-00-0404	---
	Thin metallic composite sheets	EAD 210046-01-1201	---
Skin-render	Mineral mortar	EN 998-1	---
	Organic mortar	EN 15824	---
	Reinforcement mesh (optional)	EAD 040016-01-0404	---
Adhesive skin-attachment	Mineral mortar	EN 998-1	---
	Organic mortar	EN 15824	---

	Specific adhesive (e.g., resin, polymer, hybrid polymer, polyurethane based, etc.)	---	EN 923
Mechanical fixing skin-attachment	Metal: - Steel - Aluminium	--- ---	EN 10346 EN 485-1
	Plastic	---	EN 13245-1
Thermal insulation product	Mineral wool (MW)	EN 13162	---
	Cellular plastics: - Expanded polystyrene (EPS) - Extruded polystyrene (XPS) - Polyurethane foam (PU, PIR) - Phenolic foam (PF)	EN 13163 EN 13164 EN 13165 EN 13166	---
	Cellular glass (CG)	EN 13167	---
	Wood wool (WW)	EN 13168	---
	Expanded perlite board (EPB)	EN 13169	---
	Insulation cork board (ICB)	EN 13170	---
	Wood fibre (WF)	EN 13171	---
	Vegetable and animal fibres	EAD 040005-00-1201	---
Veture fixing device			
Punctual, linear fixings or retaining devices	Metal (steel or aluminium)	EAD 330047-01-0602	EN 1993-1-1 EN 1999-1-1
	Plastic	EAD 330196-01-0604	---
Anchor to substrate (optional)			
For use in concrete	Metal	EAD 330747-00-0601 EAD 330232-01-0601	---
	Bonded	EAD 330499-02-0601	---
	Plastic	EAD 330284-00-0604	---
For use in masonry			
	Metal injection	EAD 330076-01-0604	---

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

1.2.1 Intended use(s)

Veture kits are intended to improve the thermal resistance and airborne sound insulation of vertical or slightly inclined walls and inaccessible external ceilings. This EAD covers veture kits applied on vertical walls with the maximum inclination of ±15º from the vertical axe, and on horizontal ceilings with the maximum inclination of +5º from the horizontal axe.

They are intended to be mechanically fixed or/and bonded on external vertical or slightly inclined walls, as well as external inaccessible ceilings, directly exposed to weather and possibly severe weather conditions, on substrates made of masonry (clay, concrete or stone), or concrete (cast on site or as prefabricated panels), in new or existing buildings (retrofit).

The veture kits are non-load bearing construction elements. They do not contribute to the stability of the wall on which they are installed. The veture kits can contribute to durability of the works by providing enhanced protection from the effects of weathering. They are not intended to ensure airtightness of the building.

Veture kits are not intended to be used:

- In contact with the ground.
- Under the effects of seismic actions.

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 veture kits for the intended use of 25 years when installed in the works (provided that the kits are subject to appropriate installation (see 1.1)). These provisions are based upon the current state of the art and the available knowledge and experience.

When assessing the product, the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works[2].

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 its 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

1.3.1 Substrate

The term "substrate" refers to the vertical walls, slightly inclined walls and inaccessible external ceilings, which already meet the necessary airtightness and mechanical strength requirements (resistance to static and dynamic loads). It may be faced with mineral or organic renders or paints.

The substrate walls can be made of masonry (clay, any kind of concrete or stone) or concrete (cast on site or as prefabricated panels).

1.3.2 Veture kit

A veture kit is a specific kit composed of at least, a veture unit and the fixing devices to attach it on the substrate wall.

The components are assembled on site, and thus, become an "assembled kit" when installed in the construction works.

1.3.3 Veture unit

Prefabricated (factory-made) unit composed of a thermal insulation product (see 1.3.3.1) and a skin (see 1.3.3.2).

1.3.3.1 Thermal insulation product and types

Factory-made product with a significantly low thermal conductivity, made of the materials given in table 1.1.2, for which the main function is to give thermal insulation properties to the veture kit, used to provide improved thermal resistance to the substrate.

Thermal insulation products are considered of the same type when they are made from the same material (e.g., expanded polystyrene (EPS) or mineral wool (MW)) and share general structural characteristics, like fibre orientation, surface treatment (faced, not faced) and structure (multi-layered, composite).

Examples of different thermal insulation product types are: mineral wool board, mineral wool lamella; natural cork and expanded cork; expanded polystyrene, and extruded polystyrene foam, EPS cut from big blocks and EPS spumed in moulds (e.g., "perimeter"), double density mineral wool, etc.

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2 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.

Note: When the assessment of an essential characteristic is affected by the thermal insulation type, the relevant clause defines the one to be used.

1.3.3.2 Skin

External factory-applied covering made of the materials given in table 1.1.2.

There are two types of skins:

- Skin-cladding: The skin is made of one or more discontinuous pieces such as sheets, tiles, boards, panels, brick slips or shingles. Optionally a grout may be applied in the joints between the pieces in one veture unit.
- Skin-render: The skin is made of one or multilayer renderings, reinforced or not.

1.3.3.3 Skin-attachment

Factory-applied mode to fix the skin to the thermal insulation product. Skin attachment mode may be:

- Adhesively attached:
  - With adhesive (specific adhesive or organic/inorganic mortar).
  - Without adhesive (skin attached during the forming process of insulation).
- Mechanically attached by means of mechanical fixings, as indicated in table 1.1.1.
- A combination between both attachment modes (adhesively and mechanically attached).

1.3.4 Adhesive, fixing and retaining devices

1.3.4.1 Adhesive

Element used to achieve one or both of the following functions:

1. As a veture kit component, used in situ to bond the veture units to the substrate, assuming either a main or a supplementary role, hereinafter refer to as “adhesive“.
2. As a veture unit component, used on manufacturing plant to attach skin material to insulation board, hereinafter referred to when necessary as “bonded skin attachment“.

1.3.4.2 Fixing device

Profiles/rails, brackets, screws/anchors or any special fixing device (see table 1.1.1), used to secure the veture unit to the substrate.

1.3.4.3 Retaining device

A permanent mechanical means of retaining the skin to reduce risks in the event of a failure between the insulation layer and the skin.

1.3.5 Sealant

A material applied in an unformed state that is able to seal joints once cured or dried, thanks to its adhesive and cohesive properties.

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 veture kit 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		2.2.1	Class
2	Façade fire performance		2.2.2	Description or Level or Class (as relevant)
3	Propensity to undergo continuous smouldering		2.2.3	Description
Basic Works Requirement 3: Hygiene, health and the environment				
4	Watertightness (resistance to driving rain) (I)		2.2.4	Description or Level
5	Water absorption by capillarity		2.2.5	Level
6	Water vapour permeability		2.2.6	Level
7	Hygrothermal behaviour (II)		2.2.7	Level, description
8	Content, emission and/or release of dangerous substances		2.2.8	Description
Basic Works Requirement 4: Safety and accessibility in use				
9	Wind load resistance of veture kits mechanically fixed (III)		2.2.9	Level
10	Bond strength between skin adhesively attached to insulation (IV)		2.2.10	Level
11	Bond strength between adhesive and substrate (V)		2.2.11	
12	Bond strength between adhesive and rear side of insulation (V)		2.2.12	
13	Tensile strength		2.2.13	Level
14	Pull-through resistance	Through the insulation product (only for family B)	2.2.14	Level
		Through the skin (only for family D)		
		Through the fixing device (only for family A and C)		
15	Mechanical resistance of grooved joint	Grooved insulation product (only for family A)	2.2.15	Level
		Grooved skin (only for family C)		
16	Mechanical resistance of other skin attachment	Mechanical attachment by specific geometry	2.2.16	Level
17	Dead load resistance		2.2.17	Level
18	Resistance to horizontal point loads		2.2.18	Description
19	Impact resistance		2.2.19	Class

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 5: Protection against noise			
20	Airborne sound insulation	2.2.20	Level
Basic Works Requirement 6: Energy economy and heat retention			
21	Thermal resistance	2.2.21	Level
Aspects of durability			
22	Dimensional stability by humidity	2.2.22	Level
23	Dimensional stability by temperature (linear thermal expansion)	2.2.23	
24	Thermal shock resistance (VI)	2.2.24	Description
25	Chemical and biological resistance (VII)	2.2.25	Level
26	Corrosion resistance	2.2.26	Description
27	UV radiation resistance (VIII)	2.2.27	Level
28	Creep behaviour (veture unit for ceilings) (IX)	2.2.28	Level and description

(I) for the use in walls only

(II) only relevant for veture kits in which the skin is adhesively attached and when skin material is made from factory-applied render, plastics or bituminous brick slips and thin layers of the other materials

(III) not applicable for veture kits bonded with or without supplementary mechanical fixings

(IV) only applicable to veture kits in which the veture unit is formed of a skin adhesively attached to the thermal insulation product

(V) applicable only for veture units purely bonded, or bonded with supplementary fixings to the substrate (family E), or mechanically fixed with supplementary adhesive according to the kit composition of the manufacturer, and provided its purpose is to contribute to its attachment to substrate

(VI) only relevant for kits with components that are known to be or suspected of being sensitive to thermal shock, made of wood-based panels, plastics, laminates, fibre-cement, metal

(VII) only relevant for kits with skins that are known to be or suspected of being sensitive to chemical and biological attack

(VIII) only relevant for kits with components that are known to be or suspected of being sensitive to UV radiation

(IX) only relevant for veture kits which contain horizontal surfaces for the use in external ceilings, cornices, but not in roofs

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.

Although the tests apply the "worst case scenario”, it is also accepted that, where the manufacturer produces a range of veture kits having different overall classifications, they may be grouped 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.

2.2.1 Reaction to fire

Purpose of the assessment

The purpose of the assessment is to provide the reaction to fire of the veture kit.

Assessment method

a) For the assessment of reaction to fire of the whole kit, one of the following options a) or b) shall apply: The whole kit shall be assessed based on the worst class of any component obtained either:
   - In accordance with a CWT/CWFT[3] decision.
   - Or using the test method(s) relevant for the corresponding reaction to fire class in accordance with EN 13501-1. The component shall then be classified in accordance with the Commission Delegated Regulation (EU) No 2016/364 in connection with EN 13501-1.

b) If option a) leads to too onerous classification of the kit, or if classification for one or several components are missing, then the kit shall be tested using the test method(s) relevant for the corresponding reaction to fire class in accordance with EN 13501-1. The veture kit shall then be classified in accordance with the Commission Delegated Regulation (EU) 2016/364 in connection with EN 13501-1.

Criteria and associated mounting and fixing rules for the relevant reaction to fire tests are given in Annex A.

Components fulfilling the conditions as stated in clause A.6 of Annex A can be considered as small components without the need for testing and assessment of their reaction to fire performance.

The reaction to fire classification obtained for a specific assembly of the veture kit by using one of the two options indicated above covers the application of the veture kit with this specific assembly both as vertically mounted on external walls as well as horizontally beneath external ceilings.

Expression of results

The reaction to fire class shall be stated in the ETA.

2.2.2 Façade fire performance

Purpose of the assessment

The purpose of the assessment is to provide the façade fire performance of the veture kit.

3 CWT: classified without testing; CWFT: classified without further testing

Assessment method

If the manufacturer intends to declare the façade fire performance of the product in absence of a European assessment approach, in accordance with 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, in accordance with the table given in Annex B.

Expression of results

It shall be stated at the ETA, the result(s) obtained according to the assessment method(s) as well as the assessment method(s) required by the regulatory provisions of those countries, in accordance with the table given in Annex B.

2.2.3 Propensity to undergo continuous smouldering

Purpose of the assessment

The purpose of the assessment is to provide the propensity to undergo continuous smouldering of veture kits by means of considering the components separately (thermal insulation and skin-cladding).

Assessment method

The propensity to undergo continuous smouldering of the thermal insulation product, or of the skin-cladding or both shall be tested and assessed in accordance with EN 16733 and the specific provisions given in Annex C. At least, the worst-case scenario selected according to the extension of the test results given in Annex C shall be tested.

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.

Expression of results

It shall be stated in the ETA the performance of the veture kits represented by the final worst result of a component obtained in accordance with EN 16733, clause 11, and whether the final worst result was obtained by testing the thermal insulation product, or the skin-cladding or both, specifying the information of table 2.2.3.1.

Table 2.2.3.1: Propensity to undergo continuous smouldering in accordance with EN 16733

Performance in accordance with EN 16733, clause 11, of the thermal insulation, or of the skin-cladding, as given in its own DoP or after testing	**Description of the performance of the veture kit regarding the characteristic propensity to undergo continuous smouldering to be stated in the ETA**
The thermal insulation product (or the skin-cladding), does not show propensity to undergo continuous smouldering (NoS)	The veture kit does not show propensity to undergo continuous smouldering
The thermal insulation product product (or the skin-cladding) shows propensity to undergo continuous smouldering (S)	The veture kit shows propensity to undergo continuous smouldering
Assessment of the propensity for continuous smouldering combustion is not possible (ANP)	Assessment of the propensity to undergo continuous smouldering is not possible

2.2.4 Watertightness (resistance to driving rain)

Purpose of the assessment

The purpose of the assessment is to provide the watertightness (resistance to driving rain) of the veture kits types I and II (see clause 1.1).

Assessment method

The watertightness of the veture kit shall be tested in accordance with EN 12865, Procedure A, on one specimen. It shall be installed on a test rig able to host an intermediate transparent rigid layer (e.g. made

of methacrylate boards) simulating substrate between rigid test frame and veture units in order to observe the leakage on the rear side of the veture kit (figure 2.2.4.1).

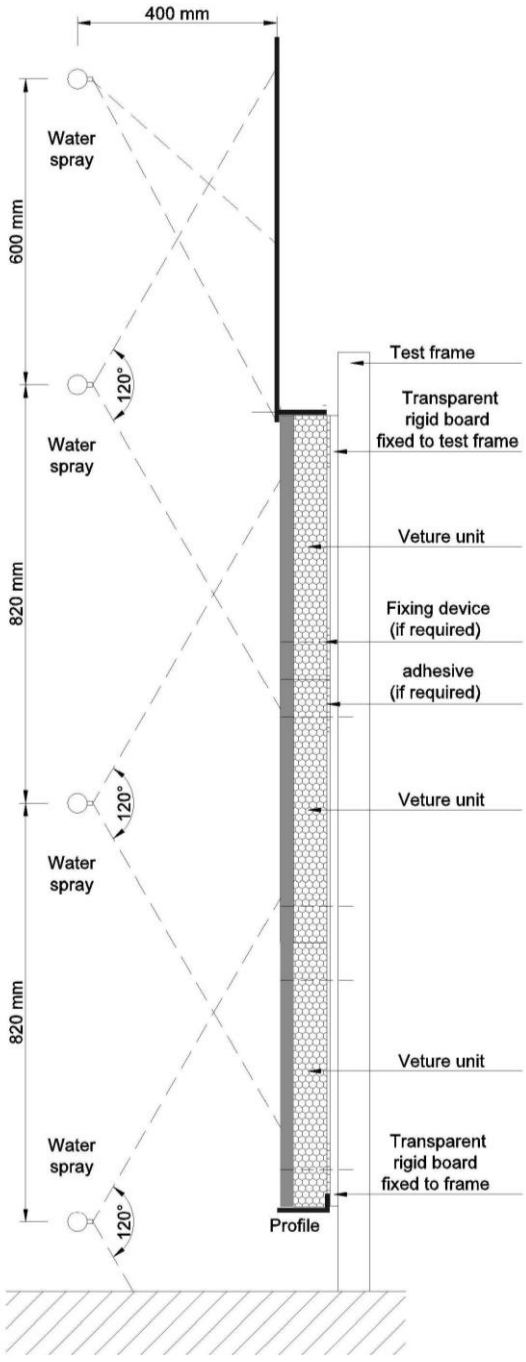

Figure 2.2.4.1: Scheme of rig composition (vertical section)

At least the worst case (e.g., maximum number of joints, maximum water absorption, minimum thickness, minimum slope in case of non-vertical veture kit, etc.) of the veture kit shall be tested.

Expression of results

The limit level of pressure in kPa (e.g., just before water penetration) shall be stated in the ETA.

Tested assembly shall be described in the ETA. At least the following information shall be given:

- Size of boards installed and its type of joints (e.g. butted, grooved, etc.).
- Profiles and sealant/grout installed.
- Skin-renders / Skin-cladding tested.

- Grout or sealant installed, as well its width.
- Maximum and minimum lengths of joints between boards, per square meter.
- Water leakage/s position/s marked at a rear view of rig scheme.

For the veture kits foreseen to be used in ceilings this characteristic shall be stated in the ETA as not relevant.

2.2.5 Water absorption by capillarity

Purpose of the assessment

The purpose of the assessment is to determine the performance for this essential characteristic of the veture kit kits by means of the water absorption by capillarity of the skin of the veture units.

Assessment method

Water absorption by capillarity of the veture unit shall be tested in accordance with Annex D.

At least the worst case (e.g., when discontinuous small skin-cladding elements are required to cover the thermal insulation product: maximum number total length of joints (vertical and horizontal), maximum water absorption of the grout material between them, minimum thickness, etc.) of the veture unit shall be tested.

Veture kits with each different type of thermal insulation material to be covered by the ETA shall be tested.

Expression of results

The result for the assessment of essential characteristic for “Water absorption by capillarity“ shall be expressed as the mean[4] values of water absorption, in kg/m^2, after 3 minutes, 1 hour and 24 hours of the veture kit rounded to the 2^{nd} decimal place, and shall be stated in the ETA.

2.2.6 Water vapour permeability

Purpose of the assessment

The purpose of the assessment is to determine the performance for this essential characteristic of the veture kit by means of the water vapour permeability of the veture units.

Assessment method

2.2.6.1. Water vapour permeability of the veture unit

The water vapour permeability, also known as water vapour diffusion resistance, of the veture kit shall be assessed by calculation in accordance with the method indicated in Annex E (using the water vapour permeability of each veture unit component in accordance with clause 2.2.6.2).

2.2.6.2. Water vapour permeability of the veture unit components

Water vapour permeability of the following veture unit components described below, shall be assessed in accordance with the relevant harmonised standard or EAD (see table 1.1.2), if available.

- Thermal insulation product.
- Adhesive.
- Skin.
- (Bonded) skin-attachment.

When the harmonised standard or EAD does not give an assessment method or when there is no applicable harmonised standard or EAD, the water vapour permeability of the veture unit components shall be preferably tested in accordance with the method indicated in EN ISO 12572 for a more precise assessment

4 The mean value is the arithmetic average value.

than by tabulated values. Alternatively, tabulated values can be considered if available in accordance with EN ISO 10456, or EN 1745 in the case of ceramic skin-claddings.

The test conditions shall be stated in the ETA. Also it shall be stated which conditions applies when the components are tested in accordance with EN ISO 12572, clause 7.1 (A) 23 ± 1 ºC and 50%+5% RH).

Expression of results

The values shall be indicated in the ETA in accordance with the relevant technical specification (e.g., as the maximum water vapour diffusion resistance factor, μ [no units, dimensionless], and maximum equivalent water vapour diffusion air layer thickness, S_d, in metres rounded to the 1/10 m (one decimal).

2.2.7 Hygrothermal behaviour

Purpose of the assessment

The purpose of the assessment is to provide the hygrothermal behaviour of the veture kit. This characteristic is only relevant for veture kits in which the skin is adhesively attached and when skin material is made from factory-applied render, plastics or bituminous brick slips and thin layers of the other materials.

Assessment method

Hygrothermal behaviour of the veture kits shall be assessed by means of bond strength test of specimens taken from the assembled kit submitted to hygrothermal cycles, in accordance with clause F.1 of Annex F.

Complementarily, the freeze-thaw resistance test in accordance with clause F.2 shall be carried out unless the veture unit shows water absorption by capillarity lower than 0.5 kg/m² after 24 hours when tested in accordance with clause 2.2.5.

At least the worst case (e.g., minimum bond strength, maximum water absorption by capillarity, minimum thickness of kit components, etc.) of the veture kits shall be tested.

Expression of results

Description of defects occurred during or at the end of the accelerated ageing cycles shall be recorded and stated in the ETA as described below:

- Deterioration such as cracking or delamination of the skin that allows water penetration to the insulation.
- Deterioration or cracking of grout and sealant between veture units.
- Detachment of the skin or the veture unit.
- Irreversible deformation, defined as a lack of flatness and determined by the length, in mm, of the gap under a straightedge (a 2m long flat ruler). The gap is measured using a flexometer and expressed as mm/m.
- No defects.

The following values, regarding bond strength between skin and insulation after hygrothermal cycles (clause F.1.5.) and if required as described above, after freeze-thaw cycles (clause F.2.4) shall be stated in the ETA:

- Minimum and mean value of bond strength tests after ageing cycles (in kPa).
- Ratio (in %) between the bond strength mean value after ageing cycles test and the mean value in the bond strength tests without ageing cycles.
- The bond strength mean value and the percentage of cohesive rupture in the thermal insulation of the veture unit after hygrothermal cycles and if required, after freeze-thaw cycles, shall be stated at the ETA.

2.2.8 Content, emission and/or release of dangerous substances

Purpose of the assessment

The purpose of the assessment is to provide the leachable substances of the kit for direct and indirect impacts on ground, soil and external water.

Assessment method

The performance of the kit related to the emission and/or release and, where appropriate, the content of dangerous substances, shall be assessed on the basis of the information provided by the manufacturer[5] after identifying the release scenarios, taking into account the intended use of the product and the Member States where the manufacturer intends his product to be made available on the market.

The identified intended release scenario for this product and intended use with respect to dangerous substances is:

S/W2: Product with indirect contact to soil, ground and surface water.

2.2.8.1. Leachable substances

For the intended use covered by the release scenario S/W2, the performance of the kit concerning leachable substances shall be assessed.

The dangerous substances assessment of the kit shall be carried out by means of the assessment of the most relevant kit components materials, which are the skin materials.

The leachable substances assessment of the kit components materials shall be assessed in accordance with the relevant harmonised standard or EAD (see table 1.1.2).

When the harmonised standard or EAD does not give an assessment method or when there is no relevant harmonised standard or EAD available, leachable substances assessment of the kit components materials shall be assessed in accordance with the following methods:

- For skin made of cement-based materials:
  A leaching test with subsequent eluate analysis shall be done, each in duplicate. Leaching tests of the skin shall be conducted in accordance with EN 16637-2, but considering the steps below indicated for the leachant renewal. The leachant shall be pH-neutral demineralised water and the ratio of liquid volume to surface area shall be (80 ± 10) l/m².

  Samples shall be prepared in accordance with clause 8.2 of EN 16637-2.

  The eluate shall be produced by a tank test in accordance with EN 16637-2. The eluates taken after 6 hours, 1 day, 2 days and 6 hours, 4 days, 9 days, 16 days, 36 days and 64 days shall be analysed for the following environmentally relevant parameters:

  - Aluminium, antimony, arsenic, barium, lead, cadmium, chromium (total), chromate (Cr VI), cyanide (total), cobalt, copper, molybdenum, nickel, mercury, thallium, vanadium, zinc.
  - Chloride (Cl^-), sulphate (SO_4^{2-}), fluoride (F^-).
  - TOC.

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

The manufacturer is **not** obliged to:
- provide the chemical constitution and composition of the product (or of constituents of the product) to the TAB, or
- provide a written declaration to the TAB stating whether the product (or constituents of the product) contain(s) substances which are classified as dangerous according to Directive 67/548/EEC and Regulation (EC) No. 1272/2008 and listed in the "Indicative list on dangerous substances" of the SGDS, taking into account the installation conditions of the construction product and the release scenarios resulting from there.

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

- pH-value, electrical conductivity, odour, colour, turbidity, and tendency to produce foam.

The parameters shall be analysed using an appropriate equipment with a measurement range allowing the measurement of the substance concentration.

Measured concentration of the leaching test in accordance with EN 16637-2 of these skins shall be expressed per step for each parameter in µg/l and mg/m². Additionally, the cumulatively released quantities shall be expressed for each parameter in mg/m².

The used test methods for the analysis of the parameters shall be documented in the ETA including the equipment and its measurement range.

- For skin materials other than cement-based covered by EN 16637-2: a leaching test with subsequent eluate analysis shall be done, each in duplicate. Leaching tests of the skins shall be conducted in accordance with EN 16637-2. The leachant shall be pH-neutral demineralised water and the ratio of liquid volume to surface area shall be (80 ± 10) l/m².

  Samples shall be prepared in accordance with clause 8.2 of EN 16637-2.

  In eluates of "6 hours" and "64 days", the following biological tests shall be conducted:

  - Acute toxicity test with Daphnia magna Straus in accordance with EN ISO 6341.
  - Toxicity test with algae in accordance with EN ISO 15799.
  - Luminescent bacteria test in accordance with EN ISO 11348-1, EN ISO 11348-2 or EN ISO 11348-3.

  For each biological test, EC20-values shall be determined for dilution ratios 1:2, 1:4, 1:6, 1:8 and 1:16.

  If the parameter TOC is higher than 10 mg/l, the following biological tests shall be conducted with the eluates of "6 hours" and/or "64 days" eluates:

  - Biological degradation in accordance with OECD Test Guideline 301 part A, B or E.

Expression of results

Determined toxicity in biological tests shall be expressed in the ETA as EC20-values for each dilution ratio. Maximum determined biological degradability shall be expressed as "…% within …hours/days". The respective test methods for analysis shall be specified in the ETA.

2.2.9 Wind load resistance of veture kits mechanically fixed

Purpose of the assessment

The purpose of the assessment is to provide the resistance to wind loads of the veture kits mechanically fixed.

This characteristic is not applicable for veture kits attached by bonding ~~bonded~~ with or without supplementary mechanical fixings.

Assessment method

The wind suction load resistance of the kit shall be tested in accordance with the methods given in Annex G.

Depending on the thermal insulation product material used in the veture unit, the wind suction test is either a static test or a fatigue test as follows:

- Mineral wool or cellular plastic (see table 1.1.2): static test in accordance with clause G.1 of Annex G.
- Other thermal insulation product materials (see table 1.1.2): fatigue test in accordance with clause G.2 of Annex G.

In addition, veture kits where the skin is attached to the thermal insulation product by means of mechanical fixings (not adhesively attached) shall also be tested in accordance with fatigue test given in clause G.2 of Annex G.

At least the worst case (the mechanically weakest case) of the assembled kit shall be considered.

In the case of veture kits including retaining devices, the veture kit may be tested with or without the retaining devices.

In cases where wind pressure may be relevant (e.g., for some kits with air gap between the skin and the insulation product), a supplementary test with a wind pressure load shall be performed. The same test methods (static test or fatigue test) as given in Annex G shall be used, only the wind action is inverse.

One test specimen for each chosen geometry shall be assessed. If the test result does not confirm the results obtained by mechanical tests at least two other test specimens shall be tested.

Expression of results

The result for the assessment of essential characteristic "Wind load resistance" shall be expressed in the ETA as maximum wind load resistance "Q" or "Q1" (accordingly with the test method applied), in kPa, rounded to the 2nd decimal place, together with the indication of the assessed veture kit assembly.

In the case of mechanically fixing with supplementary adhesive with minimum 20% of bonded area (as it is described in clause 1.1) the bonded area used in the test is relevant for the wind load resistance load and the bonded area shall be given in the ETA.

2.2.10 Bond strength between skin and insulation

Purpose of the assessment

The purpose of the assessment is to provide the bond strength between the skin and insulation of the veture unit.
This characteristic is only applicable to veture kits in which the veture unit is formed of a skin adhesively attached to the thermal insulation product.

Assessment method

Bond strength or adhesion between the skin and the thermal insulation product of a veture unit shall be tested in accordance with the method given in Annex H.1.

Bond strength test shall be carried out in normal conditioning (without ageing) and also, when relevant, after ageing cycles tests.

Expression of results

The following bond strength values shall be given in the ETA:

- The mean value (in kPa) and the rate (in %) of rupture types (cohesive rupture and/or adhesive rupture).
- The characteristic value (in kPa) in accordance with Annex O.
- Ratio (in %) between the bond strength mean value after ageing cycles test and the bond strength mean value without ageing cycles.
- The type and percentage of rupture area (adhesive or cohesive).
  The characteristic value of the veture unit, as well as main type of rupture (cohesive or adhesive) shall be stated in the ETA.

2.2.11 Bond strength between adhesive and substrate

Purpose of the assessment

The purpose of the assessment is to provide the bond strength of the veture kit between the adhesive and substrate.
This characteristic is applicable for veture units purely bonded or bonded with supplementary fixings to the substrate (family E), or mechanically fixed with supplementary adhesive according to the kit composition of the manufacturer, and provided its purpose is to contribute to its attachment to substrate.

Assessment method

The test procedure is described in Clause H.2.

The mean failure resistance shall be based on the results of five tests.

Expression of results

In the ETA it shall be stated:
- The tested thicknesses and percentage of areas of adhesive applied.
- The minimum value without supplementary conditioning (dry condition) expressed in kPa and the rupture type.
- The mean value and the minimum value after immersion of the adhesive in water for 2 days and 2 h drying at (23 ±2) °C and (50 ± 5) % RH, expressed in kPa and the rupture type.
- The minimum and mean value after immersion of the adhesive in water for 2 days and at least 7 days drying at (23 ±2) °C and (50 ± 5) % RH, expressed in kPa and the rupture type. The characteristic values in accordance with Annex O.

2.2.12 Bond strength between adhesive and rear side of the insulation

Purpose of the assessment

The purpose of the assessment is to provide the bond strength of the veture kit between the adhesive and the rear side of the thermal insulation board.
This characteristic is applicable for veture units purely bonded or bonded with supplementary fixings to the substrate (family E). or mechanically fixed with supplementary adhesive according to the kit composition of the manufacturer, and provided its purpose is to contribute to its attachment to substrate.

Assessment method

The test procedure is described in Clause H.3.

Expression of results

In the ETA it shall be stated:
- The tested thicknesses and percentage of areas of adhesive applied.
- The minimum value in dry condition expressed in kPa and the rupture type.
- The mean value and the minimum value after immersion of the adhesive in water for 2 days and 2 h drying at (23 ±2) °C and (50 ± 5) % RH, expressed in kPa and the rupture type.
- The minimum and mean value after immersion of the adhesive in water for 2 days and at least 7 days drying at (23 ±2) °C and (50 ± 5) % RH, expressed in kPa and the rupture type.
- The characteristic values in accordance with Annex O.

2.2.13 Tensile strength

Purpose of the assessment

The purpose of the assessment of the tensile strength of the veture kit shall be carried out by means of the assessment of the tensile strength of the thermal insulation product which is representative of this essential characteristic for veture kits.

Assessment method

The tensile strength perpendicular to faces of the thermal insulation products shall be given in accordance with the relevant harmonized standard (see table 1.1.2, tested in accordance with EN 1607). At least the worst case shall be tested (e.g., minimum density, maximum thickness).

The test shall be carried out:

- On dry conditions (without any supplementary conditioning).
- After exposed to heat-moisture actions at (70 ± 2) ºC and (95 ± 5) % RH in a climatic chamber for 7 days and followed by a drying period at (23 ± 2) ºC and (50 ± 5) % RH until constant mass is achieved.
- After exposed to heat-moisture actions at (70 ± 2) ºC and (95 ± 5) % RH in a climatic chamber for at least 28 days and followed by a drying period at (23 ± 2) ºC and (50 ± 5) % RH until constant mass is achieved.

At least 5 specimens per conditions/exposures shall be tested.

Expression of results

The results for the assessment of essential characteristic "tensile strength" expressed as mean and the characteristic value (in accordance with Annex O) shall be given in kPa rounded to the 2nd decimal place and stated in the ETA.

2.2.14 Pull-through resistance

Purpose of the assessment

The purpose of the assessment is to provide the pull-through resistance of the veture kit.

Assessment method

The assessment of the kit pull-through resistance shall be carried out by means of either

- The assessment of the pull-through of fixings through the thermal insulation product, test in accordance with the method indicated in clause I.1 of Annex I (only relevant for veture kits family B); or
- The assessment of the pull-through of fixings through the skin, test in accordance with the method indicated in clause I.2 of Annex I (only relevant for veture kits family D); or
- The assessment of the pull-through of fixings through the fixing device, test in accordance with the method indicated in clause I.3 of Annex I (only relevant for veture kits family A and C).

These pull-through resistances are representative for this essential characteristic for veture kits. At least the worst case (e.g., minimum thickness and minimum tensile strength perpendicular to the faces of insulation product, minimum plate diameter of anchor, minimum plate stiffness of anchor, minimum load resistance of anchor) shall be tested.

Expression of results

The result for the assessment of essential characteristic "pull-through resistance" shall be expressed in the ETA as the mean value and the characteristic value in accordance with Annex O (in N) rounded to the 2nd decimal place.

2.2.15 Mechanical resistance of grooved joint

Purpose of the assessment

The purpose of the assessment is to provide the mechanical resistance of grooved joint of the veture kit if the thermal insulation is a grooved product.

Assessment method

The assessment of the kit grooves resistance shall be carried out by means of either:

- The assessment of the resistance of the grooved thermal insulation product, test in accordance with the method indicated in clause J.1 of Annex J (only relevant for veture kits family A); or
- The assessment of the resistance of the grooved skin, test in accordance with the method indicated in clause J.2 of Annex J (only relevant for veture kits family C).

These resistances of the kit grooves are representative of this essential characteristic for veture kits.

At least the worst case (e.g., minimum thickness and minimum tensile strength perpendicular to the faces of insulation product) shall be tested.

Expression of results

The result for the assessment of essential characteristic "resistance of the grooves" shall be expressed in the ETA as the mean value and the characteristic value in accordance with Annex O (in N) rounded to the 2nd decimal place.

2.2.16 Mechanical resistance for other skin attachment

Purpose of the assessment

The purpose of the assessment is to provide the mechanical resistance of other skin attachment to insulation board (different than bonding) of the veture unit, for veture kit.

Assessment method

The assessment of the resistance of kits with other types of mechanical skin-attachments shall be carried out by means of the assessment of the resistance of this connection between skin and thermal insulation product. The skin-attachment kit shall be assessed in accordance with the method indicated in clause J.3 of Annex J.

These resistances of the kit connections are representative of this essential characteristic for veture kits.

At least the worst case (e.g., minimum thickness and minimum tensile strength perpendicular to the faces of insulation product) shall be tested.

Expression of results

The mean value and the characteristic value (in N) rounded to the 2nd decimal place, in accordance with Annex O, shall be stated in the ETA.

2.2.17 Dead load resistance

Purpose of the assessment

The purpose of the assessment is to provide the dead load resistance of the veture kit.

Assessment method

Dead load behaviour shall be tested in accordance with the method indicated in Annex K.

For mechanically fixed veture kits, at least the worst case (e.g., maximum thickness and minimum tensile strength perpendicular to faces of the insulation product, maximum thickness and weight of skin, maximum transverse deformation of the adhesives, minimum density of mechanical fixings, etc.) of the veture kit shall be tested.

For veture kits with bonding attachment, and with supplementary mechanical fixing, the test shall be conducted without the fixings. At least the worst case (e.g., maximum thickness and minimum tensile strength perpendicular to faces of the insulation product, maximum thickness and weight of skin, maximum transverse deformation of the adhesives, etc.) of the veture kit shall be tested.

Expression of results

The result of the assessment of essential characteristic “dead load behaviour” shall be expressed in the ETA as the maximum dead load applied (in kg), maximum difference of displacement obtained (in mm) and the deflection curves in function of the time (in mm/h) rounded to the 2nd decimal place.

2.2.18 Resistance to horizontal point loads

Purpose of the assessment

The purpose of the assessment is to provide the horizontal load resistance of the veture kit.

Assessment method

The resistance to horizontal points loads (representing, e.g., one person standing on a ladder leaning against the veture kit) shall be tested in accordance with the method given in Annex L.

At least the worst case (the mechanically weakest case) of the assembled kit shall be tested.

Expression of results

The result for the assessment of essential characteristic “resistance to horizontal point loads“ shall be expressed in the ETA as the description of any permanent deformation (visible deformation) (in mm) rounded to the 1st decimal place, on any component.

2.2.19 Impact resistance

Purpose of the assessment

The purpose of the assessment is to provide the impact resistance of the veture kit.

Assessment method

The impact resistance shall be tested in accordance with the method given in Annex M.

At least the worst case (the mechanically weakest case) of the assembled kit shall be tested.

The result for the assessment of essential characteristic “impact resistance” shall consider the hard body and soft body impact resistances.

Expression of results

The degree of exposure in accordance with the use categories defined in the table M.2 in clause M.3 of Annex M shall be stated in the ETA.

2.2.20 Airborne sound insulation

Purpose of the assessment

The purpose of the assessment is to provide the improvement of airborne sound insulation of the veture kit.

Assessment method

The improvement of airborne sound insulation shall be tested in accordance with EN ISO 10140-1, Annex G.

At least the worst assembled kit shall be tested. For the determination of the influence of the veture kit on the sound insulation of the external wall, parameters such as the dynamic stiffness of the insulation product, the mass/m^2 of the skin and the density of fixing devices shall be stated in the ETA.

The ratings of airborne sound insulation shall be undertaken in accordance with EN ISO 717-1.

Expression of results

The result for the assessment of essential characteristic “airborne sound insulation“ shall be expressed in the ETA as the weighted improvement ΔR_w, the sound reduction index R_w with and without the assembled kit and the spectrum adaptation terms C and C_{tr}, in dB without decimals.

2.2.21 Thermal resistance

Purpose of the assessment

The assessment of the thermal resistance of veture kit is based on the assessment of its most relevant components (i.e., thermal insulation product and, if any, mechanical fixing devices). The thermal resistance of the veture kit depends primarily on the thermal conductivity and thickness of the thermal insulation product, as well as the influence of thermal bridges introduced by mechanical fixing devices such as anchors or profiles.

Therefore, the purpose of the assessment is to determine:

- The thermal conductivity and thermal resistance of the thermal insulation product in accordance with Clause 2.2.20.1.
- The thermal resistance of the veture kit without thermal bridges in accordance with clause 2.2.20.2.

- Where applicable, the point thermal transmittance of punctual mechanical fixing devices or linear thermal transmittance of profile fixing devices or both, in accordance with clause 2.2.20.3 in order to quantify the additional heat losses caused by mechanical fixing devices (anchors or profiles) which act as thermal bridges.

2.2.21.1. Thermal conductivity and thermal resistance of the thermal insulation product

Assessment method

The thermal conductivity and thermal resistance of the thermal insulation product shall be tested, previously conditioned at least 24 h at 23 ± 1ºC and 50 ± 5 % HR, in accordance with the relevant technical specification (See table 1.1.2) depending on the material of the thermal insulation product. Only when such a standard does not exist or does not include the necessary assessment method, EN 12667 or EN 12939 are to be applied, depending on the thickness of thermal insulation product.

The maximum value of nominal thermal conductivity of thermal insulation product $\lambda_{D,}$ determined in accordance with the relevant product standard (see table 1.1.2.) or EN 12667 or EN 12939, shall be equal or lower than 0.065 W/(m.K).

Expression of results

The following data shall be stated in the ETA:

- The thermal conductivity of the thermal insulation product, expressed in W/(m.K).
- The thermal resistance of the thermal insulation product for each nominal thickness expressed in $(m^2 \cdot K)/W$.
- The thermal resistance for each nominal thickness expressed in $(m^2 \cdot K)/W$.

  Or at least:

- The minimum thermal resistance for the minimum thickness, expressed in $(m^2 \cdot K)/W$.

2.2.21.2. Thermal resistance of the veture kit without thermal bridges

Assessment method

The thermal resistance of the veture kit without thermal bridges (R_{veture}) shall be calculated in accordance with clause Q.1. Where more than one type or thickness or both of thermal insulation product is used in the veture kit, the thermal resistance shall be calculated for each combination of insulation type and thickness.

Expression of results

The following data shall be stated in the ETA:

- The thermal resistance (R-value) of the veture kt without thermal bridge expressed in $(m^2 \cdot K)/W$ for each assessed insulation type and thickness.

2.2.21.3 Thermal transmittance of fixing device

Assessment method

When the veture kits includes fixing devices (i.e., bonded veture kits with supplementary mechanical fixing devices, mechanically fixed veture kits with supplementary adhesive or purely mechanically fixed veture kits), the point thermal transmittance of anchors or the linear thermal transmittance of profiles or both shall be obtained in accordance with clauses Q.2 and Q.3 respectively.

The calculation of thermal resistance shall consider, at least, the worst-case scenario in accordance with the extended application rules given in clause Q.4.

Expression of results

The following data shall be stated in the ETA:

- The point thermal transmittance (χ-value) expressed in W/K of one anchor, or the linear thermal transmittance (ψ-value) expressed in W/(m·K) of one profile, or both.
- The number of anchors per unit area expressed in pieces/m^2, or the number of profiles per unit area expressed in m/m^2, or both.

2.2.22 Dimensional stability by humidity

Purpose of the assessment

The purpose of the assessment is to provide the dimensional stability by humidity of the veture kit.

Assessment method

Dimensional stability of the kit shall be assessed by means of the dimensional stability of the kit components that are known to be or suspected of being sensitive to changes in environmental relative humidity.

The dimensional stability of the kit components associated with changes in relative humidity shall be assessed in accordance with the relevant test standard cited in harmonised standard or EAD (see table 1.1.2), examples given:

- Wood based products, in accordance with clause 5.5 of EN 13986.
- Fibre cement, in accordance with clause 7.3.7 of EN 12467.
- High pressure laminate (HPL) in accordance with clause 15 of EN 438-2.

When the harmonised standard does not give an assessment method or when there is no applicable harmonised standard or EAD, the dimensional variation by humidity of the kit components shall be assessed in accordance with EN 318 (16 specimens prepared as described at clause 5 of this standard), for organic materials or EN 1170-7 for inorganic materials (8 specimens as described at clause 4 of this standard).

Expression of results

The result for the assessment of essential characteristic “dimensional stability by humidity“ shall be stated in the ETA as the maximum value for each sensitive kit component, in accordance with the criteria described at the applicable standard (e.g. dimension or volume variation/initial dimension or volume value, expressed as %, category or mm/m rounded to the 1st decimal place). Reference to the relevant harmonised standard, or standard used in the assessment shall be stated in the ETA.

The values shall cover the range of density of the kit components. That means that the kit performance shall be given in the ETA for the highest and the lowest densities of each of all components to be covered by the ETA.

2.2.23 Dimensional stability by temperature (linear thermal expansion)

Purpose of the assessment

The purpose of the assessment is to provide the dimensional stability by temperature (linear thermal expansion) of the veture kit.

This characteristic is only relevant for kits with components that are known to be or suspected of being sensitive to changes in environmental relative temperature, such as those made of wood-based panels, wood polymer composite, plastics, laminates, or metal.

Assessment method

The dimensional stability of the kit components associated with changes in temperature shall be assessed in accordance with the relevant harmonised standard or EAD (see table 1.1.2).

When the harmonised standard or EAD does not give an assessment method or when there is no applicable harmonised standard or EAD, the linear thermal expansion coefficient of the kit components shall be assessed:

- Without tests in accordance with the respective stated value of clause 3.2.6 of EN 1993-1-1 for steel, and of clause 3.2.5 of EN 1999-1-1 for aluminium.
- Mean value from tests results obtained on at least three specimens shall be carried out in accordance with EN 1770 (clause 3) for inorganic materials or EN 14617-11 for organic materials.

Expression of results

The result for the assessment of essential characteristic "linear thermal expansion" shall be expressed in the ETA as the maximum value for each sensitive kit component (in mm/m) rounded to the 1st decimal place. Reference to the relevant harmonised standard, EAD or standard used in the assessment shall be stated in the ETA.

The values shall cover the range of density of the kit components. That means that the kit performance shall be given in the ETA for the highest and the lowest densities of each of all components to be covered by the ETA.

2.2.24 Thermal shock resistance

Purpose of the assessment

The purpose of the assessment is to provide the thermal shock resistance of the veture kit.

This characteristic is only relevant for kits with components that are known to be or suspected of being sensitive to thermal shock, such as those made of wood based panels, plastics laminates, fibre-cement, natural stone, agglomerated stone, or ceramic.

Assessment method

Thermal shock of the veture kit components shall be assessed in accordance with the relevant test standard cited in harmonised standard or EAD (see table 1.1.2), examples given:

- High pressure laminate (HPL) in accordance with clause 19 of EN 438-2.
- Natural stone, in accordance with clause 4.2.10.2 of EN 1469.
- Agglomerated stone, in accordance with clause 4.2.7 of EN 15286.
- Ceramic, in accordance with applicable Annex of EN 14411.

When the harmonised standard or EAD does not give an assessment method or when there is no applicable harmonised standard or EAD, the thermal shock resistance of the kit components shall be assessed in accordance with the method given in clause F.1 of Annex F.

Expression of results

The result for the assessment of thermal shock resistance shall be stated in the ETA as the maximum value for each sensitive kit component, in accordance with the criteria described at the applicable standard.

When the method described on clause F.1 of Annex F has been followed, it shall be stated in ETA if no defects occur or if any of the following defects occur, during or at the end of the thermal shock programme:

- Deterioration such as cracking or delamination of the skin that allows water penetration to the insulation.
- Deterioration or cracking of seals between veture units.
- Detachment of the skin or the veture unit.
- Irreversible deformation, defined as a lack of flatness and determined by the length, in mm, of the gap under a straightedge (a 2 m long flat ruler). The gap is measured using a flexometer and expressed as mm/m.

2.2.25 Chemical and biological resistance

Purpose of the assessment

The purpose of the assessment is to provide the chemical or biological resistance of the veture kit.

This characteristic is only relevant for kits with skins that are known to be or suspected of being sensitive to chemical or biological attack, as described below:

Assessment method

Chemical or biological resistance of the kit components shall be assessed in accordance with the following standards:

- EN 335 (use classes) and EN 350 (tests and classification criteria), for wood-based elements covered by EN 13986.
- EN 335 (use classes) and EN 350 (tests and classification criteria), for solid wood-based elements covered by EN 14915.
- EN ISO 22479 for metal elements covered by EN 14782 and 14783.
- EN 12326-2 for slate and stone elements covered by EN 12326-1.
- EN ISO 10545-13 for ceramic elements covered by EN 10169.
- EN 15534-1 clauses 8.4 to 8.6 for WPC or NFP elements covered by EN 15534-5.
- EN ISO 846 for plastic elements.

Expression of results

Test results shall be stated in the ETA in accordance with the corresponding test standards listed above. Reference to the relevant harmonised standard, EAD or standard used in the assessment shall be stated in the ETA.

2.2.26 Corrosion resistance

Purpose of the assessment

The purpose of the assessment is to provide the corrosion resistance of the veture kit.

Assessment method

The assessment of the corrosion resistance of the veture kit shall be carried out by means of the metallic components or their protective layer, representative for this essential characteristic of veture kits, according to the appropriate EN standard, as described below:

For components made of carbon steel with a continuously hot dip metallic protective layer: With compositions as defined at applicable clause of product standard (e.g. clauses 3.2.1 to 3.2.5 of EN 508-1, referred to at EN 14782, or clauses 3.1.1 to 3.1.4 of EN 505[6] , referred to at EN 14783), with protective layer classified and designated as defined at clause 4 of EN 10346. The assessment shall be carried out as follows:

The test to define the thickness of the thinnest protective layer shall be carried out, based on clause 6.2 of EN ISO 1461, on at least 3 specimens of protected steel sheets, each of them of minimum reference area of 10 cm^2 chosen at the approximate centre of the specimen, and at least 5 measurements per reference area, by magnetic method as defined in EN ISO 2178.
The corrosion protection shall be assessed by gravimetric method (mass loss) before and after exposures described below, on at least 3 flat steel specimens with at least ~~with~~, the thinnest protective layer. For the weighing, an analytical balance shall be used, able to measure with an accuracy of 0.1 mg, and able to weigh specimens with dimensions of 100 mm x 50 mm x 0.5 mm (total thickness including protection) or 50 x 50 mm x 1 mm (total thickness including protection)[7]. The different exposures are:

- Water condensation according to clause N.1 Annex N of this EAD.
- Neutral salt spray (NSS) according to clause N.2 Annex N of this EAD.
- Humid atmospheres containing sulphur dioxide according to N.3. Annex N of this EAD.

6 Except for multilayer coated steel sheets, which are not included in this EAD

7 Mass of sample (density x volume of specimen) must not overcome the maximum weight limit of the balance

After each exposure and defects assessments as described at respective clause of Annex N, corrosion product layer shall be removed according to EN ISO 8407 and then specimens shall be weighted again.

- For components made of continuously organic coated steel sheets: With compositions as defined at applicable clause of product standard (e.g. clause 3.2.6 of EN 508-1, referred to at EN 14782, or clause 3.1.6 of EN 505[7], referred to at EN 14783), with protective layer defined (including range of thicknesses) at clause 6 and Annex B of EN 10169. The assessment shall be carried out per type of organic coating material and on the thinnest foreseen layer, in accordance with EN 13523-1. Method B.

  The corrosion protection shall be assessed by presence and type of defects after the following exposures:

  - Water condensation according to clause N.1 Annex N of this EAD.
  - Neutral salt spray (NSS) according to N.2 Annex N of this EAD.
  - Cyclic ageing according to clause N.4. Annex N of this EAD.

- For components made of coated aluminium sheets: With compositions as defined at applicable clause of product standard (e.g. clause 4.2. of EN 508-2, referred to at EN 14782, or clause 4.2 of EN 507, referred to at EN 14783), with protective layer defined (including range of thicknesses) at clause 6.1 EN 1396. The assessment shall be carried out per type of organic coating material and on the thinnest foreseen layer, in accordance with EN 13523-1. Method B.

  The corrosion protection shall be assessed by presence and type of defects after the following exposures:

  - Water condensation according to clause N.1 Annex N of this EAD.
  - Neutral salt spray (NSS) according to N.2 Annex N of this EAD.
  - Cyclic ageing according to clause N.4. Annex N of this EAD.

- For components made of stainless steel sheets: as defined at applicable clause of product standard (e.g. clause 3.2.1 of EN 508-3, or thickness as referred to at clause 4.2. of EN 14782, or clause 3.1.1 of EN 502, or thickness as referred to at clause 4.2 of EN referred to at 14783), and chemical composition as defined in clause 4 of EN 10088-1, shall be considered as no relevant. For any other type of chemical composition, the test shall be carried by gravimetric method (mass loss) as described below for zinc, copper and aluminium sheets. Regarding intergranular corrosion, the stainless steels types shall be assessed according to clause 6.4. and classification (resistant, not resistant) given in tables 7, 10 and 11 of 10088-4. If not covered by this classification, the assessment of the resistance to intergranular corrosion shall be carried out according to EN ISO 3651-2, following method A, B, or C based on the stainless steel composition.

- For components made of not coated aluminium, zinc or copper alloys sheets: With compositions as defined at applicable clause of product standard (e.g. clause 4.2. of EN 508-2, or thickness as referred to at clause 4.2. of EN 14782, or clause 4.2 of EN 507, or thickness as referred to at clause 4.2. of EN 14783 for aluminium), (clause 3.2. of EN 506, referred to at EN 14782, for copper or zinc, composition of zinc as defined as EN 988, composition of copper alloy as defined at clause 4.2 of EN 504 and composition as defined in EN 1172.

  The corrosion resistance shall be assessed by gravimetric method (mass loss) before and after exposures described below, on at least 3 flat specimens without scribe. For the weighing, an analytical balance shall be used, able to measure with an accuracy of 0.1 mg and able to weigh specimens dimensions of 100 mm x 50 mm x 0.5 mm (total thickness including protection) or 50 x 50 mm x 1 mm (total thickness including protection)[7]. The different exposures are:

  - Water condensation according to clause N.1 Annex N of this EAD (without scribe).
  - Neutral salt spray (NSS) according to clause N.2 Annex N of this EAD (without scribe).
  - Cyclic ageing according to clause N.4. Annex N of this EAD (without scribe).

  After each exposure and defects assessments as described at respective clause of Annex N, corrosion product layer shall be removed according to EN ISO 8407 and then specimens shall be weighted again.

Expression of results

- Thickness of protective layer and initial mass of specimens: Minimum individual and average of test results per assessed specimen set shall be stated at the ETA.

- Resistance to water condensation: At the end of the exposure period the condition of the corrosion protection system shall be visually assessed regarding blistering, rusting, cracking and flaking following EN ISO 4628-2 for blistering, EN ISO 4628-3 for rusting, EN ISO 4628-4 for cracking and EN ISO 4628-5 for flaking. Also, when relevant for the product being assessed, its mass loss (average and deviation standard values) shall be stated in the ETA.

- Resistance to neutral salt spray (NSS): In the ETA the applied exposure period in hours (i.e., 1440, 720 or 480 h) shall be indicated; in addition, either the information shall be given that no detectable as well as no visible defects under ×10 magnification were observed, or the observations about the defects shall be described in the ETA. Where applicable, the description shall follow the standardised rating scheme for designating the quantity and size of defects of the relevant standards referred to EN ISO 4628-2 for blistering, EN ISO 4628-3 for rusting, EN ISO 4628-4 for cracking and EN ISO 4628-5 for flaking). The corrosion penetration at scribe ends in the direction of the longitudinal axis ML [mm] (highest value of all specimens) shall additionally be stated in the ETA. Also, when relevant for the product being assessed, its mass loss (average and deviation standard values) shall be stated in the ETA.

- Resistance to humid atmospheres containing sulphur dioxide: In the ETA, the exposure period in hours (i.e., 720h) shall be indicated; in addition, either the information shall be given that no detectable as well as no visible defects under ×10 magnification were observed, or the observations about the defects shall be described in the ETA. Where applicable, the description shall follow the standardised rating scheme for designating the quantity and size of defects of the relevant standards referred to EN ISO 4628-2 for blistering, EN ISO 4628-3 for rusting, EN ISO 4628-4 for cracking and EN ISO 4628-5 for flaking). Also, when relevant for the product being assessed, its mass loss (average and deviation standard values) shall be stated in the ETA.

- Resistance to cyclic ageing exposure: In the ETA, after the exposure period it shall be stated wether if no detectable as well as no visible defects under ×10 magnification were observed, or the observations about the defects. Where applicable, the description shall follow the standardised rating scheme for designating the quantity and size of defects of the relevant standards referred to EN ISO 4628-2 for blistering, EN ISO 4628-3 for rusting, EN ISO 4628-4 for cracking and EN ISO 4628-5 for flaking). Also, when relevant for the product being assessed, its mass loss (average and deviation standard values) shall be stated in the ETA.

Reference to the relevant harmonised standard, EAD or standard used in the assessment shall be stated in the ETA.

2.2.27 UV radiation resistance

Purpose of the assessment

The purpose of the assessment is to provide the UV radiation resistance of the veture kit.

This characteristic is only relevant for kits with components that are known to be or suspected of being sensitive to UV radiation, such as plastics and organic coatings.

Assessment method

Kit components behaviour after UV radiation ageing shall be assessed in accordance with the following technical specification, on at least three samples per testing conditions:

- For plastic materials: EN ISO 877-1, EN ISO 877-3, EN ISO 4892-1, EN ISO 4892-2, EN ISO 4892-3.
- For coating materials such as paints: EN ISO 16474-1 and EN ISO 16474-3.
- For coating varnishes for wood: EN 927-6.
- For organic coatings (coil coated): EN 10169.
- For single skin profiled plastics: EN 1013, clause 5.5.
- For WPC or NPF elements: EN 15534-1, clauses 8.1 and 8.2.

Expression of results

The description of previous conditioning, as well as the tests results for the assessment of essential characteristic “UV radiation resistance“ shall be stated in the ETA in accordance with the relevant harmonised standard, EAD or standard listed above. Reference to the relevant harmonised standard, EAD or standard used in the assessment shall be stated in the ETA.

2.2.28 Creep behaviour (veture unit for ceilings)

Purpose of the assessment

The purpose of the assessment is to provide the creep behaviour resistance of the veture kit.

This characteristic is only relevant for veture kits which contain slightly inclined-/ horizontal surfaces for the use in external ceilings, cornices, but not in roofs. For creep behaviour of the veture kit, the performance of the veture unit is decisive.

Assessment method

The veture unit shall be tested in accordance with the method given in Annex P.

Expression of results

The creep coefficient φ_t, the applied load F_c, and the description of the attachment considered in the test (distance and density between mechanical fixings or minimum bonded area in the case of bonded attachment) shall be stated in the ETA.

3. ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

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

For the products covered by this EAD, the applicable European legal act is Commission Decision 2001/308/EC.
The applicable AVCP system is 3 for any use except for uses subject to regulations on reaction to fire.
For uses subject to regulations on reaction to fire[8] the applicable AVCP systems regarding reaction to fire are 1, or 3, or 4 depending on the conditions defined in the said Decision.

8 Including propensity to undergo continuous smouldering, where relevant.

3.2 Tasks of the manufacturer

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

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.

The actions to be undertaken by the manufacturer of the product for the different components of the veture kits are laid down in tables 3.2.2 to 3.2.6 when the components are produced by the manufacturer himself. table 3.2.7 describes actions to be undertaken when the components are not produced by the manufacturer himself but by its supplier under the specifications of the manufacturer.

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 specimens	Minimum frequency of control
	Factory production control (FPC)				
1	Reaction to fire (I)				
	- Reaction to fire (for any classification)	Indirect tests as specified in tables 3.2.2 to 3.2.7	See tables 3.2.2 to 3.2.7	See tables 3.2.2 to 3.2.7	See tables 3.2.2 to 3.2.7
	- Reaction to fire (for class A1)	Direct test in accordance with EN ISO 1182	As defined in the Control Plan	According to test method and the Control Plan (V)	(IV)
	- Reaction to fire (for class A1 or A2)	Direct test in accordance with EN ISO 1716	As defined in the Control Plan	According to test method and the Control Plan (V)	At least once each two years
	- Reaction to fire (for class A2 to D)	Direct test in accordance with EN 13823 (II)	As defined in the Control Plan	According to test method and the Control Plan (V)	(IV)
	- Reaction to fire (for class E and F)	Direct test in accordance with EN ISO 11925-2	As defined in the Control Plan	According to test method and the Control Plan (V)	(IV)
2	When applicable: Propensity to undergo continuous smouldering	Direct control method based on relevant clause	As defined in the Control Plan	One (V)	At least once each two years
		Indirect tests as specified in tables 3.2.2 to 3.2.7	Indirect tests as specified in tables 3.2.2 to 3.2.7	Indirect tests as specified in tables 3.2.2 to 3.2.7	Indirect tests as specified in tables 3.2.2 to 3.2.7
	Factory production control (FPC)				
3	Components produced by the manufacturer himself:				
	Veture units	See table 3.2.2	See table 3.2.2	See table 3.2.2	See table 3.2.2
	Thermal insulation product	See table 3.2.3	See table 3.2.3	See table 3.2.3	See table 3.2.3
	Skin	See table 3.2.4	See table 3.2.4	See table 3.2.4	See table 3.2.4
	Skin attachment	See table 3.2.5	See table 3.2.5	See table 3.2.5	See table 3.2.5
	Veture unit attachment devices	See table 3.2.6	See table 3.2.6	See table 3.2.6	See table 3.2.6
	Other ancillary components	As defined in the Control Plan (e.g., checking on geometry, material, etc.)	As defined in the Control Plan	As defined in the Control Plan	As defined in the Control Plan

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of specimens	Minimum frequency of control
4	Components not produced by the manufacturer himself (III)	See table 3.2.7	See table 3.2.7	See table 3.2.7	See table 3.2.7

(I) Indirect tests shall be applied to all components independent from the source of their classification (testing, Commission Decision 96/603/EC, as amended by Commission Decisions 2000/605/EC and 2004/424/EC, 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) in accordance with Commission Delegated Regulation (EU) 2016/364 in connection with EN 13501-1.

(II) If it is necessary to perform SBI tests within the FPC, the same test set-up shall apply that was used as worst case for the classification tests within the assessment procedure.

(III) Components produced by the supplier under the specifications of the manufacturer.

(IV) The tests shall always be carried out whenever the constancy of performance is not verified by means of indirect tests (see tables 3.2.2 to 3.2.7) or, at least, once each five years when the indirect tests verify the constancy of 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.

(V) The necessary number of specimens shall be more 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 consecutive production process.

Table 3.2.2: Control plan when the veture unit is produced by the manufacturer himself; cornerstones

No	Subject/type of control		Test or control method	Criteria, if any	Minimum number of specimens	Min. frequency of control
Factory production control (FPC)						
Incoming components						
1	Receipt components/ Common general control		Checking of 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
	Incoming thermal insulation product		See table 3.2.7	See table 3.2.7	See table 3.2.7	See table 3.2.7
	Incoming skin		See table 3.2.7	See table 3.2.7	See table 3.2.7	See table 3.2.7
	Incoming skin-attachment		See table 3.2.7	See table 3.2.7	See table 3.2.7	See table 3.2.7
Process						
1	When relevant, flame retardant quantity (I)		Quantity measurement	As defined in the Control Plan	---	Each batch
Finished component (veture unit)						
1	Geometry (length, width, thickness, squareness, and flatness) (I)		When applicable, as defined in the relevant harmonised standard or EAD Otherwise, measuring, visual check or table 3.4.1 of clause 3.4	As defined in the Control Plan	According to tests or control methods	Daily (II)
2	Weight per unit area or per veture unit (I)		When applicable as defined in the relevant hEN or EAD Otherwise, table 3.4.1 of clause 3.4	As defined in the Control Plan	According to tests or control methods	Daily (II)
3	Mechanical characteristics	Bond strength	Test or control based on relevant clause 2.2.10	As defined in the Control Plan	According to tests or control methods	As defined in the Control Plan (II)
						At least once each 5 years
		Tensile strength of insulation	Direct test according to 2.2.13	As defined in the Control Plan	According to tests or control methods	As defined in the Control Plan (II)
						At least once each 5 years
		Pull-through resistance	Direct test according to 2.2.14	As defined in the Control Plan	According to tests or control methods	As defined in the Control Plan (II)
						At least once each 5 years
		Resist. of the grooves, if relevant	Direct test according to 2.2.15	As defined in the Control Plan	According to tests or control methods	As defined in the Control Plan (II)
						At least once each 5 years
		Resistance for other skin attachment	Direct test according to 2.2.16	As defined in the Control Plan	According to tests or control methods	As defined in the Control Plan (II)
						At least once each 5 years

(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) may 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.

Table 3.2.3: Control plan when the thermal insulation 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)					
Incoming materials					
1	Receipt materials	Checking of 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 flame retardant quantity (I)	Quantity measurement	As defined in the Control Plan	---	Each batch
Finished component					
3	As defined in the relevant harmonised standard or EAD	As defined in the relevant harmonised standard or EAD	As defined in the relevant harmonised standard or EAD	As defined in the relevant harmonised standard or EAD	As defined in the relevant harmonised standard or EAD
4	Organic content (I)	Ash content / loss on ignition in accordance with clause. Otherwise, Thermogravimetry test as done in accordance with EN ISO 11358-1	As defined in the Control Plan	As defined in the Control Plan	As defined in the relevant harmonised standard or EAD or each batch, if applicable (II)
(I) Indirect characteristic related to propensity to undergo continuous smouldering, when applicable.					
(II) Deviations from the given cornerstones (higher or lower frequencies) may 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.					

Table 3.2.4: Control plan when the skin 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)					
Incoming materials					
1	Receipt materials	Checking of 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					
1	When relevant, flame retardant quantity (I)	Quantity measurement	As defined in the Control Plan	---	Each batch
Finished component					
1	Geometry (form and dimensions) (I)	When applicable, as defined in the relevant harmonised standard or EAD. Otherwise measuring, visual check or table 3.4.1 of clause 3.4	As defined in the Control Plan	As defined in the Control Plan	Daily (II)
2	Density or mass per unit area or per unit (I)	When applicable as defined in the relevant harmonised standard or EAD. Otherwise, table 3.4.1 of clause 3.4	As defined in the Control Plan	As defined in the Control Plan	Daily (II)
3	Mechanical characteristics	When applicable, as defined in the relevant harmonised standard or EAD.	As defined in the Control Plan	As defined in the Control Plan	As defined in the Control Plan (II)

		Otherwise, measuring, visual check or table 3.4.1 of clause 3.4			
4	PCS value (for classes B to D) (I)	Test in accordance with EN ISO 1716	As defined in the Control Plan	As defined in the Control Plan	Monthly (II)
5	Organic content (I)	Ash content / loss on ignition in accordance with clause. Otherwise, Thermogravimetry test as done in accordance with EN ISO 11358-1	As defined in the Control Plan	As defined in the 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) may 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.

Table 3.2.5: Control plan when the skin-attachment are 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)					
Incoming materials					
1	Receipt materials	Checking of 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
2	Type of component material (I)	Checking of supplier certificates or supplier tests	Conformity with the order	---	Each delivery
Finished component					
1	Geometry (form and dimensions) (I)	Measuring and visual check	As defined in the Control Plan	As defined in the Control Plan	Daily (II)
2	Viscosity, pot life, curing time, handing time	When applicable, as defined in the relevant harmonised standard or EAD Otherwise, measuring, visual check or clause 3.4.2	As defined in the Control Plan	As defined in the Control Plan	Daily (II)
3	Specific mass (I)	When applicable, as defined in the relevant harmonised standard or EAD. Otherwise, measuring, visual check or clause 3.4.2	As defined in the Control Plan	As defined in the Control Plan	Daily (II)
4	Mechanical characteristics	When applicable, test or control based on relevant clause 2.2.10 to 2.2.14	As defined in the Control Plan	As defined in the Control Plan	As defined in the Control Plan (II)
		When applicable, test or control based on relevant clause 2.2.10 to 2.2.14	As defined in the Control Plan	As defined in the Control Plan	At least once each 5 years
5	When relevant, organic content (I)	Ash content / loss on ignition in accordance with clause. Otherwise, Thermogravimetry test as done in accordance with EN ISO 11358-1	As defined in the Control Plan	As defined in the Control Plan	Once per batch (II)

(I) Indirect characteristic related to reaction to fire.
(II) Deviations from the given cornerstones (higher or lower frequencies) may 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.

Table 3.2.6: Control plan when the veture unit attachment devices are 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)					
Mechanical fixings					
Incoming materials					
1	Receipt materials	Checking of delivery ticket or label on the package Checking of supplier certificates or supplier tests	Conformity with the order	---	Each delivery
Finished component (including adhesive if it exists)					
1	Geometry (form and dimensions) (I)	Measuring and visual check	As defined in the Control Plan	As defined in the Control Plan	Daily (II)
2	Viscosity, pot life, curing time, handing time	When applicable, as defined in the relevant harmonised standard or EAD. Otherwise, measuring, visual check or table 3.4.2 of clause 3.4	As defined in the Control Plan	As defined in the Control Plan	Daily (II)
3	Specific mass (I)	When applicable, as defined in the relevant harmonised standard or EAD. Otherwise, measuring, visual check or table 3.4.2 of clause 3.4	As defined in the Control Plan	As defined in the Control Plan	Daily (II)
4	Mechanical characteristics	When applicable, test or control based on relevant clause 2.2.10 to 2.2.14	As defined in the Control Plan	As defined in the Control Plan	As defined in the Control Plan (II)
		When applicable, test or control based on relevant clause 2.2.10 to 2.2.14	As defined in the Control Plan	As defined in the Control Plan	At least once each 5 years
5	When relevant, organic content (I)	Ash content / loss on ignition in accordance with clause. Otherwise, Thermogravimetry test as done in accordance with EN ISO 11358-1	As defined in the Control Plan	As defined in the Control Plan	Once per batch (II)

(I) Indirect characteristic related to reaction to fire.

(II) Deviations from the given cornerstones (higher or lower frequencies) may 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.

Table 3.2.7: Control plan <u>when the components are not produced by the manufacturer</u>; cornerstones

No	Subject/type of control (ii)	Test or control method	Criteria, if any	Minimum number of specimens	Minimum frequency of control
Factory production control (FPC)					
1	Components belonging to Case 1 (I)	(1)	Conformity with the order	Testing is not required	Each delivery
		(2)	As defined in the Control Plan	Testing may not be required (2)	Each delivery
2	Components belonging to Case 2 (I):	(1)	Conformity with the order	Testing is not required	Each delivery
	▪ Characteristics declared in DoP for the specific use within the kit.	(2)	As defined in the Control Plan	Testing may not be required (2)	Each delivery
	▪ Characteristics not declared in DoP for the specific use within the kit.	(3)	As defined in the Control Plan	As defined in the Control Plan	As defined in the Control Plan
3	Components belonging to Case 3 (I):	(1)	Conformity with the order	Testing is not required	Each delivery
		(3)	As defined in the Control Plan	As defined in the Control Plan	As defined in the Control Plan

(1) Checking of delivery ticket and/or label on the package.
(2) Checking of technical data sheet and DoP or, when relevant: supplier certificates or supplier tests or test or control in accordance with tables 3.2.1 to 3.2.6 above.
(3) Checking of supplier certificates or supplier tests or test or control in accordance with tables 3.2.1 to 3.2.6 above.

(I) Case 1: The component is covered by a harmonised European standard or its own ETA for all characteristics needed for the specific use within the kit.
Case 2: The component is a product covered by a harmonised European standard or its own ETA which, however, does not include all characteristics needed for the specific use within the kit or the characteristic is presented as NPD option for the component manufacturer.
Case 3: Component not (yet) covered by a harmonised European standard or its own ETA.
(II) Component characteristics are those defined in tables 3.2.1 to 3.2.6 above.

3.3 Tasks of the notified body

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

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 specimens	Minimum frequency of control
Initial inspection of the manufacturing plant and of factory production control *(for systems 1+, 1 and 2+ only)*					
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 veture 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, after starting a new production line or after modifications of the production process.
Continuous surveillance, assessment and evaluation of factory production control *(for systems 1+, 1 and 2+ only)*					
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 fire[8] 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 tasks to be undertaken by the notified body under AVCP system 1 are laid down in table 3.3.2.

Table 3.3.2 Control plan for the notified body; cornerstones under AVCP system 1

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of specimens	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).	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 the Control Plan agreed between the TAB and the manufacturer	Once per year

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

3.4.1 Skin-cladding

Table 3.4.1.1 shows the relevant test methods applicable to the skin-claddings by materials.

Table 3.4.1.1 Skin-cladding test methods by materials

Skin-cladding material	Test methods			
	Water absorption	**Bending strength, Modulus of elasticity or Modulus of rupture**	**Dimensions**	**Specific mass or density**
Wood based	EN ISO 15148	EN 310	EN 325; EN 1309-1	EN 323
Fibre-cement Fibre reinforced cement	EN 12467; EN 492; EN 494; EN 1170-6; EN ISO 15148	EN 12467; EN 492; EN 494; EN 1170-4	EN 12467; EN 492; EN 494; EN 13369	EN 12467; EN 492; EN 494; EN 1170-6
Concrete	EN 491; EN ISO 15148; EN 771-4	EN 491	EN 491; EN 13369; EN 771-4	EN 491; EN 771-4
Natural stone	EN 1925; EN ISO 15148	EN 12372	EN 13373	EN 1936
Terra cotta or ceramic	EN ISO 10545-3; EN ISO 15148	EN ISO 10545-4; EN 538	EN ISO 10545-2	EN ISO 10545-3
Metal	EN 14782; EN 14783; EN ISO 15148	EN 10346; EN 485-2	EN 10143; EN 485-4; EN 14782; EN 14783	EN 10346; EN 1396
HPL laminates	EN ISO 15148	EN ISO 178	EN 438-6	Method A EN ISO 1183-1
Plastic	EN ISO 15148	EN ISO 178	EN 16153; EN 1013	Method A EN ISO 1183-1; EN ISO 10352
Bituminous shingles or brick slips	EN 14223; EN ISO 15148	EN 12311-1; EN 12311-2; EN ISO 178	EN 1848-1; EN 1848-2; EN 16153; EN 1013	EN 1849-2; Method A EN ISO 1183-1; EN ISO 10352
Agglomerated stone	EN 14617-1	EN 14617-2	Annex A of EN 15286 or EN 14617-16	EN 14617-1
Wood-polymer composite (WPC) and Natural Fibre Composite (NFC)	EN 15534-1	EN 15534-1	EN 15534-1	EN 15534-1

3.4.2 Skin-render and skin-attachment adhesive

3.4.2.1 Density or specific mass (as delivered)

- Pastes and liquids:

  This is measured at (23 ± 2) °C in a 1000 cm^3 cylinder.

- Powders:

  This is measured at (23 ± 2) °C in a 500 cm^3 cylinder.

Method of operation

The results are recorded after maximum packing down on a vibrating table and levelling of the surface. The results are expressed in kg/m^3 (mean value of 3 tests).

3.4.2.2 Dry extract (only pastes and liquids):

- Lime and polymer-based products:

  This is determined after placing the sample in a ventilated oven set at (105 ± 5) °C until a constant mass is obtained. The mass is regarded as constant if the difference in mass between two successive weighing, one hour apart, does not exceed 0,1 g. Initial weighing for testing:

  - 2 g for liquid products (impression, etc.),
  - 5 g for products in paste form.

  The results are expressed as a percentage relative to the initial mass (mean value of 3 tests).

  When this method is not possible (the product or test device requires an exposure of 105 ± 3 °C), the method in accordance with EN 480-8 shall be used.

- Silicate based products:

  The dry extract is determined by the following method:

  A – Initial weighing of approximately 5 g (product in the as-delivered state) on an aluminium sheet, approximately 100 mm x 100 mm, 2/3 covered.

  B – Pre dry for 1 hour at (125 ± 10) °C. Dry for 2 hours at (200 ± 10) °C.

  C – Final weighing.

  Weighing accuracy shall be within 5 mg.

  The difference in mass from the initial weighing is accounted for by volatile components including water of crystallization.

  The results are expressed as a percentage relative to the initial mass (mean value of 3 tests).

  When this method is not possible (the product or test device requires an exposure of 105 ± 3 °C), the method in accordance with EN 480-8 shall be used.

3.4.2.3 Ash content:

- Pastes and liquids:

  The ash content is determined on the same samples as those on which the dry extract has been measured (see clause A.2.2).

- Powders:

The ash content is determined at 450 °C and 900 °C on a sample of approximately 5 g pre-dried at (100 ± 5) °C or at (200 ± 5) °C for silicate-based products, to constant mass. The mass is regarded as constant if the difference in mass between two successive weightings, one hour apart, does not exceed 0,1 g.

Method of operation

- The sample is placed in a tared crucible either fitted with a lid or enclosed in a leak-tight container and the whole is weighed.
- After the lid has been removed, where necessary, the crucible is placed in the oven maintained at ambient temperature.
- The temperature of the oven is then raised to (450 ± 20) °C (ash content at 450 °C) or to (900 ± 20)°C (ash content at 900 °C) and maintained at that temperature for 5 hours.
- The crucible is allowed to cool down to room temperature in the desiccators before being weighed.

The results are expressed as a percentage relative to the initial mass after drying (mean value of 3 tests).

Note: The tolerances at 900 °C may become larger, taking account of the products' composition.

- Glass fibre reinforcement mesh:

  The ash content is determined at (625 ± 20) °C on three 100 mm square samples, cut parallel to the yarn and at least 100 mm apart from the side to constant mass.

  The result is expressed as a percentage relative to the initial mass.

  Alternative method for types of glass unstable at 625 ºC shall be used in accordance with EAD 040016-01-0404.

4 REFERENCE DOCUMENTS

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EN ISO 10211:2017	Thermal bridges in building construction - Heat flows and surface temperatures - Detailed calculations (ISO 10211:2007)
EN ISO 10352:2020	Fibre-reinforced plastics – Moulding compounds and prepregs - Determination of mass per unit area and fibre mass per unit area (ISO 10352:2020)
EN ISO 10456:2007+AC:2009	Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values (ISO 10456:2007 + Cor1:2009)
EN ISO 10545-2:2018	Ceramic tiles - Part 2: Determination of dimensions and surface quality (ISO 10545-2:2018)
EN ISO 10545-3:2018	Ceramic tiles - Part 3: Determination of water absorption, apparent porosity, apparent relative density and bulk density (ISO 10545-3:2018)

EN ISO 10545-4:2019	Ceramic tiles - Part 4: Determination of modulus of rupture and breaking strength (ISO 10545-4:2019)
EN ISO 10545-13:2016	Ceramic tiles. Part 13: Determination of chemical resistance (ISO 10545-13:2016).
EN ISO 11348-1:2008+A1:2018	Water quality - Determination of the inhibitory effect of water samples on the light emission of Vibrio fischeri (Luminescent bacteria test) - Part 1: Method using freshly prepared bacteria (ISO 11348-1:2007 + Amd1:2018)
EN ISO 11348-2:2008+A1:2018	Water quality - Determination of the inhibitory effect of water samples on the light emission of Vibrio fischeri (Luminescent bacteria test) - Part 2: Method using liquid-dried bacteria (ISO 11348-2:2007 + Amd1:2018)
EN ISO 11348-3:2008+A1:2018	Water quality - Determination of the inhibitory effect of water samples on the light emission of Vibrio fischeri (Luminescent bacteria test) - Part 3: Method using freeze-dried bacteria (ISO 11348-3:2007 + Amd1:2018)
EN ISO 11358-1:2022	Plastics - Thermogravimetry (TG) of polymers - Part 1: General principles (ISO 11358-1:2022)
EN ISO 11925-2:2020	Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test (ISO 11925-2:2020)
EN ISO 12572:2016	Hygrothermal performance of building materials and products - Determination of water vapour transmission properties – Cup method (ISO 12572:2016)
EN ISO 12944-5:2019	Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 5: Protective paint systems (ISO 12944-5:2019)
EN ISO 12944-6:2018	Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 6: Laboratory performance test methods (ISO 12944-6:2018)
EN ISO 13788:2012	Hygrothermal performance of building components and building elements - Internal surface temperature to avoid critical surface humidity and interstitial condensation - Calculation methods (ISO 13788:2012, Corrected version 2020-05)
EN ISO 15148:2002+A1:2016	Hygrothermal performance of building materials and products - Determination of water absorption coefficient by partial immersion (ISO 15148:2002 + Amd1:2016)
EN ISO 15799:2022	Soil quality - Guidance on the ecotoxicological characterization of soils and soil materials (ISO 15799:2019)
EN ISO 16474-1:2013	Paints and varnishes - Methods of exposure to laboratory light sources - Part 1: General guidance (ISO 16474-1:2013)
EN ISO 16474-3:2021	Paints and varnishes - Methods of exposure to laboratory light sources - Part 3: Fluorescent UV lamps (ISO 16474-3:2021)
EN ISO 22479:2022	Corrosion of metals and alloys - Sulfur dioxide test in a humid atmosphere (fixed gas method) (ISO 22479:2019)
EN ISO 29466:2022	Thermal insulating products for building applications – Determination of thickness (ISO 29466:2022)
EN ISO 29469:2022	Thermal insulating products for building applications - Determination of compression behaviour (ISO 29469:2022)

EN ISO 29470:2020	Thermal insulating products for building applications – Determination of the apparent density (ISO 29470:2020)
EN ISO 29766:2022	Thermal insulating products for building applications - Determination of tensile strength parallel to faces (ISO 29766:2022)
EAD 030016-00-0402	Corrugated bitumen tiles and sheets
EAD 040005-00-1201	Factory-made thermal and/or acoustic insulation products made of vegetable or animal fibres
EAD 040016-01-0404	Glass fibre mesh for reinforcement of cementitious or cement-based renderings
EAD 040083-01-0404	External thermal insulation composite systems (ETICS) with renderings
EAD 040287-00-0404	Kits for external thermal insulation composite system (ETICS) with panels as thermal insulation product and discontinuous claddings as exterior skin
EAD 040914-00-0404	Veture kits – Prefabricated units for external wall insulation and their fixing devices
EAD 090062-01-0404	Kits for external wall claddings mechanically fixed
EAD 130118-01-0603	Screws and threaded rods for use in timber constructions
EAD 210046-01-1201	Thin metal composite sheet
EAD 210195-00-0404	Ultra-thin natural stone veneer sheets for internal and external wall finishes and roof coverings
EAD 220020-00-0402	Low bitumen mass shingles, laminated or not, with mineral or synthetic reinforcement
EAD 330047-01-0602	Fastening screws for sandwich panels
EAD 330076-01-0604	Metal injection anchors for use in masonry
EAD 330196-01-0604	Plastic anchors made of virgin or non-virgin material for fixing of external thermal insulation composite systems with rendering
EAD 330232-01-0601	Mechanical fasteners for use in concrete
EAD 330284-00-0604	Plastic anchors for redundant non-structural systems in concrete and masonry
EAD 330499-01-0601	Bonded fasteners for use in concrete
EAD 330747-00-0601	Fasteners for use in concrete for redundant non-structural systems
OECD (1992), *Test No. 301*	*Ready Biodegradability*, OECD Guidelines for the Testing of Chemicals, Section 3, OECD Publishing, Paris, https://doi.org/10.1787/9789264070349-en

ANNEX A: REACTION TO FIRE

A.1 General

A.1.1 Principle

The determination of reaction to fire of the veture kit 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 veture kit is valid for all configurations having better performance in sense of reaction to fire.

For the particular parts of the veture kit, the following principles apply:

- Within a family of components (skin, thermal insulation and adhesives) made of the same material the component with the highest amount of organic content[9] (if there are only differences in the amount of organic content but no difference in the organic component himself) or the highest gross heat of combustion – Q_{PCS} [MJ/kg] value in accordance with EN ISO 1716 (from now on called "Q_{PCS}-value") of this organic component shall be tested.
- In addition, each component selected for testing in accordance with the previous point shall have the lowest amount of flame retardants.

Components of a kit which are classified A1 without testing in accordance with 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 in accordance with option "a)" of clause 2.2.1. They also do not need to be tested for an assessment in accordance with 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 to 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

The following parameters influence the reaction to fire behaviour:

- Type of insulation product (composition, thickness, density).
- Type of skin (composition, thickness, density).
- Type and nature of fixings and adhesives.
- Organic content (binder and any other additives) of kit components, where applicable (e.g., elements made of fibre-cement, concrete, cement bonded particle, agglomerated stone, and other materials in accordance with table 1.1.2).
- Type and amount of flame retardant[10].

  Note: Fire breaks are important for the behaviour of the whole facade veture system and cannot be assessed on the basis of SBI-testing. The influence can only be observed during a large-scale test. Therefore, breaks are not included in the mounting and fixing rules for the SBI-test.

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9 The organic content can be checked by providing the formulation or by performing suitable characterisation tests as defined by the applicable standard, or by determining the glow loss (loss on ignition (thermogravimetry, e.g., according to EN ISO 11358-1, or ash content according to EN ISO 3451-1). When information on organic content per unit is not available, the QPCS-value shall be tested to decide about the worst case.

10 The term "fire retardant" refers both to chemicals incorporated into a product composition during the manufacturing process (sometimes known as flame retardants) and to coatings applied onto a finished product, in both cases with the purpose of improving the product´s reaction to fire.

A.2 Testing in accordance with EN ISO 1182

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

Using this test, only the substantial components of the veture kit need to be tested. 'Substantial components' are defined by thickness (≥ 1 mm) and/or mass per unit area (≥ 1 kg/m^2).

In the following, the insulation product, skin, grout (where relevant) and adhesives are considered as "substantial components".

For these components, the principles specified in section A.1 shall be applied.

A.2.1 Insulation product

For veture kits expected to be classified as A1 or A2, it is anticipated that only insulation products with reaction to fire class A1 or A2 will form the insulation layer. For testing the insulation product, complementary indications, if given in the applicable harmonised product standards, shall be followed and references to them included.

A.2.2 Skin-cladding

For veture kits expected to be classified as A1 or A2, it is anticipated that only skin materials with reaction to fire class A1 or A2 will form the skin. For testing the skin-cladding, complementary indications, if given in the applicable harmonised product standards, shall be followed and references to them included.

A.2.3 Skin-renders, grout and adhesives

The reaction to fire behaviour of the renders, grout (where relevant) and adhesives not falling under Commission Decision 96/603/EC, as amended by Commission Decisions 2000/605/EC and 2003/424/EC, shall be tested, taking into account the principles indicated in section A.1.

The test results can be directly applied to all variants with the same render, grout and adhesive with lower amount of organic components. When the subject of the directly applied result contains a flame retardant, it shall be of the same type, and its content shall be at least that of the product tested.

Differences greater than tolerances ± 10 % concerning the density shall be considered by testing the lowest and the highest density.

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 in accordance with EN ISO 1716 (Q_{PCS}-value)

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

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

Parameters relevant or applicable for this test method are composition (when performing calculation of the Q_{PCS}-value), density or mass per unit area and thickness are relevant). Discrete and non-continuous mechanical fixings and ancillary components which fulfil the conditions for small components in accordance with clause A.6 shall not be considered for testing and for the calculation of the Q_{PCS}-values.

A.3.1 Insulation product

For testing the insulation product, complementary indications, if given at the applicable harmonised product standards, shall be followed and references to them included.

It is not realistic to require that each insulation product of the same type of material shall be tested within the classification of a veture kit. If the insulation products are of different thickness, density and formulation from those used in the testing, these may be used subject to the requirements of class A1 and A2 still being fulfilled. It shall be proved that the veture kit, together with the actual insulation product used in end use application, fulfils the requirements concerning the Q_{PCS}-value of the whole product. For example, it is sufficient to determine the Q_{PCS}-value of the mineral wool and if this is lower than the originally tested product then it is acceptable to use the alternative mineral wool instead of that used in the original test.

A.3.2 Skin-claddings

For testing the skin cladding product, complementary indications, if given at the applicable harmonised product standards, shall be followed and references to them included.

It is not realistic to require that each skin of the same material is tested within the classification of a veture kit. If the skins are of different thickness, density and formulation from those used in the testing, these may be used subject to the requirements of class A1 and A2 still being fulfilled. It shall be proved by calculation that the veture kit, together with the actual skin used in end use application, still fulfils the requirements concerning the Q_{PCS}-value of the whole product. For example, it is sufficient to determine the Q_{PCS}-value of the ceramic tile and if this is lower than the originally tested product then it is acceptable to use the alternative ceramic tile instead of that used in the original test.

Note: Information relating to alternative skin of the same material to that originally tested may be evaluated on the basis of the supplier's evidence provided within the context of its CE marking.

A.3.3 Skin-renders and grout

In general, when performing calculations of the unit area referred PCS_S-value (related to the surface) the variant that provides the highest PCS_S-value shall be considered.

The test shall be performed in accordance with the principles specified in section A.1 applied to each component.

The test results are also applicable for a render or grout with different grain sizes if the organic content is the same as or lower than that of the tested component.

When the render includes a reinforcement, it shall be tested in accordance with EN ISO 1716. In case the reinforcement is randomly dispersed (e.g., fibres) in the render it shall be tested as part of the render.

The test results can be directly applied to all variants with the same render and grout but with a lower amount of organic components. When the subject of the directly applied result contains a flame retardant, it shall be of the same type and its content shall be at least that of the product tested.

A.3.4 Adhesive

For testing the Q_{PCS}-value of the adhesives of the veture kit, each product with a different formulation shall be tested by selecting the variant with the highest amount of organic components. The test results can be directly applied to all variants with the same composition but lower amount of organic components. For the case where a mortar is used as the adhesive, the rules in accordance with section A.3.3 shall be applied.

A.4 Testing in accordance with EN 13823 (SBI-test)

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

Mounting and fixing provisions for the SBI-test for veture kit are indicated in section A.4.1.

Parameters which are relevant for this test method:

- Type of skin (thickness, dimensions, and density).
- Type of grout and adhesives (composition, thickness and mass per unit area).

- Type of insulation product (thickness and density).
- Type of reinforcement mesh (composition, thickness and mass per unit area).
- Amount of organic content of each component.
- Amount of flame retardant of each component, if any.

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 in accordance with 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. Due to the possible effects of the insulation product, the following provisions are considered separately the testing of veture kit with class A1 and A2 insulation products and the testing of veture kit with class B, C, D and E insulation products.

A.4.1 Mounting and fixing provisions for the SBI-test

In this test procedure the veture kit shall be tested. The veture kit is fixed to a substrate representing that on which the veture kit is fixed in the end use application (reference is made to EN 13238). The fixing shall be made using the mechanical fixings used in the end use application. All veture kits (for vertical or sloped façades as well as for external ceilings) shall be tested in vertical position

When a plastic mechanical fixing is used the test result is valid also for metallic anchors.

The maximum testable thickness of the test specimen, including a standard substrate in accordance with EN 13238, is 200 mm. However, in practice, for many veture kit, the total overall thickness may be greater than 200 mm. In such cases, using a standard substrate, the thickness of the insulation product shall be reduced to provide for the maximum specimen thickness of 200 mm. Results obtained on an veture kit at 200 mm thickness are accepted for greater thicknesses.

The test specimen consists of a corner construction which shall be representative of the construction in practice. All edges shall be covered with the skin excluding the bottom edge and the top of the specimen. The floor of the test trolley beneath the test specimen shall be covered by an aluminium foil (see figures A.4.1.1 and A.4.1.2).

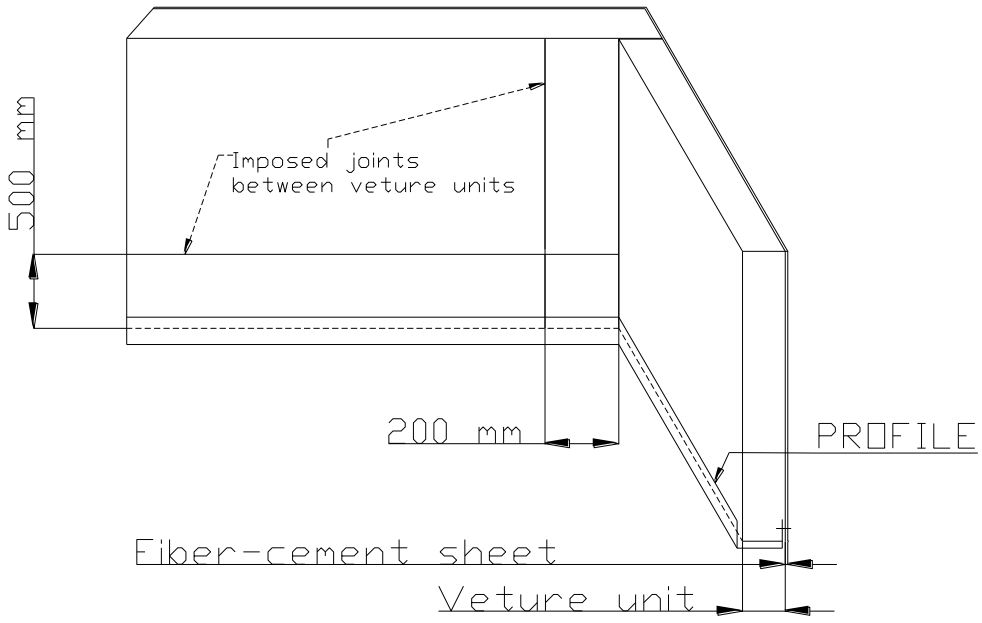
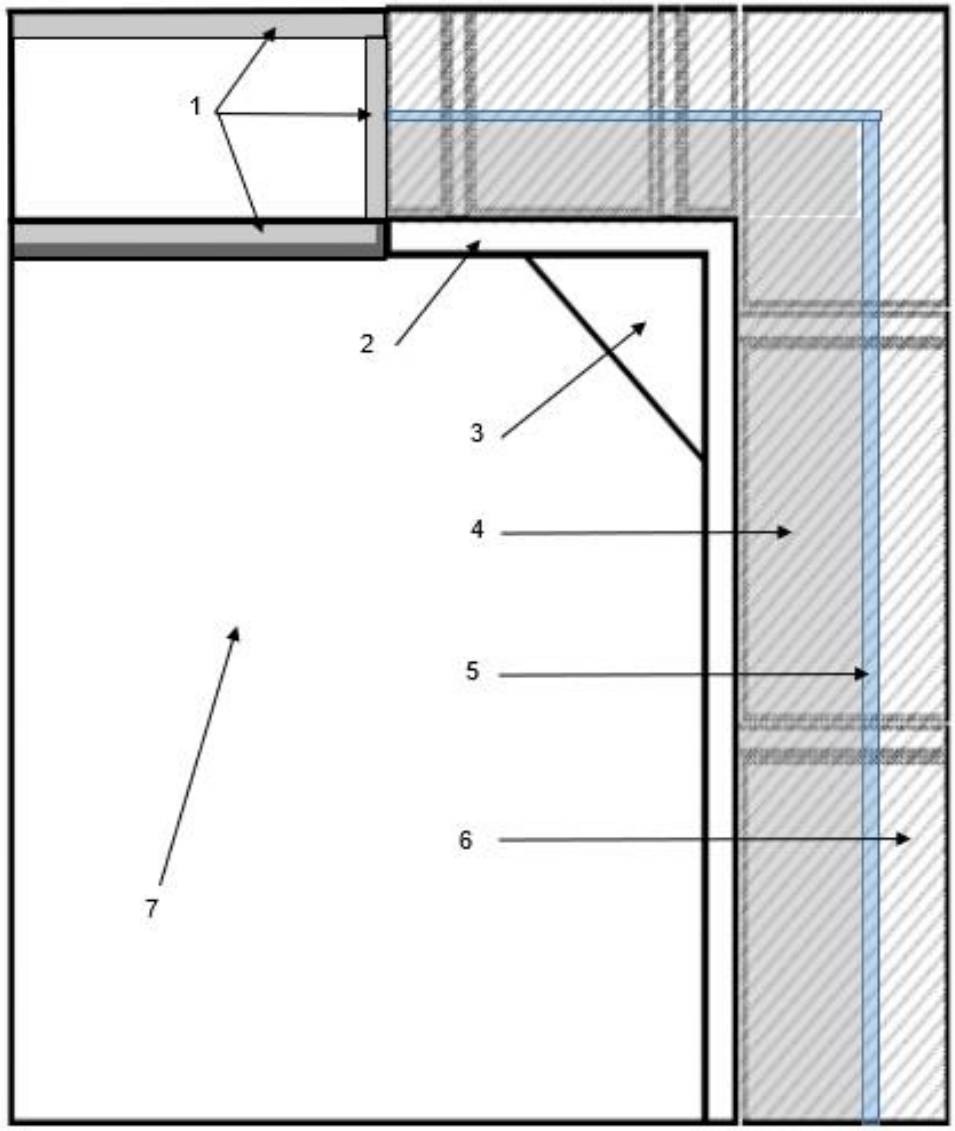


Figure A.4.1.1: Example of installation for veture kit.



1 – Calcium-silicate boards of the SBI apparatus.
2 – U-profile of the SBI apparatus.
3 – Main burner.
4 – Veture kit specimen (including substrate).
5 – Backing board of the SBI apparatus.
6 – Area below the specimen covered by aluminium foil (entire hatched area).
7 – Floor of the specimen trolley.

Figure A.4.1.2: Ground view on the specimen trolley with the areas covered by an aluminium foil (Aluminium foil covered area shown in grey hatching)

It is recommended to prepare the specimens at the lab and then put it onto the trolley (with the foil on), or the manufacturer builds the wall at the factory and carries it to the lab where it is put onto the trolley. After preparation of the test specimens they shall be conditioned in accordance with EN 13238.

A.4.2 Insulation product

For the testing of veture kit with insulation products of reaction to fire class A1 or A2, the insulation product with the highest (or highest testable) thickness, the highest density (with a tolerance of ± 10 %) and the

highest organic content (related to the mass in dried condition) shall be used for preparing the test specimen. The reaction to fire classes A1 or A2 of the insulation product shall be proven separately.

For the testing of veture kit with insulation products with reaction to fire class B, C, D or E, each type of insulation product material (i.e., EPS, XPS, PUR, and also MW in some cases) shall be tested within the system. For each type of insulation product material, the insulation product with the highest (or highest testable) thickness and the highest density (with a tolerance of ±10%) shall be used for preparing the test specimen.

For the testing of veture kit with insulation products made of phenolic resin (PF) or wood fibre (WF) each thermal insulation product with the highest and lowest density shall be used for preparing the test specimens.

For the testing of veture kit with insulation products made of expanded cork (ICB) or wood wool (WW) EN 15725 shall be used as orientation to define all specimen configurations being relevant or applicable for testing and taking into account the intended field of application of the test results.

For the testing of veture kits the following cases regarding thickness of insulation shall be considered when preparing and testing the specimens:

- The highest thickness of the insulation product in cases where the adhesive has an organic content of equal to or less than 15 % (related to the mass of dried condition and in end use application) or if only mechanical fixing devices are used and
- The highest and the lowest thickness of the thermal insulation product in cases where the adhesive has an organic content of more than 15 % (related to the mass in dried condition and in end use application).

A.4.3 Skin

For defining the most unfavourable skin for SBI test representing a range of different skins, the following rules shall be applied to identify the composition, which is able to represent a range of skins:

- The skin, grout (where relevant) and adhesive, taking account of the combination(s) to be covered by the ETA, shall be determined in accordance with the principles specified in section A.1.
- The test specimen shall be prepared with the skin, grout and adhesive with the highest organic content or Q_{PCS}-value per unit area.
    - For skin reaction to fire A1 and A2 no further specific tests are needed apart from $Q_{PCS\ VALUE.}$
    - For skin reaction to fire classes B, C, D and E, one SBI test on veture kit specimens shall be carried out on:
        - One rig composed with lowest thickness and highest density.
        - One rig composed with highest thickness and highest density.
          The worst result shall be considered for the two remaining SBI test specimens.
- For adhesives and grouts having an organic content less than or equal to 5% (related to the mass in dried condition as used in the end use application), only the lowest thickness needs to be used for preparing the test specimen.
- For adhesives and grouts having an organic content higher than 5%, one repetition of the SBI test on veture kit specimens with composed by both the lowest and the highest thickness of the layer of the adhesives and grouts shall be used for preparing the test specimens.

Regardless of the organic content, only the highest thickness of adhesives and grouts shall be tested on insulation material with class A1 or A2-s1,d0.

A.4.4 Application of test results

The test result is valid for:

- Application for walls and ceilings.
- Insulation products:

- Of the same type.
- With lower density, or the density range between those values evaluated in the tests.
- With lower thickness or between those evaluated in the tests, provided that the worst result of the two thicknesses tested is used for intermediate thicknesses.
- With equal or less organic content.

- Skin:
  - Of the same material of skin, grout and adhesive.
  - The range of skin between lowest and highest thickness / and lower density, for skin reaction to fire classes B, C, D and E.

- Components with equal or lower organic content.
- Components with equal or lower PCS_S-value per unit area.
- Components with equal or higher content of the same type of flame retardants.

A.5 Testing in accordance with EN ISO 11925-2

This test method is relevant for the classes B, C, D and E.

In this test procedure, the veture kit is tested without using a substrate. The maximum thickness of the test specimen is 60 mm. In cases where the thickness of the veture kit is larger than 60 mm, the insulation product may be reduced for the purposes of testing. The results from the testing of specimens at 60 mm are applicable to greater thicknesses.

Parameters which are relevant for this test method:

- Type of skin (thickness, dimensions and density).
- Type of grout and adhesives (composition, thickness and mass per unit area).
- Type of insulation product (thickness and density).
- Type of reinforcement mesh (composition, thickness and mass per unit area).
- Amount of organic content of each component.
- Amount of flame retardant of each component, if any.

The specimens shall be prepared in such a way that the edges are not covered with the skin (cut edges). The tests shall be performed with surface flaming of the front side and possibly edge flaming of the test specimen turned by 90° in accordance with the rules of standard EN ISO 11925-2.

A.5.1 Insulation product

An insulation product, representative in its characterisation (type, reaction to fire classification and density) for the end use application shall be used. The veture kit shall be evaluated incorporating the insulation product at the highest possible thickness and the highest and the lowest possible densities.

For veture kit with insulation products classified class E, the test results are valid only for the insulation products as used in the test. For insulation products made of polystyrene or PUR, it shall be proven separately that the product fulfils the requirements for reaction to fire class E under the following conditions: Polystyrene insulation shall be tested with the highest density and at a thickness of 10 mm for expanded polystyrene foam and at the minimum thickness produced for extruded polystyrene. The test result is valid for lower densities and higher thicknesses. PUR insulation shall be tested at the density intended for the end use and at the highest thickness. The test result is valid for PUR insulation with the same density and for lower thicknesses.

A.5.2 Skin

For testing one specific skin representing a range of different skins, the rules as mentioned in sections A.1.1 apply.

A.5.3 Application of test results

The test result covers the specimen and test arrangements as used for the test with the same type of insulation product (excluding insulation made of polystyrene or PUR) as used in the tests with thicknesses and densities as described in section A.5.1 and equal or lower organic content.

The test results from tests with insulation products made of polystyrene or PUR classified class E are valid for veture kit with insulation products as used in the test or for veture kit with any polystyrene and PUR insulation products classified class E when the test evidence in accordance with section A.5.1 was provided.

For the direct application of test results regarding skin, grout and adhesives the same rules shall apply as given in section A.4.4.

A.6 Reaction to fire of small components

A veture kit component can be considered a small component with no influence on the reaction to fire when it is made from class A1 or A2 material, or it satisfies all the following requirements (summarized also in figure A.6.1):

- It has a mass ≤ 50 g, and
- A size of ≤ 50 mm x ≤ 50 mm or a diameter of ≤ 57 mm (equal area size as for a rectangular size of ≤ 50 mm x ≤ 50 mm) and
- A distance ≥ 200 mm to similar components when:
- It forms 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
- It 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.

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.

Sealants for 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, such sealants generally cannot be considered as products having small areas and/or surfaces, nor as small components as defined above and at figure A.6.1.

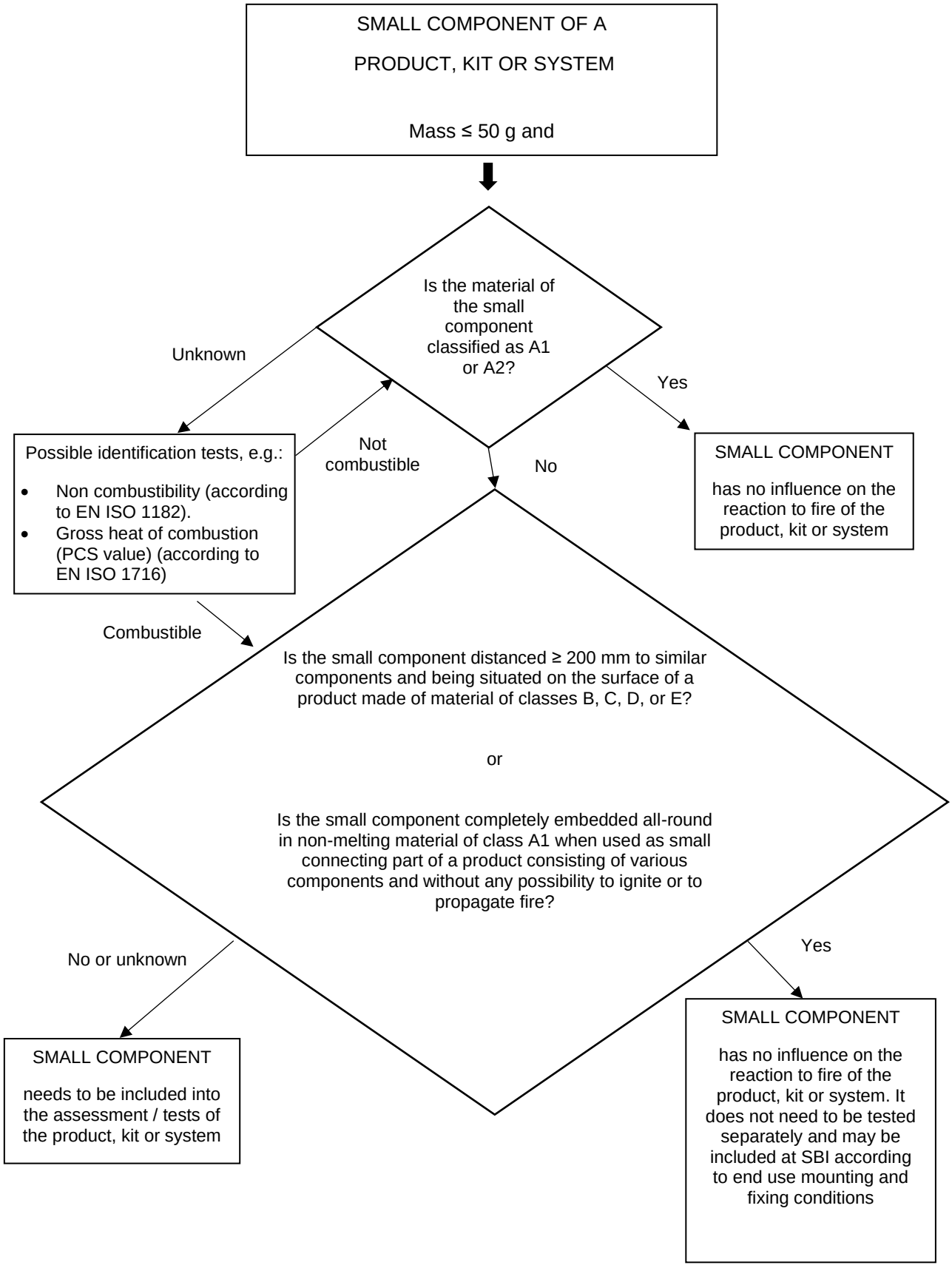


Figure A.6.1: Synopsis of small components assessment approach

ANNEX B: ASSESSMENT METHODS APPLIED IN EU/EFTA MEMBER STATES FOR ASSESSING THE FIRE PERFORMANCE OF FACADES

Country	Assessment method
Austria	ÖNORM B 3800-5
Belgium	• BS 8414-1 • BS 8414-2 • DIN 4102-20 • LEPIR 2
Czech Republic	ČSN ISO 13785-1
Denmark, Sweden, Norway	SP Fire 105
Finland	• SP Fire 105 • BS 8414
France	LEPIR 2
Germany	• DIN 4102-20 Complementary reaction-to-fire test for claddings of exterior walls, • Technical regulation A 2.2.1.5
Hungary	MSZ 14800-6:2009 Fire resistance tests. Part 6: Fire propagation test for building façades
Ireland	BS 8414 (BR 135)
Poland	PN-B-02867:2013
Switzerland, Liechtenstein	• DIN 4102-20 • ÖNorm B 3800-5 • Prüfbestimmung für Aussenwandbekleidungssysteme

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

This Annex specifies the additional provisions for specific insulation materials for determination the characteristic propensity to undergo continuous smouldering of the thermal insulation product or of the skin-cladding.

C.1 Provisions for products made of mineral wool

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 specimens:
  - 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)[11].
  - The product or product variant with the highest organic content (in percentage per mass), determined in accordance with EN 13820.
- The product or product variant with the highest density as well as a density of about 100 kg/m³ (±15 %); if this range is lower than 115 kg/m³, then only the product or product variant with the highest density. The density shall be determined in accordance with EN ISO 29470.
  - The product or product variant with the highest thickness or – if greater than 100 mm – highest testable thickness of 100 mm; (thickness determined in accordance with 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.
- Specimens without any non-substantial facings, coatings or suchlike (mass < 1 kg/m², and thickness < 1 mm), otherwise clause C.1.2 applies.

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 below).

If the highest thickness is greater than 100 mm, then the specimen thickness shall be reduced from the reverse (non-exposed) side to the maximum testable thickness of about 100 mm.

- Existing non-substantial facings, coatings or similar (mass < 1 kg/m², and thickness < 1 mm), shall be removed when preparing the test specimens.

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 be 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.

C.1.3 Extended application of test results

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

11 To permit the TAB to apply EXAP-rules for test results within the assessment, it is recommended that the manufacturer should provide (but he is not obliged to do it) 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 to reduce the number of tests required.

- 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 external non-substantial facings, coatings or suchlike (mass < 1 kg/m², and thickness < 1 mm) as defined by EN 13501-1, clause 3.1.5, otherwise clause C.1.2 applies.
- For any end-use conditions.

C.2 Provisions for products made of wood wool

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)[11].
- The product or product variant with the highest organic content (in percentage per mass), determined in accordance with EN 13820.
- The product or product variant with the highest density as well as the lowest density, determined by tests in accordance with 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 in accordance with EN ISO 29466, on at least three specimens.
- Each different produced material orientation of the wood wool / wood chips (i.e., lengthwise and crosswise to the length direction of the specimen).

- Specimens without any non-substantial facings, coatings or suchlike (mass < 1 kg/m², and thickness < 1 mm) as defined by EN 13501-1, clause 3.1.5, otherwise clause C.1.2 applies.

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 and other possible layer materials, and produced in a certain production process).
- The product or product variant with the highest as well as lowest density of the wood wool layer.
- The product or product variant with the highest thickness of the wood wool layer.
- Each different produced orientation of the wood wool 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 in accordance with 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), density determined by tests in accordance with EN ISO 29470.

- The product or product variant with the highest density as well as a density of about 100 kg/m³ (± 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/m³, then only the product or product variant with the highest density. The density shall be determined in accordance with 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.

- 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.

- Each different produced main and second layer material 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 non-substantial facings, coatings or suchlike (mass < 1 kg/m², and thickness < 1 mm).

- Existing facings or coatings shall be removed when preparing the test specimens.

C.2.2 Preparation of tests specimens

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

If the highest thickness is greater than 100 mm, then the specimen thickness shall be reduced from the reverse (non-exposed) side to the maximum testable thickness of about 100 mm.

Existing non-substantial facings, coatings or similar (mass < 1 kg/m², and thickness < 1 mm) shall be removed when preparing the test specimens.

In case of composite boards made of wood wool 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 and any other second layer material, which do not show propensity to undergo continuous smouldering, only the wood wool 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 paragraph 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., binder type and additives, wood type of the fibres, including the production process).
- With lower organic content of the wood wool layer.
- With all densities of the wood wool 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 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 fibre orientations, if all relevant orientations had been tested.
- With all orientations of the wood wool 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 external non-substantial facings, coatings or suchlike (mass < 1 kg/m², and thickness < 1 mm) as defined by EN 13501-1, clause 3.1.5.
- For any end-use conditions.

C.3 Provisions for products made of cork

C.3.1 Specimen input data

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

- 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[11].
- The product or product variant with the highest and lowest density, determined by tests according to EN ISO 29470.
- The product or product variant with the highest thickness or – if greater than 100 mm – highest testable thickness of 100 mm, determined by tests in accordance with EN ISO 29466 on at least three specimens.
- Each different produced orientation, if relevant (i. e. lengthwise and crosswise to the length direction of the product).
- Specimens without any non-substantial facings, coatings or suchlike (mass <1 kg/m², and thickness < 1 mm), otherwise, clause C.3.2 applies.

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 highest thickness is greater than 100 mm, then the specimen thickness shall be reduced from the reverse (non-exposed) side to the maximum testable thickness of about 100 mm.

Existing non-substantial facings, coatings or similar (mass < 1 kg/m², and thickness < 1 mm) shall be removed when preparing the test specimens.

If 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 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 external non-substantial facings or coatings or suchlike (mass < 1 kg/m², and thickness < 1 mm) as defined by EN 13501-1, clause 3.1.5.
- For any end-use conditions.

C.4 Provisions for products made of wood fibre

C.4.1 Specimen input data

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

- 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)[11].
- 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 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 by tests according to 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).
- Specimens without any non-substantial facings, coatings or suchlike (mass < 1 kg/m², and thickness < 1 mm) – otherwise, clause C.4.2 applies.

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 highest thickness is greater than 100 mm, then the specimen thickness shall be reduced from the reverse (non-exposed) side to the maximum testable thickness of about 100 mm.

Existing non-substantial facings, coatings or similar (mass < 1 kg/m², and thickness < 1 mm) shall be removed when preparing the test specimens.

If 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 (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 external non-substantial facings, coatings or suchlike (mass < 1 kg/m², and thickness < 1 mm) as defined by EN 13501-1, clause 3.1.5.
- For any end-use conditions.

C.5 Provisions for products made of other vegetable fibre (than wood fibre) or animal fibre

C.5.1 Specimen input data

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

- 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) [11].
- The product or product variant with the highest and lowest density, determined by tests in accordance with 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 by tests in accordance with 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).
- Specimens without any non-substantial facings, coatings or suchlike (mass < 1 kg/m², and thickness < 1 mm), otherwise, clause C.5.2 applies.

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 highest thickness is greater than 100 mm, then the specimen thickness shall be reduced from the reverse (non-exposed) side to the maximum testable thickness of about 100 mm.

Existing non-substantial facings, coatings or similar (mass < 1 kg/m², and thickness < 1 mm) shall be removed when preparing the test specimens.

If 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 product-family, including 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 external non-substantial facings, coatings or suchlike as defined by EN 13501-1, clause 3.1.5, (mass < 1 kg/m², and thickness < 1 mm).

- For any end-use conditions.

C.6 Provisions for products made of phenolic foam

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 binder and additives / treatment, and produced in a certain type of production process) [11].
- The product or product variant with the highest and lowest density, determined by tests in accordance with 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 by tests in accordance with EN ISO 29466 on at least three specimens.
- Each different produced orientation (i.e., lengthwise and crosswise to the length direction of the specimen).
- Specimens without any non-substantial facings, coatings or suchlike (mass < 1 kg/m², and thickness < 1 mm), otherwise clause C.3.2 applies.

C.6.2 Preparation of tests specimens

If the highest thickness is greater than 100 mm, then the specimen thickness shall be reduced from the reverse (non-exposed) side to the maximum testable thickness of about 100 mm.

Existing non-substantial facings, coatings or similar (mass < 1 kg/m², and thickness < 1 mm) shall be removed when preparing the test 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 paragraph 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 orientations, if all relevant orientations had been tested,
- With any external non-substantial facings or coatings or suchlike (mass < 1 kg/m², and thickness < 1 mm) as defined by EN 13501-1, clause 3.1.5.
- For any end-use conditions.

C.7 Provisions for wood-based boards / panels

C.7.1 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) [11].
- The product or product variant with the highest as well as the lowest density of the wood-based board/panel, determined by tests in accordance with EN 323.
- The product or product variant with the highest thickness of the wood-based board / panel, determined by tests in accordance with 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.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 paragraph 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 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.
- For any end-use conditions.

Note: The aforementioned provisions / model clauses of clause C.6. refer to homogenous boards / panels or non-homogenous boards / panels only with external non-substantial layers.

C.8 Provisions for factory-made products from materials other than those regulated in C.1 to C.7

C.8.1 Sample input data

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

- 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)[11].

- If applicable, at least the product or product variant with the highest organic content (in percentage per mass) determined in accordance with EN 13820 shall be taken as the critical case for testing.
- At least the product or product variant with the highest and lowest density, determined by tests in accordance with EN ISO 29470.
- At least the product or product variant with the highest thickness or – if greater than 100 mm – highest testable thickness of 100 mm, determined by tests in accordance with EN ISO 29466 on at least three specimens.
- If relevant, each different product orientation, (i.e., lengthwise and crosswise to the length direction of the specimen) shall be tested.
- Specimens without any non-substantial facings, coatings or similar (mass < 1 kg/m², and thickness < 1 mm); otherwise, clause C.8.2 applies.

C.8.2 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 highest thickness is greater than 100 mm, then the specimen thickness shall be reduced from the reverse (non-exposed) side to the maximum testable thickness of about 100 mm.

Existing non-substantial facings, coatings or similar (mass < 1 kg/m², and thickness < 1 mm) shall be removed when preparing the test specimens.

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

C.8.3 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 lower organic content.
- With all densities between those evaluated.
- With lower thickness and also with higher thickness if 100 mm thick specimens were tested.
- With all the tested product orientations.
- With any external non-substantial facings or coatings (mass < 1 kg/m², and thickness < 1 mm) as defined by EN 13501-1, clause 3.1.5.
- For any end-use conditions.

ANNEX D: WATER ABSORPTION BY CAPILLARITY TEST

D.1 Preparation of the test specimen

Test shall be carried out on at least three specimens.

Specimens shall have a surface area of at least 200 mm x 200 mm and shall be assembled according to the MPII.

The following aspects should be recorded in the test report:

- Thickness of the veture unit and of each individual layer of the specimen.
- Size of the veture unit.
- Thickness of joints between skin pieces, if relevant.
- Weight of the whole specimen.
- Summary of the manufacturer's product installation instructions used for the specimen installation.
- Technical information about the components considered in the test specimens (at least the water absorption of the skin materials, thermal insulation and grout/sealant shall be given).

The edges of the specimens (including the insulation product) shall be sealed against water, to ensure that during subsequent testing only the front face of the veture unit is subject to water absorption.

D.2 Conditioning of the specimens

The prepared specimens shall be conditioned for 7 days at (23 ± 2) °C and (50 ± 5) % RH.

They shall then be subjected to a series of 3 cycles comprising the following phases:

- Phase 1: 24 h partial immersion in a water bath (tap water) at (23 ± 2) °C.

  The specimens shall be immersed face downwards to a depth of 2 to 10 mm; the depth of immersion depends upon surface roughness. To achieve complete wetting of rough surfaces, the specimens shall be tilted as they are introduced into the water. The depth of immersion can be regulated in the water tank by means of a height-adjustable slat.

- Phase 2: 24 h drying at (50 ± 5) °C.

  If interruptions are necessary, e.g., at weekends or holidays, the specimens shall be stored at (23 ± 2) °C and (50 ± 5) % RH after the drying at (50 ± 5) °C.

After the cycles, the specimens shall be stored for at least 24 h at (23 ± 2) °C and (50 ± 5) % RH.

D.3 Test procedure

To start the capillarity test the specimens shall again be immersed in a water bath as described above.

The specimens shall be weighed after 3 minutes immersion in the bath (reference weight) and then after 1 hour and 24 hours. Prior to the second and subsequent weighing, water adhering to the surface of the specimen shall be removed with a damp sponge cloth.

D.4 Test results

Calculation shall be undertaken to determine the mean value of water absorption per square metre after 3 minutes, 1 hour and 24 hours of the three specimens.

ANNEX E: WATER VAPOUR PERMEABILITY

E.1 General

Input data for calculation is the water vapour permeability of the veture unit components (see clause 2.2.6.2). This data can be expressed by means of one of the following terms:

- Water vapour diffusion resistance factor, μ.
- Water vapour diffusion-equivalent air layer thickness, S_d, in [m].
- Water vapour diffusion resistance, Z, in [$m^2 \cdot s \cdot Pa/kg$].
- Water vapour permeance, W, in [$kg/(m^2 \cdot s \cdot Pa)$].

The related equations are:

$Z = 1/W$; $Z = (d \cdot \mu)/\delta_a$; $Z = S_d/\delta_a$; $\mu = \delta_a/\delta$; $S_d = \mu \cdot d = \delta_a \cdot Z$;

where:

d = thickness of layer [m].

δ_a = water vapour permeability of the air [kg/(m·s·Pa)], see section 6.2 of EN ISO 13788. $\delta_a = 2{,}0 \cdot 10^{-10}$ kg/(m·s·Pa) shall be used as reference value.

δ = water vapour permeability [kg/(m·s·Pa)].

E.2 Calculation procedure

The water vapour diffusion resistance Z of veture units shall be calculated by the addition of water vapour diffusion resistance of the different layers:

- In the case of continuous skin (render):

  $Z_{VET\text{-}unit} = Z_{skin} + Z_{insulation}$

- In the case of skin-claddings:

  $Z_{VET\text{-}unit} = Z_{skin} + Z_{skin\text{-}attachment} + Z_{insulation}$

  When relevant, because the skin may consist of the cladding piece and the grout of the joints, the water vapour diffusion resistance, Z_{SKIN}, shall be calculated by proportionality of the areas of both components.

  $$\frac{1}{Z_{skin}} = \frac{P_{cladd}}{Z_{cladd}} + \frac{P_{joint}}{Z_{grout}}$$

  Where:

  P_{cladd} = percentage surface of cladding piece (%)

  P_{joint} = percentage surface of joints (%)

The water vapour diffusion resistance Z of veture kit shall be calculated by proportionality of the areas of both components (veture unit and fixing device).

$$\frac{1}{Z_{veture}} = \frac{P_{VET\text{-}unit}}{Z_{VET\text{-}unit}} + \frac{P_{Fixing}}{Z_{Fixing}}$$

Where:

$P_{VET\text{-}unit}$ = percentage surface of veture units (%)

P_{Fixing} = percentage surface of fixings (%)

ANNEX F: ACCELERATED AGEING PROCEDURES

This Annex describes three types of accelerated ageing tests, which are:

1. Hygrothermal behaviour test (see clause F.1), which includes

- Heat-rain cycles,
- Heat-cold cycles.

2. Freeze-thaw behaviour test (see clause F.2).

The principle is to determine the effects of accelerated ageing procedures on the kit.

After the accelerated ageing procedures, bond strength tests (see clause 2.2.10) shall be carried out on samples taken of the test specimens.

F.1 Hygrothermal behaviour test

F.1.1 Principles related to the preparation of the specimen

The veture kit shall be installed, in accordance with the manufacturer's product installation instructions, onto a sufficiently stabilised masonry or concrete substrate (minimum 28 days).

The test wall shall have one or two openings (depending on the number of rendering system configurations that are to be tested) positioned as given in the figures F.1.1.1. The dimension of the weather surface of the test wall shall be:

- Width: ≥ 2.50 m (for one opening) or ≥ 3.00 m (for two openings).
- Height: ≥ 2.00 m.

The openings shall be at the upper part of the test wall, positioned at a distance ≥ 0.40 m from the edges (preferably positioned as shown in figures F.1.1.1, for one and two openings). The openings shall have a width and a height of (0.5 ± 0.1) m.

The configuration of the specimen shall be decided according to the following rules:

- At least the worst case (e.g., maximum water absorption, minimum bond strength, minimum thickness of the components, etc.,) of the kit shall be tested.
- As general rule, for each opening, only one thermal insulation material and one skin material shall be used for the specimen.
- Not more than two skins (different skin pieces size of the same material) can be applied per opening in the test wall (vertical divisions). Maximum two configurations in the case of one opening (see figure F.1.1.1a) and maximum four configurations in the case of two openings (see figure F.1.1.1b).

Special methods for reinforcing corners of the opening shall be applied, if necessary, according to the relevant design details provided by the manufacturer´s MPII.

Installation of the window sill and other ancillary materials shall be carried out according to the relevant design details provided by the manufacturer´s MPII.

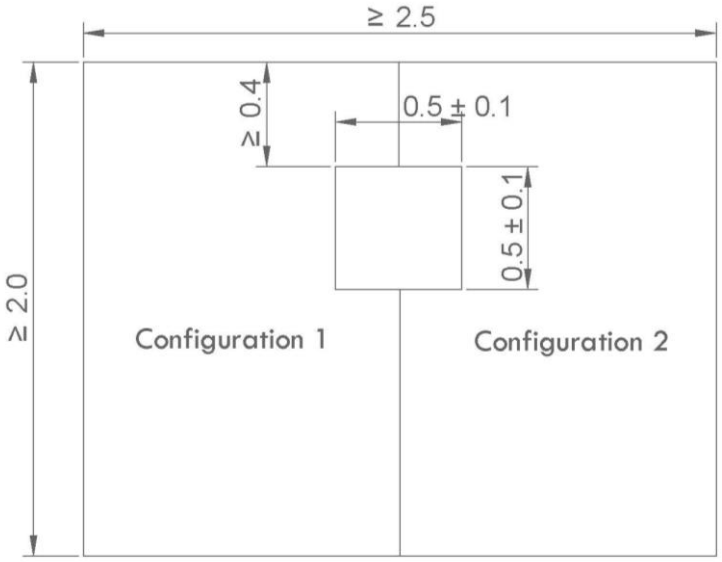


Figure F.1.1.1a: Example of hygrothermal behaviour test specimen with one opening (dimensions in metres).

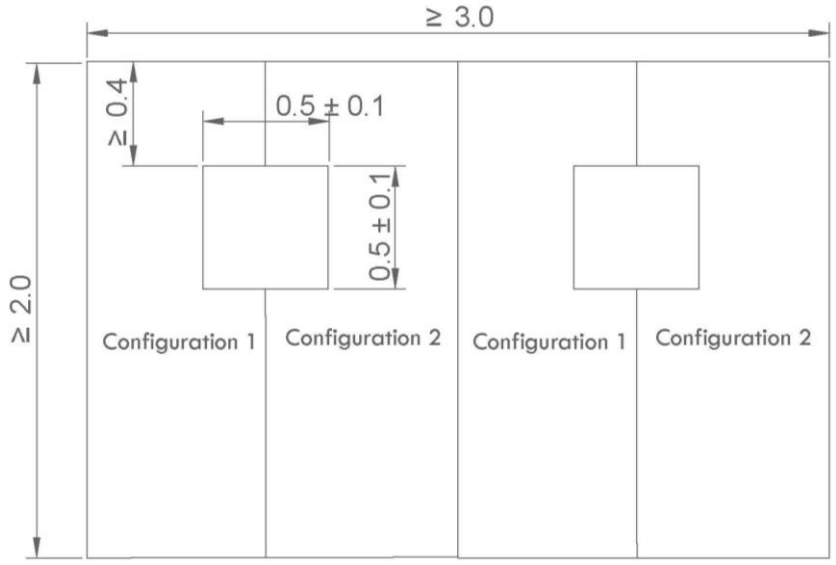


Figure F.1.1.1b: Example of hygrothermal behaviour test specimen with two openings (dimensions in metres).

F.1.2 Preparation of the specimen

The preparation of the specimen shall be carried out by the manufacturer and be supervised by the laboratory in charge of the test, regarding:

- Checking of the respective manufacturer prescriptions: All stages shall be in accordance with the technical documentation of the manufacturer.
- Registering of all the stages of the installation:
  - The date and time of the various stages.
  - Temperature and % RH during the installation (every day – at least at the beginning).
  - Name and production lot of the components,
  - Figure describing the specimen (place of the kit and of the joints, etc.).
  - Use and position of accessories.
  - Any other relevant information.

F.1.3 Hygrothermal cycles

The test apparatus is positioned against the front face of the specimen, 0.10 m to 0.30 m from the edges.

The specified temperatures during the cycles shall be measured at the surface of the specimen. The regulation shall be obtained by adjustment of the air temperature.

Heat - rain cycles:

The specimen shall be subjected to a series of 80 cycles, comprising the following phases:

1. Heating to 70°C (rise for 1 hour) and maintaining at (70 + 5) °C and 10% to 30% RH for 2 hours (total of 3 hours).
2. Spraying for 1 hour, water temperature (15 ± 5) °C, amount of water (1.5 ± 0.5) l/m² min.
3. Leave for 2 hours (drainage) at (20 ± 5) °C.

Heat-cold cycles:

After at least 48 hours of subsequent conditioning at temperatures (20 ± 10) °C and a minimum relative humidity of 50%, the same test specimen shall be exposed to 5 heat/cold cycles of 24 hours comprising the following phases:

1. Exposure to (50 ± 5) °C (rise for 1 hour) and maximum 30% RH for 7 hours (total of 8 hours).
2. Exposure to (- 20 ± 5) °C (fall for 2 hours) for 14 hours (total of 16 hours).

F.1.4 Observations during the tests

At periods of every four cycles during the heat/rain cycles and at every cycle during the heat/cold cycles, observations relating to a change in characteristics or performance (blistering, detachment, crazing, loss of adhesion, formation of cracks, etc.) of the veture units shall be recorded as follows:

- The skin surface of the kit shall be examined to establish whether any cracking has occurred. The dimensions and position of any cracks should be measured and recorded.
- The surface shall also be checked for any blistering or peeling, and the location and extent should again be recorded.
- The sills and profiles shall be checked for any damage/degradation together with any associated cracking of the finish. Again, the location and extent shall be recorded.

Following the completion of the test, a further investigation shall be conducted involving removal of clauses containing cracks to observe any water penetration within the kit (e.g., back of the veture unit).

F.1.5 After the cycles

After the heat-rain and heat-cold cycles, bond strength tests (see clause H.1 of Annex H) shall be carried out on samples taken from the test specimens.

These tests shall be performed after at least 7 days drying.

F.1.6 Test report

The test report shall detail at least the following:

- Observations recorded during the test (see clause F.1.4).
- Photos to detail the damages occurred on each specimen after the cycles and, if necessary, after each visual inspection.

F.2 Freeze-thaw behaviour test

The freeze-thaw test shall be carried out as determined by the analysis of the capillarity test, i.e., shall be carried out except when the water absorption after 24 hours is less than 0.5 kg/m².

F.2.1 Test specimen preparation

The test shall be carried out on either on a full-scale specimen or on a small-scale specimen.

In the case of full-scale, the specimen shall be carried out in accordance with clauses F.1.1 and F.1.2.

In the case of small-scale specimens of size 500 mm x 500 mm shall be prepared according to the manufacturer's product installation instructions and then stored for at least 28 days at (23 ± 2) °C and (50 ± 5) % RH.

At least three specimens shall be tested for each case.

The edges of the specimens (including the thermal insulation) shall be sealed against water.

Veture unit quantities and dimensions shall be recorded.

F.2.2 Freeze-thaw cycles

The specimens shall be subjected to a series of 30 cycles comprising:

1. Exposure to water for 8 hours at (23 ± 4) °C by immersion of the specimens, with the skin submerged in a water bath, in accordance with the method described in clause D2, phase 1.

2. Freezing to (-20 ± 2) °C (fall for 2 hours) for 14 hours (total of 16 hours).

If the test is interrupted, because the specimens are handled manually and there are stops during weekends or holidays the specimens shall always be stored at a temperature of (- 20 ± 2) °C between the cycles.

Remark: The specified temperatures shall be measured at the surface of the samples. The regulation shall be obtained by conditioned air.

F.2.3 Observations

At the end of the test, observations relating to a change in characteristics of the surface or to the behaviour of the kit shall be recorded in accordance with clause F.1.4.

Any distortion at the edges of the samples shall also be reported.

F.2.4 After the cycles

After the freeze-thaw cycles, bond strength tests (see clause H.1 of Annex H) shall be carried out on each specimen submitted to freeze-thaw cycles.

These tests shall be performed after at least 7 days drying.

F.2.5 Test report

See clause F.1.6.

ANNEX G: WIND SUCTION AND PRESSURE LOAD TESTS

The principle is to establish the effects of wind loads on the assembled veture kit.

The number of tests depends on the combination of parameters presented for the assembled veture kit.

As a minimum, the mechanically weakest design shall be tested.

G.1 Wind suction test

G.1.1 Preparation of the test specimen

The test specimen shall be mounted in the test equipment in accordance with the manufacturer product installation instructions.

The test specimen is defined as follows:

- A non-airtight substrate (test rig) such as wood or steel rigid frame. Masonry or concrete wall may also be used as substrate; however, they have to include at least one hole per square metre with a minimum diameter of at least 150 mm.
- The assembled veture kit shall be fixed to the test rig.
- The dimensions of the test specimen depend on the size of veture unit and the specified fixings devices:
  - If the veture units are mechanically fixed independent of each other (e.g., family B), at least one veture unit shall be tested.
  - If the veture units depend on each other vertically and horizontally (e.g., families A or C), at least 3 x 3 veture units shall be tested.
  - If the veture units depend on each other vertically or horizontally (e.g., family D), at least 4 veture units shall be tested.
- To define the mechanically weakest design the following aspects shall be considered:

  The mechanically weakest skin and thermal insulation product (e.g., minimum thickness, minimum resistance of the grooves, etc.)

  Density of veture fixing devices (e.g., minimum density).

  The tolerances due to manufacturing and/or installation and deformations due to temperature and humidity variations shall be taken into account.

  The mechanical properties of the kit components used for the test shall be known and indicated in the test report.

G.1.2 Test equipment

The test equipment consists of a suction/pressure chamber (see figure G.1.2) against which the assembled veture kit is placed. The depth of the chamber shall be sufficient for a constant pressure or suction to be exerted on the test specimen applied to the assembled veture kit irrespective of its possible deformation. The chamber shall be mounted on a rigid frame. The assembled veture kit acts as the seal between the chamber and the environment. The connection between the assembled veture kit and the chamber shall be sufficient to allow a realistic deformation of the test specimen under the influence of simulated wind suction/pressure.

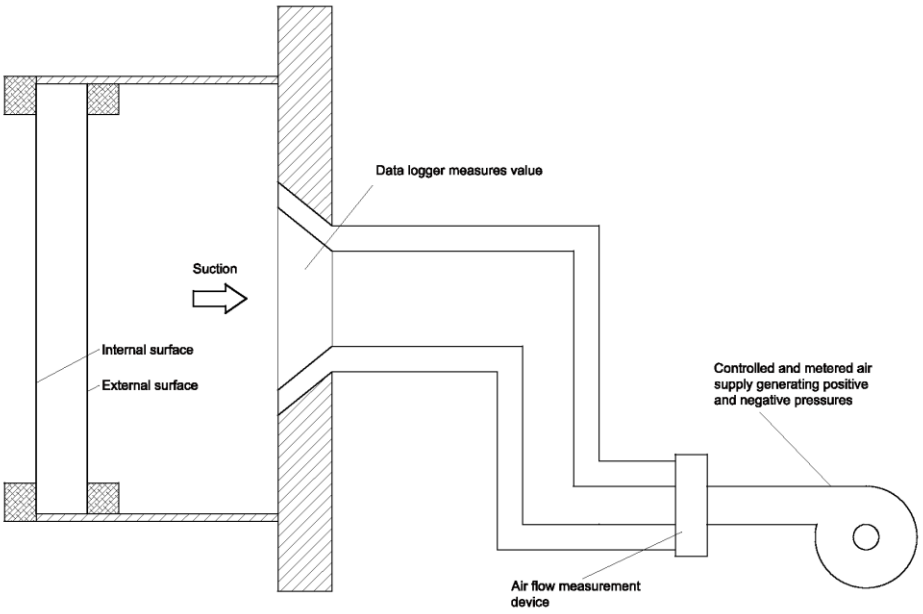


Figure G.1.2.1: Example of wind pressure and suction apparatus.

G.1.3 Test procedure

The uniformly distributed loads shall be exerted on the surface of the assembled veture kit. The test shall be performed in successive steps (two steps of 300 Pa, one step of 500 Pa and one step of 1000 Pa, then steps of +200 Pa or thereafter; at each step the load shall be maintained constant for at least 10 seconds for measuring instantaneous deflections.

With the differential pressure reduced to zero after each step (see figure G.1.6) the permanent deflection shall be noted after 1 minute recovery.

Both type of deflections (instantaneous and permanent) shall be measured, at the relevant points (e.g., central point of the veture unit, border or corner of the veture unit, etc.), as a function of the load and reported in tabular or graphic form. In particular, wind loads reaching or overcoming permanent deformations of 1 mm, 1.5 mm, 2.00 mm, 2.5 mm and 3.00 mm (if failure does not occur). These load values shall be stated in the ETA.

The test shall then be continued until failure occurs. The pressure at which defect or damage occurs shall be noted and stated at the ETA.

Additionally, when it is observed a greater recovery behaviour or when permanent deflection bigger than 3 mm occurs, the final permanent deflection which occurs 1 hour after failure shall be noted and stated in the ETA.

The fixings between the assembled veture kit and the test equipment shall not constitute weak points and shall, therefore, be chosen accordingly. The test shall be repeated if an incorrect failure mode occurs during testing, using additional fixings or different fixings.

G.1.4 Observations during the test

Failure is defined by any of the following events:

- Any veture unit or fixing device breaks.
- Delamination occurs in the insulation product or in the skin-attachment.
- Any veture unit or fixing device presents a significant permanent deflection.

- Any detached components fall off.
- Any veture unit is pulled of a fastener.
- Permanent deflection bigger than 3 mm.

G.1.5 Test results

The test result is:

- The instantaneous and permanent deformations per relevant and load pressure steps
- The loads pressures that reach or overcome permanent deformations of 1 mm, 1.5 mm, 2.00 mm, 2.5 mm and 3.00 mm
- The failure load Q.
- The type of failure.
- The value of maximum permanent deflection (after 1 minute recovery), the maximum deflection of the test specimen and the load and sensor position for this maximum permanent deflection and maximum deflection.

G.1.6 Test specimen description

It is necessary to describe the test specimen by giving details about:

- Veture units (materials and geometry).
- Fixing devices (material and geometry and number and disposition of fixings).
- Fixings between the test equipment and the assembled veture kit (position, generic type, material and geometry).
- Any type of grout or sealant used in the joints between the veture units.

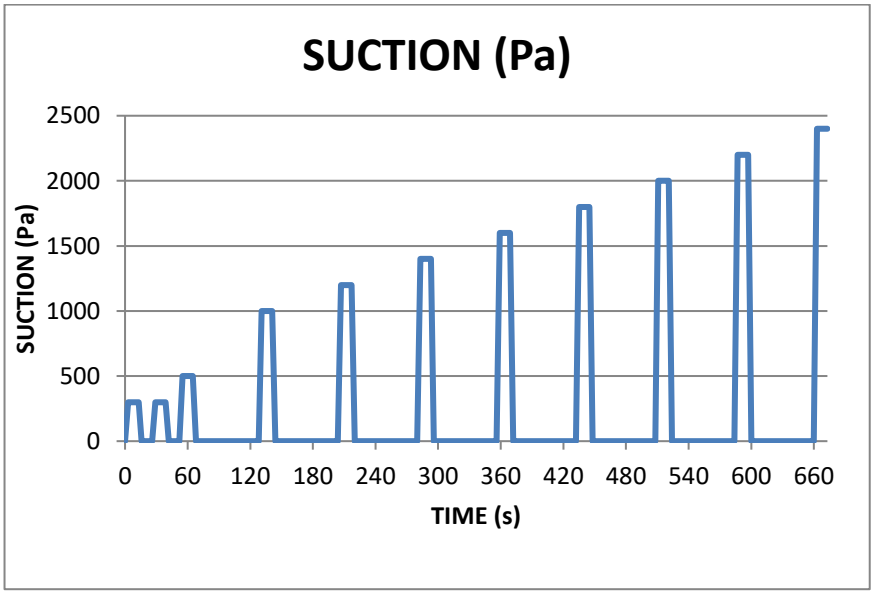


Figure G.1.6.1: Example of wind load steps.

G.2 Fatigue test

G.2.1 Preparation of the test specimen

See clause G.1.1.

G.2.2 Test equipment

See clause G.1.2.

G.2.3 Test procedure

The loads shown in the figure G.2.5.1 shall be applied, each gust having the profile shown.

The maximum suction of each cycle shall be $W_{100\%}$ and is defined in the following table:

Table G.2.3.1: Maximum suction of the cycles $W_{100\%}$.

Number of cycles	Maximum suction in kPa
4	1.0
1	1.5
1	2.0
1	2.5
1	3.0
1	3.5
1	4.0
1	etc.

The specimen shall be tested until failure. Failure is defined by any one of the events defined in clause G.1.4.

G.2.4 Test results

The test result is:

- The failure load Q1 is the $W_{100\%}$ load in the cycle preceding that in which the test specimen fails.
- The type of failure.

G.2.5 Test specimen description

See clause G.1.6.

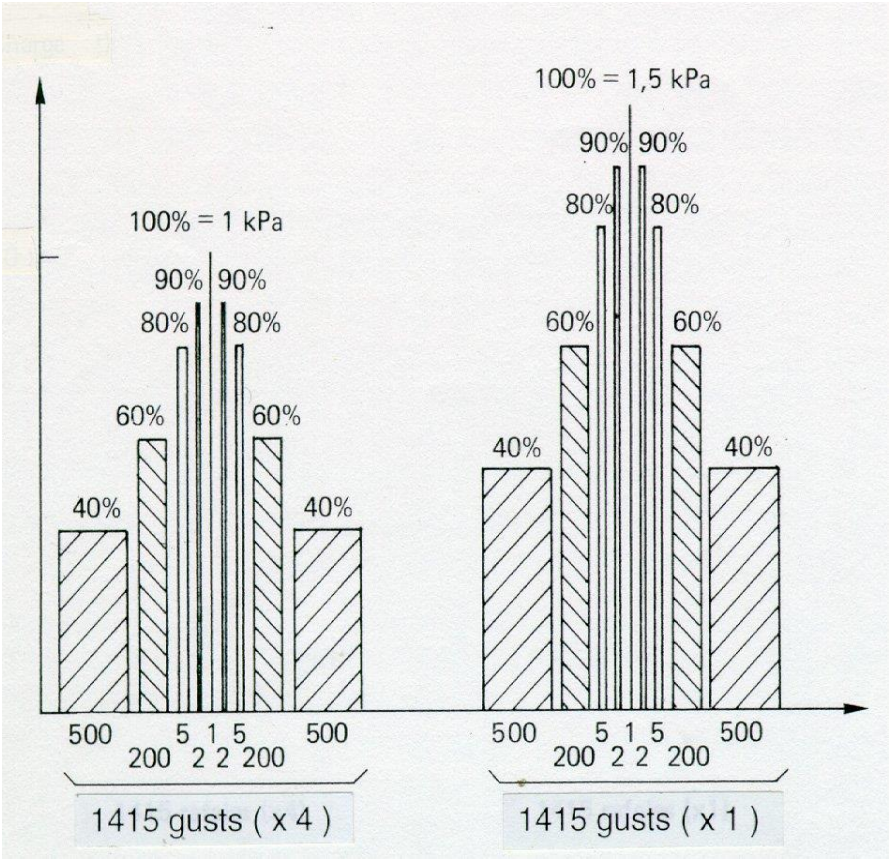


Figure G.2.5.1: Fatigue loads to be applied.

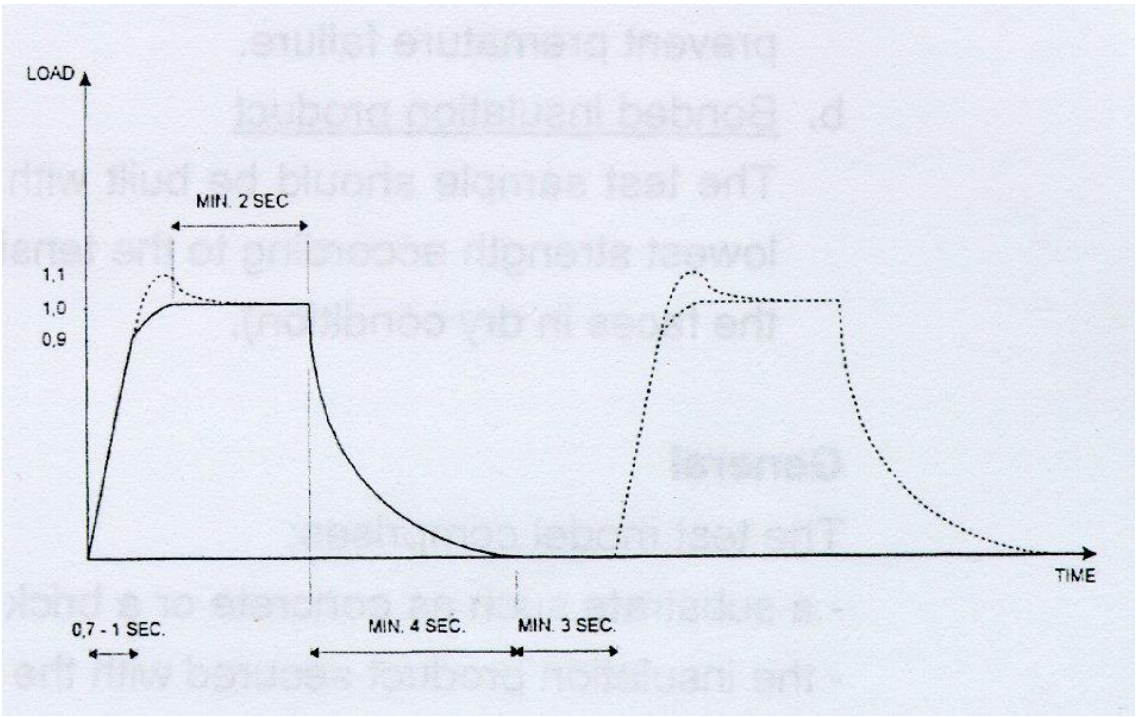


Figure G.2.5.2: Pressure/time profile of cyclic loads.

ANNEX H: BOND STRENGTH TEST

H.1 Between skin and thermal insulation

This test is only applicable to veture kits in which the veture unit is formed of a skin adhesively attached to the thermal insulation product (see clause 1.3.3.3).

This test shall be carried out in normal conditioning (without ageing) and, when relevant, after respective cycles described at clauses F.1.5, F.2.4 and F.3.3 of Annex F.

H.1.1 Preparation of the test specimen

Veture units samples with appropriate size to obtain the cut specimens shall be prepared according to the manufacturer's instructions.

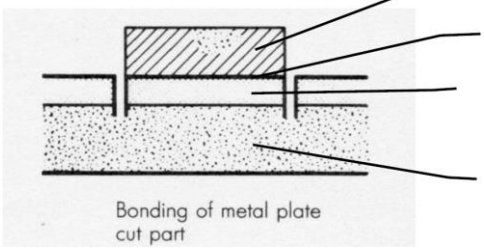
Samples shall be conditioned at (23 ± 2) ºC and (50 ± 5) % RH until constant mass.

Test shall be carried out on at least 5 specimens obtained by cut-out from the large sample size.

Each specimen shall have a square surface with the following dimensions depending on the thermal insulation product material used in the veture unit:

- For mineral wool: 200 mm x 200 mm.
- For cellular plastic (see table 1.1.2): 50 mm x 50 mm.

The square specimens shall be cut through the skin and just into the insulation product using an angle grinder. At least 50 mm of distance is necessary between each square specimen and with the border of the sample. Square metal plates of appropriate size shall be affixed to these areas with a suitable adhesive (see figure H.1.1.1).



Test square

Bonded joint

Skin or veture or adhesive (according to type of test)

Test substrate (concrete or thermal insulation according to type of test)

Figure H.1.1.1: Example of test device.

H.1.2 Test procedure

The bond strength test (see figure H.1.1.1) shall be performed at a tensioning speed between 1 to 10 mm/minute.

H.1.3 Test results

The test results are:

- Each individual value R_i (in kPa).
- The mean value, R_m (in kPa) and the characteristic value, R_C (in kPa) in accordance with Annex O.
- The type of failure (cohesive rupture and/or adhesive rupture).

H.2. Between adhesive and substrate

H.2.1 Preparation of test specimen

The tests shall be performed on the following substrate:

- A substrate consisting of a smooth concrete slab at least 40 mm thick. The water/cement ratio shall be of the order of 0.45 to 0.48. The tensile strength of the slab shall be at least 1.5 N/mm^2. The moisture content of the slab prior to the test shall be a maximum of 3 % of the total mass.

Additionally:

- For cement-free adhesive the most absorbent substrate of those to be covered by the ETA: masonry (clay, concrete or stone), concrete (cast on site or as prefabricated panels), which may be faced with mineral or organic renders or paints.

The adhesive shall be spread on the substrate. The thickness shall be between 3 and 5 mm, unless another range of values (e.g. lowest and highest thicknesses) as given in the MPII shall be assessed. After allowing the adhesive to cure at (23 ± 2)°C and (50 ± 5) % RH for at least 28 days, 15 squares with an area between 15 and 25 cm^2 are cut through the adhesive in accordance with figure H.1.1.1. Metal plates of appropriate size are bonded to the squares using a suitable adhesive.

H.2.2 Test procedure

The pull-off test (see figure H.1.1.1) shall be performed at a tensioning speed between 1 to 10 mm/minute.

H.2.3 Test results

The test results are:

- Each individual value R_i (in kPa).
- The mean value, R_m (in kPa) and the characteristic value, R_C (in kPa) in accordance with Annex O.
- The type of failure (cohesive rupture and/or adhesive rupture).

H.3 Between the adhesive and the rear side of the insulation

H.3.1 Preparation of test specimen

The adhesive shall be spread on the insulation product. The thickness shall be between the lowest and the highest thickness values. After allowing the adhesive to cure at (23 ± 2)°C and (50 ± 5) % RH for at least 28 days, 15 squares, with appropriate specimen size shall be cut through the adhesive in accordance with figure H.1.1.1 using an angle grinder. The dimensions should be the same as the specimens for testing the tensile strength perpendicular to the faces in accordance with the respective technical specification of the insulation product (harmonised standard or ETA in accordance with EAD). If a technical specification for thermal insulation products does not define the size of specimens, the dimension of specimens shall be 200x200 mm. Square metal plates of appropriate size shall be affixed to these areas with a suitable adhesive.

H.3.2 Test procedure

The pull-off test (see figure H.1.1.1) shall be performed with the same conditions as described in Clause H.1, (5 samples each):

- Without supplementary conditioning (dry condition).

- After immersion of the adhesive in water for 2 days and 2 h drying at (23 ± 2)°C and (50 ± 5)% RH.
- After immersion of the adhesive in water for 2 days and at least 7 days drying at (23 ± 2)°C and (50 ± 5)% RH.

H.3.3 Test results

The test results are:

- Each individual value R_i (in kPa).
- The mean value, R_m (in kPa) and the characteristic value, R_C (in kPa) in accordance with Annex O.
- The type of failure (cohesive rupture and/or adhesive rupture).

ANNEX I: PULL-THROUGH RESISTANCE TESTS

I.1 PULL-THROUGH RESISTANCE TEST THROUGH THE INSULATION PRODUCT

This test is only applicable for veture kits with mechanical fixings through the insulation product (family B, see table 1.1.1).

The test shall be performed in ambient conditions.

At least 5 specimens shall be tested.

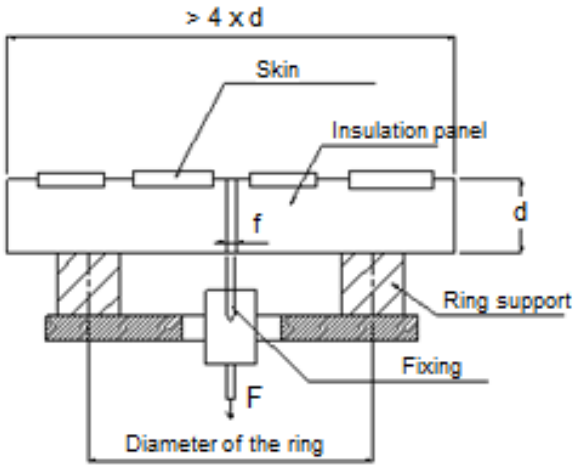
Specimens with a fixing driven through the centre of each sample are applied as show in figure I.1.1.

A force shall be exerted, at a speed rate of 10 mm/min on the fixing through the insulation product until failure. The force can be applied either by pushing on the head of the fixing or pulling the end of the fixing.

The test results are:

- Each individual value, F_i (in N).
- The mean value, F_m (in N) and the characteristic value, F_C (in N) in accordance with Annex O.
- The mode of failure description.

The mechanical properties of the kit components used for the test shall be known and indicated in the test report. As minimum, mean tensile strength of the insulation (TR), and mean compression strength of the insulation (CS) in accordance respectively with EN ISO 29766 for tensile strength and EN ISO 29469 for compression strength.



d = thickness of the insulation product

f = diameter of the fixing

Diameter of the ring: > 3 x d + f and > 150 mm

Ring support width: ≥ 50 mm

Figure I.1.1: Example of test specimen

I.2 PULL-THROUGH RESISTANCE TEST THROUGH THE SKIN

This test is only applicable for veture kits with mechanical fixings through the skin (family D, see table 1.1.1).

The test shall be performed in ambient conditions.

At least 5 specimens of veture units shall be tested.

Specimens, measuring 200 mm x 100 mm x the thickness of skin, with a fixing shall be applied to a rigid substrate as show in figure I.2.1. Ring shaped bearers immobilized by clamps shall be used to hold temporary the specimen fixed as clamping pressure, avoiding its movements during test.

A force shall be exerted, at a speed rate of 10 mm/min on the fixing through the skin until failure. The force can be applied either by pushing on the head of the fixing or pulling the end of the fixing.

The test results are:

- Each individual value, F_i (in N).
- The mean value, F_m (in N) and the characteristic value, F_C (in N) in accordance with Annex O.
- The mode of failure description.

The mechanical properties of the kit components used for the test shall be known and indicated in the test report. As minimum:

- Mean tensile strength or mean flexural strength (when tensile strength is not relevant for identification of the material) according to the corresponding clause of the applicable harmonized standard or EAD as defined at table 1.1.2
- Mean compression strength of the insulation (CS) in accordance respectively with EN ISO 29766 for tensile strength and EN ISO 29469 for compression strength.
- Mean tensile strength of the fixing shall be stated, according to the test specified at the applicable standard (respective clauses of EN ISO 898-1 for fixings made of carbon steel and alloy steel) and of EN ISO 3506-1 for fixing element made of stainless steel).

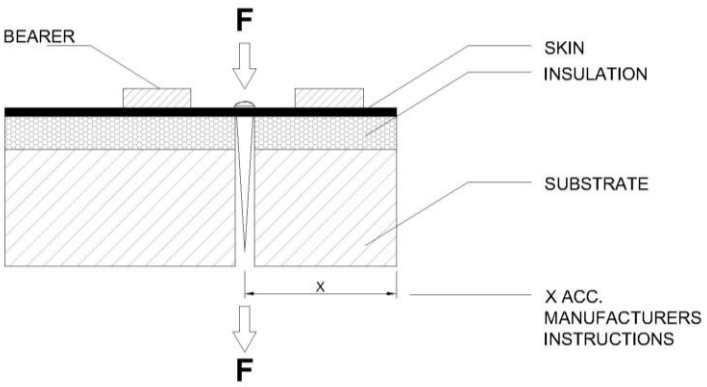


Figure I.2.1: Example of test specimen

I.3 PULL-THROUGH RESISTANCE TEST THROUGH THE FIXING DEVICE

This test is only applicable for veture kits with mechanical fixing devices in accordance with families A and C (see table 1.1.1).

This test establishes the pull-through resistance of an anchor through the perforation in the profile/rail fixing device.

At least 5 specimens with an anchor placed perpendicular to the fixing device as described in figure I.3.1shall be tested.

The dimensions of the specimen depend on the type of fixing device:

- In the case of rail profiles or linear fixings: 300 mm ± 20 mm and perforated in the centre using a drill if no predrill hole is on the profile.
- In the case of small rails or punctual fixings: one complete fixing and perforated in the centre using a drill if no predrill hole is on the profile.

Test specimens shall be conditioned for at least 2 hours at (23 ± 2) °C before the test.

The apparatus consists of:

- A dynamometer.
- A test support as shown in figure I.3.1, depending on the type of test indicated above.

The test shall be performed in ambient conditions.

The test shall be carried out using a tensioning speed of 20 ± 1 mm/min. When it is observed that the test specimen behaviour is affected by this tensioning speed (e.g., there is no accurate force/displacement measurements, lower speeds, not less than (5 ± 0.5 mm/min) shall be considered.

The test results are:

- Each individual value, F_i (in N).
- The mean value, F_m (in N) and the characteristic value, F_C (in N) in accordance with Annex O.
- The mode of failure description.

The mechanical properties of the kit components used for the test shall be known and indicated in the test report. As minimum, the mean tensile strength of the fixing shall be stated, according to the test specified at the applicable standard (respective clauses of EN ISO 898-1 for fixings made of carbon steel and alloy steel) and of EN ISO 3506-1 for fixing element made of stainless steel).

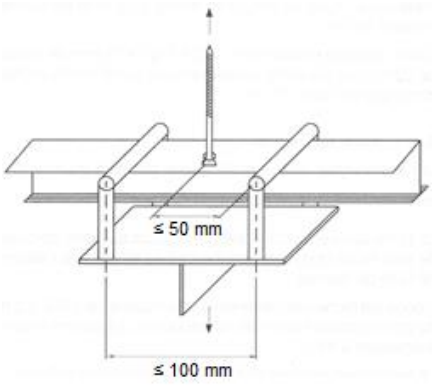


Figure I.3.1: Example of test specimen

ANNEX J: MECHANICAL RESISTANCE TESTS FOR CONNECTIONS BETWEEN KIT COMPONENTS

J.1 RESISTANCE TEST OF THE GROOVED INSULATION PRODUCT

This test is only applicable for veture kits with a grooved insulation product which fits onto a fixing device as shown in figure J.1.1.

The test shall be performed in ambient conditions.

The grooved insulation specimens (two fragments of insulation) are simply fixed to a rigid substrate with ring shaped bearers immobilized by clamps to hold temporary the specimen fixed by clamping pressure, avoiding its movements during test. Then a pull out load is applied with the retaining device that is part of the kit (see figure J.1.1).

A force shall be exerted, at a speed rate of 5 mm/min on the fixing device. The force shall be applied by pulling the head of the fixing device.

At least 5 specimens shall be tested.

The test results are:

- Each individual value, F_i (in N).
- The mean value, F_m (in N), and the characteristic value, F_C (in N), in accordance with Annex O.
- The mode of failure description.

The mechanical properties of the kit components used for the test shall be known and indicated in the test report.

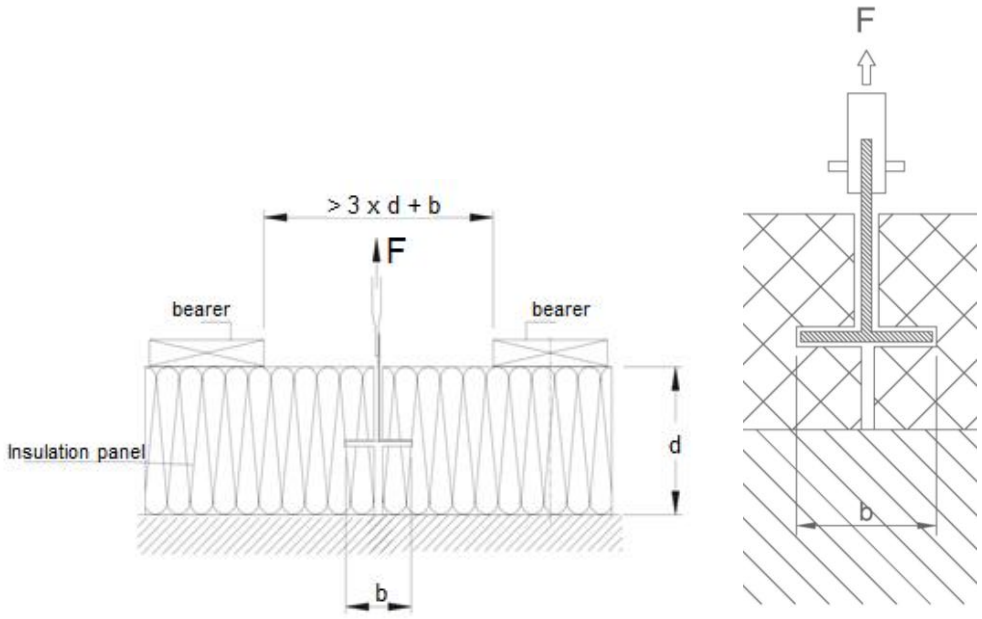


Figure J.1.1: Example of test specimen (general and detail views)

J.2 RESISTANCE TEST OF THE GROOVED SKIN

This test is only applicable for veture kits with a grooved skin which fits onto a fixing device as shown in figure J.2.1.

The test shall be performed in standard laboratory conditions.

Specimens incorporating the retaining device shall be applied to a rigid substrate (see figure J.2.1).

A force shall be exerted, at a speed rate of 5 mm/min on the fixing device. The force shall be applied by pulling the head of the fixing device.

Length L = 100 mm, unless other fixing devices (instead of profile) are used in which the length (L) may be < 100 mm.

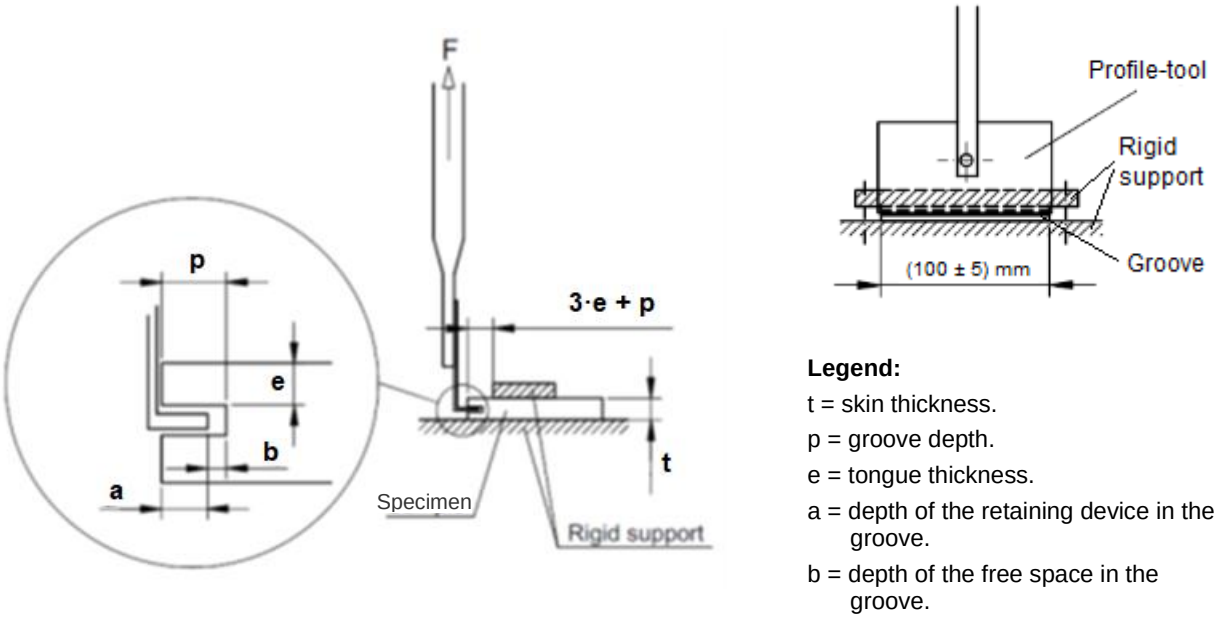
At least 5 specimens shall be tested.

The test results are:

- Each individual value, F_i (in N).
- The mean value, F_m (in N) and the characteristic value, F_C (in N) in accordance with Annex O.
- The mode of failure description (breakage of insulation element, significant deformation of the retaining device, etc.)

Test report shall include at least:

- Detailed information of the test specimens. At least the following information shall be defined (data based on the MPII):
    - Type and geometry of the test specimen (values of “e”, “p”, “a”, “b” and “t” as indicated in figure J.2.1.
    - Type, material and geometry of the retaining device profile used to exert the force.
    - The mechanical properties of the grooved skin material used for the test shall be known and indicated in the test report. As minimum, the mean value of flexural strength of the according to the applicable harmonized standard or EAD as described in table 1.1.2.



Legend:

t = skin thickness.

p = groove depth.

e = tongue thickness.

a = depth of the retaining device in the groove.

b = depth of the free space in the groove.

Figure J.2.1. Example of test specimen

J.3 RESISTANCE TEST OF OTHER MECHANICAL SKIN – THERMAL INSULATION ATTACHMENTS

This test is only applicable for veture kits with a thermal insulation made of mineral wool, wood wool or cellular plastic and a mechanical attachment between skin and thermal insulation (e.g., by dovetail joints) as shown in figures J.3.1.

Veture units samples with appropriate size to obtain the cut specimens shall be prepared according to the manufacturer's instructions. Specimens shall be conditioned at (23 ± 2) ºC and (50 ± 5) % RH until constant mass. Test shall be carried out on at least 5 specimens obtained by cut on the large sample size. Each specimen shall have a square surface with the following dimensions depending on the thermal insulation product material and the design of the connection between the skin and the thermal insulation:

- For mineral wool or wood wool or other fibre-based materials:
  - For connection type 1:
    - If d ≥ 200 mm, dimension "d" mm x "d" mm.
    - If d < 200 mm, dimension "N*d" mm x "N*d" mm, where N = number of spans between dovetail joints for which N*d ≥ 200 mm.
  - For connection type 2:
    - 200 mm x 200 mm where a ≥ 100 mm.
    - Dimension "d" mm x "d" mm where d > 200 mm if a < 100 mm.
- For cellular plastic, or not fibre-based materials: 50 mm x 50 mm:
  - For connection type 1:
    - If d ≥ 50 mm, dimension "d" mm x "d" mm.
    - If d < 50 mm, dimension "N*d" mm x "N*d" mm, where N = number of spans between dovetail joints for which N*d ≥ 50 mm.
  - For connection type 2:
    - 50 mm x 50 mm where a ≥ 25 mm.
    - Dimension "d" mm x "d" mm where d > 50 mm if a < 25 mm.

The square specimens shall be cut through the skin and into the insulation product until the end of the connection depth, using an angle grinder. At least 50 mm of distance is necessary between each square specimen and with the border of the sample. Square metal plates of appropriate size shall be affixed to these areas with a suitable adhesive. The test shall be performed in ambient conditions. A force shall be exerted, at a speed rate of 5 mm/min

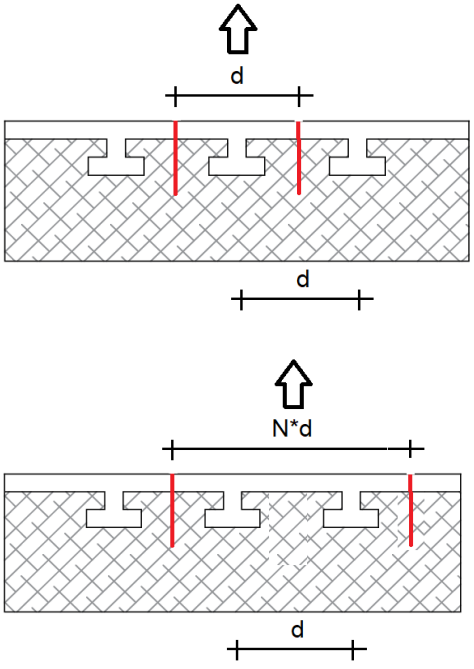


Figure J.3.1a: Example of test specimen; connection type 1.

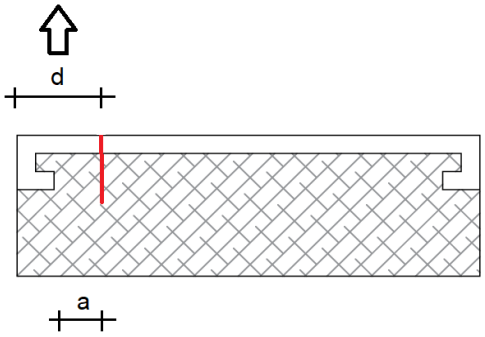


Figure J.3.1b: Example of test specimen; connection type 2.

ANNEX K: DEAD LOAD TEST

This test is applicable to veture kits mechanically fixed, with or without grooved insulation product and to bonded veture kits. This test shall be performed in standard laboratory conditions. The principle is to establish the effect of an additional dead load on the assembled veture kit.

At least, the mechanically weakest veture kit (e.g., maximum weight, minimum density of fixing devices, etc) shall be tested.

The veture kit shall be fixed or bonded to the substrate, in accordance with the manufacturer‘s product installation instructions and the following specifications:

- Fixed attachment without adhesive: Purely mechanically fixed veture units or veture units foreseen to be mechanically fixed to substrate with bonded area minor than 20% of the rear side of the insulation.
- Fixed and bonded attachment: Veture units foreseen to be mechanically fixed and bonded to substrate (minimum bonded area 20% of the rear side of the insulation).
- Bonded attachment without mechanical fixing: Veture units foreseen to be purely bonded to substrate or veture units bonded to substrate with supplementary mechanical fixings, (minimum bonded area 40% of rear side of the insulation).

The deflection of the fixing device or the veture unit shall be started to be measured at initial loading at the middle of its span and registered along the duration of the test with linear variable differential transformer (LVDT) sensors.

The test shall be carried out under standard laboratory conditions (20 ± 3) ºC and (50 ± 2) % relative humidity.

Test shall be carried out on at least three specimens.

One veture unit shall be installed on the fixing devices and an additional dead load equivalent to two veture units shall be added on top of the first one.

The test can be stopped when the deflection, after adding the dead load, is less than 0.1 mm after 1 hour.

The test result is a deflection curve in function of the time and the maximum deflection [in mm].

The mechanical properties of the kit components used for the test shall be known and indicated in the test report.

ANNEX L: RESISTANCE TO HORIZONTAL POINT LOAD TEST

The veture kit shall be first fixed to a rigid substrate (considering its family options) and tested under a static load 500 N applied for one minute horizontally (e.g. by hydraulic jack), through two rigid squares made of steel, wood or aluminium, of 25 mm x 25 mm and adequate thickness (to avoid the deformation of the rigid squares) spaced apart (distance 440 mm), on at least its centre and close to the borders of the veture unit at room temperature (20 ± 10) ºC and (50 ± 10) % relative humidity and in accordance with figure L.1. To define the mechanically weakest case of the assembled kit the following aspects shall be taken into account:

- The mechanically weakest veture unit (e.g., minimum thickness, minimum tensile strength of the insulation product, etc.).
- The mechanically weakest fixing devices (e.g., minimum thickness, minimum mechanical material characteristics, etc.).
- Minimum density of fixing devices.
- Instantaneous and permanent deformation (if occurs) after 1 minute after removing the load shall be measured at the centre between squares, distanced 220 mm from each one

The mechanical properties of the kit components used for the test shall be known and indicated in the test report.

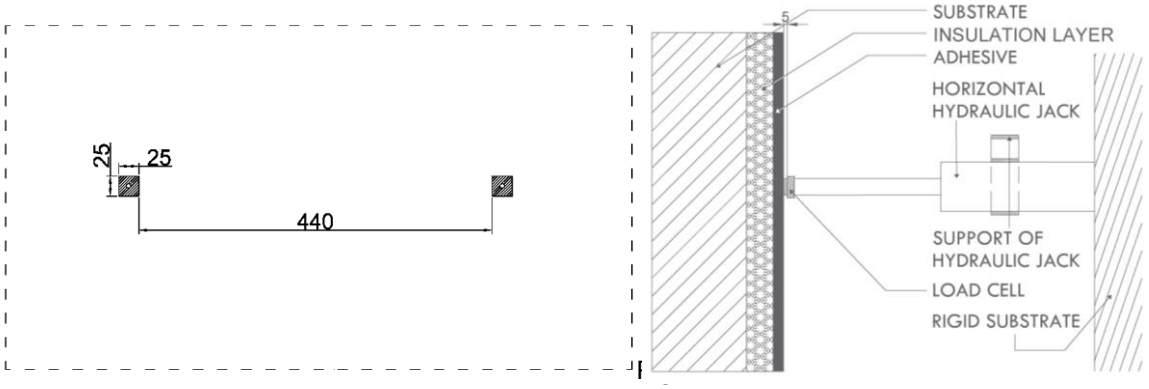


Figure L.1a: Scheme of resistance to horizontal load test (dimensions in mm). Front and lateral view.

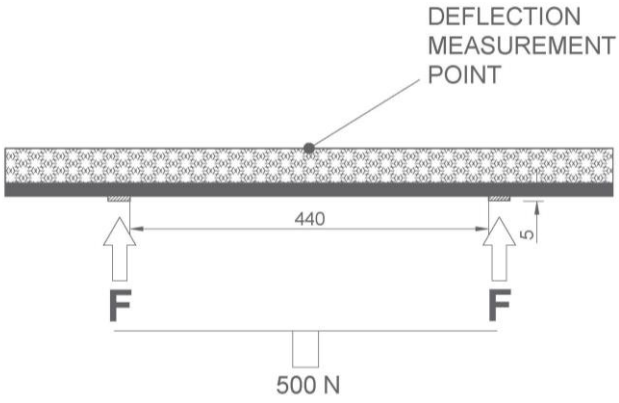


Figure L.1b: Scheme of resistance to horizontal load test (dimensions in mm). Upper view

Test report shall describe the test specimen. At least the following information shall be defined (data base on the MPII):

- When applicable, brackets: material, geometry, distance between two brackets and number and disposition of fixings.
- When applicable, profiles: material, geometry, distance between two profiles.
- Veture unit: materials and geometry.
- Veture unit fixings: material, number per unit, and disposition of fixings.
- When applicable, adhesive: generic type, and disposition of adhesive spots or beads.

ANNEX M: IMPACT RESISTANCE TEST

M.1 General

The principle is to establish the impact resistance of the kit considering hard body and soft body impacts. Besides, the impact use categories corresponding to the degree of exposure to impacts in use shall be established considering the impacts for such category.

The bodies for soft and hard impact and the test equipment are given in clause M.4. The points of impact shall be selected taking into account the behaviour of veture unit, varying according to whether the impact point is or is not located in an area of greater rigidity (at less than 50 mm from the edge of the veture unit).

Hard body impacts are:

- H1 and H2 (1 J and 3 J respectively), carried out with the steel ball weighing 0.5 kg and from a height of 0.20 m and 0.61 m respectively (at least in three locations of a veture unit).
- H3 (10 J), carried out with the steel ball weighing 1.0 kg and from a height of 1.02 m (at least in three locations of a veture unit).

Soft body impacts are:

- Small soft body S1 and S2 (10 J and 60 J respectively), carried out with the soft ball weighing 3.0 kg and from a height of 0.34 m and 2.04 m respectively (at least in three locations of a veture unit).
- Large soft body S3 and S4 (100 J and 400 J respectively), carried out with the spherical bag weighing 50.0 kg and from a height of 0.61 and 0.82 m respectively (at least in the space between two profiles of a veture unit).

Note: National building regulations in some member states may have specific impact energy requirements. In this case, other additional energy values for the hard and soft body impacts may be additionally considered and they shall be stated in the ETA.

At least, the mechanically weakest design shall be tested.

The size of the test specimen shall be chosen to carry out all the impacts given in table M.2.1.

The dimensions of any indentation and any damage caused shall be reported. The mechanical properties of the kit components used for the test shall be known and indicated in the test report.

The presence of any sharp or cutting edges and if the veture kit surface could cause bodily injury shall be noted before and after the impact test.

M.2 Test procedure

Test procedure shall be carried out using one of following options:

- When the impact resistance is known, using the impact tests given in table M.1 for this known impact resistance.
- When the impact resistance is not known, starting with lowest impact bodies and continue increasing the impacts, with the aim of obtaining the maximum impact resistance.

Table M.2.1: Hard and soft body impact tests

External impacts and assessment							
			Category IV	**Category III**	**Category II-b**	**Category II-a**	**Category I**
Hard body impact	H1	• Weight: 0.5 kg • Impact: 1 J (height 0.20 m) • No. impacts: 3 • Position of impacts: three different locations	Not penetrated (2) and Not perforated (3)	---	---	---	---
	H2	• Weight: 0.5 kg • Impact: 3 J (height 0.61 m) • No. impacts:3 • Position of impacts: three different locations	---	Not penetrated (2) and Not perforated (3)	No deterioration (1)	No deterioration (1)	No deterioration (1)
	H3	• Weight: 1 kg • Impact: 10 J (height 1.02 m) • No. impacts: 3 • Position of impacts: three different locations	---	---	Not penetrated (2) and Not perforated (3)	Not penetrated (2) and Not perforated (3)	No deterioration (1)
Soft body impact	S1	• Weight: 3 kg • Impact: 10 J (height 0.34 m) • No. impacts: 3 • Position of impacts: three different locations	No deterioration (1)	No deterioration (1)	---	---	---
	S2	• Weight: 3 kg • Impact: 60 J (height 2.04 m) • No. impacts: 3 • Position of impacts: three different locations	---	---	No deterioration (1)	No deterioration (1)	No deterioration (1)
	S3	• Weight: 50 kg • Impact: 300 J (height 0.61 m) • No. impacts: 1 • Position of impacts: At least in the centre point of a cladding element	---	---	---	No deterioration (1)	---
	S4	• Weight: 50 kg • Impact: 400 J (height 0.82 m) • No. impacts: 1 • Position of impacts: At least in the centre point of a cladding element	---	---	---	---	No deterioration (1)

(1) Superficial damage (e.g., aesthetic damage without any kind of cracking) is considered as showing "no deterioration" for all the impacts. Collapse or any other dangerous failure is not allowed.

(2) The test result shall be assessed as being "penetrate" if there is any cracking penetrating as far as the insulation product is observed. Superficial cracking (no penetrating) is allowed. Collapse or any other dangerous failure is not allowed.

(3) The test result shall be assessed as being "perforated" if there a destruction of the skin is shown up to a level in at least 3 of the 5 impacts. Collapse or any other dangerous failure is not allowed.

M.3 Bodies to impact and test equipment

M.3.1 Soft body

Principle

The soft body impact test simulates an impact resulting from a person accidentally falling against the product.

The soft body shall be dropped from a height, creating an impact energy, which corresponds with the impact energy released by a person.

Test apparatus

The soft body impactor shall be a spherical canvas bag of diameter 400 ± 40 mm (see figures M.4.2.1) filled with 3.0 ± 0.3 mm diameter glass spheres or equivalent material to give a total weight of 50 ± 0.5 kg.

M.3.2 Hard body

Principle

The hard body impact test simulates the impact, resulting from an object accidentally falling against the product.

The hard body shall be dropped from a height, creating an impact energy, which corresponds with the impact energy released by hard objects.

Test apparatus

The hard body impactor shall be a steel ball, with a diameter of 50 ± 0.5 mm, with a mass of 514 ± 19 g (0.5 kg steel ball) as defined at table M.2.1 for type of impact H1 and H2, and a steel ball, with a diameter of 63,5 ± 1 mm, with a mass of 1030 g ± 40 g (1 kg steel ball), as defined at table M.2.1 for type of impact H3.

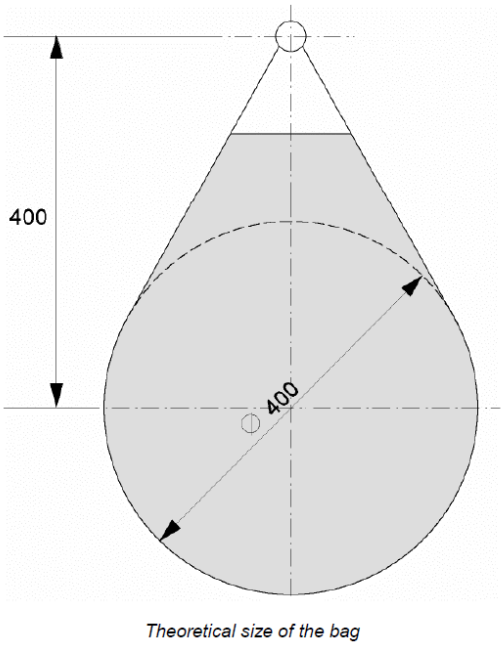


Figure M.3.2.1a: Theoretical size of the bag

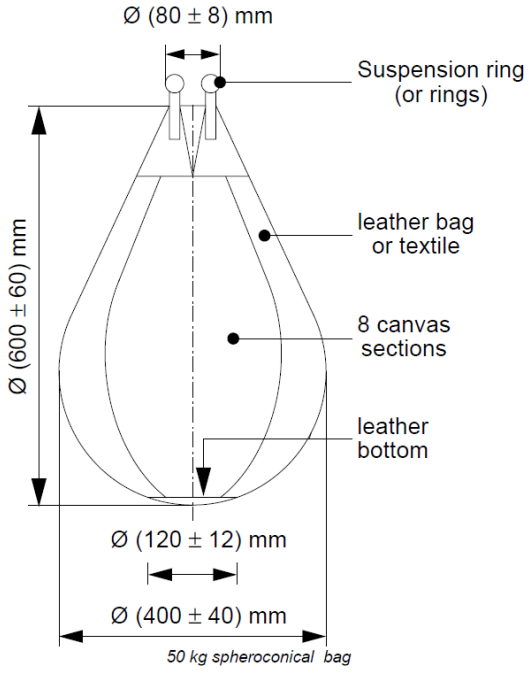


Figure M.3.2.1b: Soft body impactor

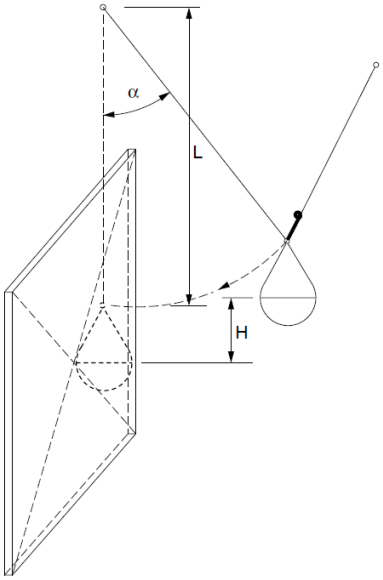


Figure M.3.2.2: Soft body impact on vertical assembly

Legend: H = drop height; L = length rope; α = minimum 65°.

ANNEX N: CORROSION RESISTANCE

The corrosion resistance shall be assessed by testing the following characteristics at least on the thinnest corrosion protective layer:

N.1. Resistance to water condensation

The tests shall be carried out in accordance with EN ISO 6270-2, on at least three flat specimens of dimensions 150 mm x 100 mm specimens with a scribed line as defined at Annex A of EN ISO 12944-6, per exposure period. They shall be prepared according to this standard and conditioned for 24 h at standard laboratory conditions. Then, specimens are exposed to water condensation for at least, the following periods of time (in hours, as minimum 1000, 720, 500, 240 and 120 h). Just after the end of each period, specimens will be retrieved from chamber to immediately assess the degradation of the coated surface by degree of blistering, according to EN ISO 4628-2**.** The test shall be conducted in accordance with EN ISO 6270-2, test regime CH, for a specific exposure period.

N.2. Resistance to neutral salt spray (NSS)

The tests shall be carried out in accordance with EN ISO 9227 on at least three flat specimens of dimensions 150 mm x 100 mm, with a scribed line as defined at Annex A of EN ISO 12944-6, per exposure period. They shall be prepared according to EN ISO 9227 and conditioned for 24 h at standard laboratory conditions. The test shall be conducted in neutral salt spray – NSS exposure for a specific exposure period in hours (i.e., 1440, 1000, 720, 500 h).

N.3. Resistance to humid atmospheres containing sulphur dioxide

The tests shall be carried on three flat specimens without scribe lines, of 150 x 100 mm at least, in accordance with EN ISO 22479, method B (volume of used sulphur dioxide: one litre) for an exposure period in hours (30 cycles x 24 hour = 720 h). The test specimens shall be as described in clause 2.2.1 but without a scribe line. No special conditioning is needed.

N.4. Resistance to cyclic ageing exposure

The tests shall be carried out on at least three flat specimens of dimensions 150 mm x 100 mm, with a scribed line as defined at Annex A of EN ISO 12944-6, and in accordance to Annex B of EN ISO 12944-6.

ANNEX O: TEST RESULTS STATISTICAL DESCRIPTION

$F_{u,5} = F_{mean} - k_n \cdot S$

Where:

$F_{u,5}$ = the characteristic breaking force giving 75 % confidence that 95 % of the test results will be higher than this value

F_{mean} = the mean breaking force, either under tension or shear

k_n = the variable as a function of the number of test specimens for 5 % (p = 0.95) with 75 % confidence level when the population standard deviation is unknown (see table O.1)

S = the standard deviation of series under consideration

Table O.1 – The variable kn as a function of the number of test specimens (see EN 1990, table D1, Vx, unknown).

Number of specimens	3	4	5	6	7	8	10	20	30	∞
Variable k_n	3.37	2.63	2.33	2.18	2.10	2.00	1.92	1.76	1.73	1.64

ANNEX P: CREEP BEHAVIOUR

The principle is to establish the mechanical resistance of the veture kit to long-term or permanent dead load (creep behaviour test) by the assessment of the resistance of the veture unit to long-term or permanent dead load. This shall be tested in accordance with the following test procedure, based on variation of deflection due to flexural strength for mechanically fixed veture kits and on variation of deflection due to debonding strength in bonded veture kits.

The tests shall be carried out on each of three specimens (single veture units).

At least, the mechanically weakest veture unit (e.g., maximum weight, minimum density of fixing devices, etc.,) shall be tested.

The veture kit shall be fixed or bonded to the substrate, in accordance with the manufacturer‘s product installation instructions and the following specifications:

a) Fixed attachment without adhesive: Purely mechanically fixed veture units or veture units foreseen to be mechanically fixed to substrate with bonded area minor than 20% of the rear side of the insulation.

b) Fixed and bonded attachment: veture units foreseen to be mechanically fixed and bonded to substrate (minimum bonded area 20% of the rear side of the insulation).

c) Bonded attachment without mechanical fixing: veture units foreseen to be purely bonded to substrate or veture units bonded to substrate with supplementary mechanical fixings, (minimum bonded area 40% of rear side of the insulation).

Test specimen shall be composed of one veture unit element and its associated attachment devices to substrate, in horizontal position with skin down.

At least, the mechanically weakest configuration shall be tested (normally minimum number of profiles, minimum thickness and maximum dimensions of the veture unit, minimum fixings density, minimum bonded area, and weakest mechanical resistance of veture unit fixings and, when relevant, subframe components, etc.).

The test specimen shall be attached horizontally to a supporting frame, which is rigid enough, and subjected to a uniformly distributed dead load F_c equal to the self-weight/area of the veture unit plus its adhesive and/or mechanical fixings (including plate test device).

This load shall be applied simply supported on the rear side of the insulation layer of the veture unit or bonded to the skin of the veture unit, through a rigid enough plate test device.

During the placing of the test load, the test specimen shall be propped from below in such a way that the propping can be removed quickly and smoothly in order to initiate the test.

Deflection measurements shall commence the instant that the full load is applied (w0) and then as wt in intervals 1; 2; 4; 8; 24 hours, 2; 4; 7; 14; 28; 56; 84 days (48; 96; 168; 336; 672; 1344; 2016 hours). After end of loading period, test load shall be removed carefully without any propping of test specimen and deflection $w_{t,0}$ measured in intervals 1; 2; 4; 8 and 24 hours, or finished later when no change to previous measurement is detected.

The creep resistance of a veture unit shall be determined using the expression:

$\varphi_t = (w_t - w_0) / (w_0 - (w_t - w_{t,0}))$,

where

w_t = the total deflection under load measured at time t, (i.e., 84 days, about 2000 hours),

w_0 = the total initial deflection under load measured at the time t = 0

$w_{t,0}$ = the total deflection measured after removing of test load after 24 hours from end of test, or later when no change to previous measurement is detected.

The test report shall contain at least the following information:

- Mean and characteristic value in accordance with Annex O of φ_t.
- Description of test specimen and its components.
- Test load, F_c applied.
- Each measured deformation at every interval given above and calculated creep coefficient.

The test will be ended if failure occurs (e.g., due to pull-out resistance of fixings, or pull-through resistance of insulation/skin joints, detachment of skin, debonding). The failure and interval time of the worst result shall be stated in the ETA).

ANNEX Q: Thermal resistance and thermal transmittance of veture kit

Q.1 Thermal resistance of veture kit without thermal bridge

The thermal resistance of the veture kit (R_{VETURE}) without thermal bridge shall be calculated in accordance with clause 6.7.1.2 of EN ISO 6946 (see equation Q.1.1) without the internal and external surface resistances (R_{si} and R_{se}) and considering the following homogeneous layers:

- Thermal resistance of the thermal insulation product ($R_{insulation}$) obtained in accordance with clause 2.2.21.1.

- Thermal resistance of the rendering system (R_{render}) and of the adhesive ($R_{adhesive}$) when the veture kit includes adhesive, obtained either in accordance with EN ISO 6946 clause 6.7.1.1 Equation (3) where the thermal conductivity shall be obtained by tabulated values in accordance with clause 8 of EN ISO 10456 (as a default value, 0,02 m^2K/W may be considered); or by testing in accordance with EN 12667 or EN 12664 (depending on expected thermal resistance), on at least three specimens, previously conditioned at (23 ± 2) °C and (50 ± 5) % RH with successive weighings performed at 24 h intervals until a constant mass is achieved. The mass shall be regarded as constant if the difference in mass between two successive weightings, one hour apart, does not exceed 0.1 g.

$$R_{VETURE} = R_{adhesive} \text{ (if relevant)} + R_{insulation} + R_{render} \quad [(m^2 \cdot K)/W] \qquad (Q.1.1)$$

When the veture kit contains fixing devices (i.e., bonded veture kits with supplementary mechanical fixing devices, mechanically fixed veture kits with supplementary adhesive or purely mechanically fixed veture kit), these fixing devices cause thermal bridges that may have influence in the thermal transmittance of the entire external wall where the veture kit is installed.

Thermal bridges caused by the fixing devices are expressed by means of the additional thermal transmittances that these components introduce in the thermal transmittance of the entire external wall where the veture kit is installed.

For defining these additional thermal transmittances, the following data shall be obtained:

- In the case of anchors (punctual fixing devices):
    - The point thermal transmittance (χ-value) of one anchor, expressed in W/K, obtained by means of one of the methods indicated in clause Q.2.
    - The number of anchors per unit area expressed in $1/m^2$.
- In the case of profiles (linear fixing devices):
    - The linear thermal transmittance (ψ-value) of one profile, expressed in W/(m·K), obtained by means of the method indicated in clause Q.3.
    - The number of profiles per unit area expressed in m/m^2.

Q.2 Point thermal transmittance of anchors

Point thermal transmittance of anchors shall be obtained by means of the following methods:

Method 1 (reference method):

The point thermal transmittance value (χ-value) shall be obtained by means of the relevant product thermal specifications (see table 1.1.2), however, when the relevant product thermal specification does not give any assessment method, the χ-value shall be obtained in accordance with clause Q.3.

Method 2:

When the number of anchors per square metre is 16 or less, χ-values given in the table Q.2.1 shall be applied:

Table Q.2.1: Reference χ-values for anchors.

Anchor	**χ-values [W/K]**
For anchors with a plastic screw/nail, stainless steel screw/nail with the head covered by at least 15 mm plastic material, or with a minimum 15 mm air gap at the head of the screw/nail	0.002
For anchors with a galvanized carbon steel screw/nail with the head covered by at least 15 mm a plastic material or a minimum 15 mm air gap at the head of the screw/nail	0.004
For all other anchors (worst-case)	0.008

Q.3 Point thermal transmittance of anchors and linear thermal transmittance of profiles

Q.3.1 General

This clause describes the assessment method of the point thermal transmittance χ-value [in W/K] of anchors, and the linear thermal transmittance ψ-value [in W/(m·K)] of subframe profiles that may penetrate in the veture kit's thermal insulation layer.

This method is based on the comparative results of the thermal transmittance of an undisturbed model wall (without anchors or profiles) and a disturbed model wall (with anchors or profiles, which create a thermal bridge and the consequent heat loss).

The higher the thermal resistance of the undisturbed wall, the higher the influence of the anchors and profiles related to the thermal transmittance of the wall. Therefore, the calculation model considers the most unfavourable substrate (made of normal-weight concrete) and a range of thermal insulation thickness with low thermal conductivity.

The point thermal transmittance χ-value and linear thermal transmittance ψ-value may increase or decrease with increasing thickness of the thermal insulation layer material depending on the type of anchors (dimensions and material) and type of profile (dimensions, material and penetration in the thermal insulation layer). The behaviour is not linear as it is represented in the figure Q.3.1.1 for three different situations (different χ-values).

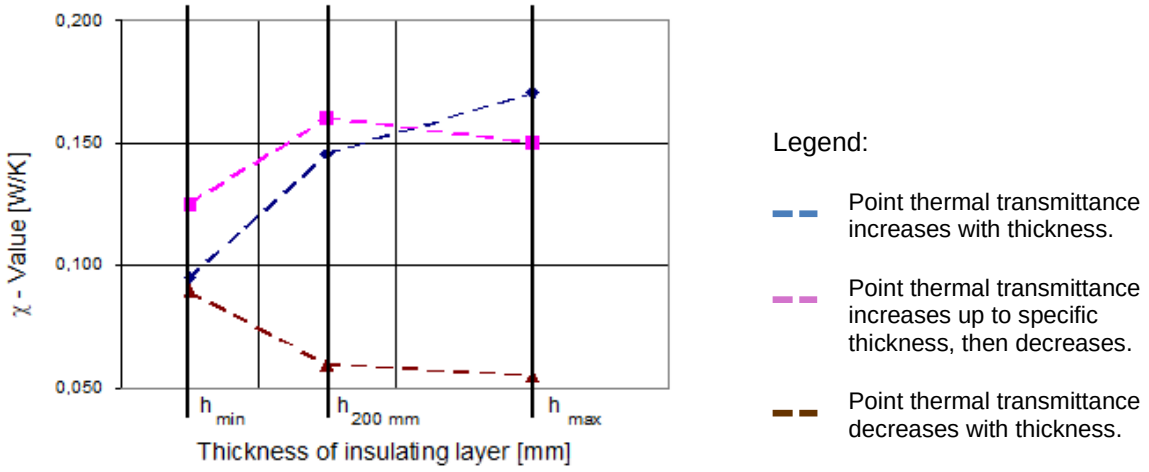


Figure Q.3.1.1: Variants of point thermal transmittance χ-value depending on the thickness of the thermal insulation layer.

The point thermal transmittance χ-value for anchors results from equation (Q.3.2.1.1).

The linear thermal transmittance ψ-value of profiles results from equation (Q.3.2.1.2).

- $\chi = \frac{U_c - U}{n}$ [W/K] (Q.3.2.1.1)
- $\psi = \frac{U_c - U}{n}$ [W/K] (Q.3.2.1.2)

Where

χ [W/K]	is the point thermal transmittance of anchors.
ψ [W/(m·K)]	is the linear thermal transmittance of profiles.
U_c [W/(m²·K)]	is the thermal transmittance of the disturbed wall, with anchors or profile penetrating in the thermal insulation layer.
U [W/(m²·K)]	is the thermal transmittance of the undisturbed wall, without anchors or profile penetrating in the thermal insulation layer.
n	is the number of anchors per unit area [1/m²] or number of profiles per unit area [m/m²] in the calculation or test model.

Q.3.2 Assessment method

Q.3.2.1 General

The point thermal transmittance (χ-value) and the linear thermal transmittance (ψ-value) shall be carried out by means of calculation or testing. Both methods are considered equivalent and shall be carried out for the reference wall model (test specimen) described in clause Q.3.2.2.

The point thermal transmittance χ-value results from calculation in accordance with equation (Q.3.1.1) with the thermal transmittance U_c of the disturbed wall model (i.e., including “n” anchors) determined by means of calculation (see clause Q.3.2.5) or by means of testing (see clause Q.3.2.6).

The linear thermal transmittance ψ-value results from calculation in accordance with equation (Q.3.1.2) with the thermal transmittance U_c of the disturbed wall model (i.e., including “n” profiles) determined by means of calculation (see clause Q.3.2.5) or by means of testing (see clause Q.3.2.6).

Q.3.2.2 Wall model (test specimen)

The wall model[12] for the calculation and testing for determination of the point thermal transmittance χ-value and linear thermal transmittance ψ-value shall consider the following dimensions and conditions:

The disturbed wall model shall be configured as an area (at least 1,0 m x 1,0 m) that includes, at least one anchors or, at least one profile. The final dimensions of the wall area shall be selected depending on the number and position of the anchors and profiles to be considered. See figure Q.3.2.2.1 for anchors and figure Q.3.2.2.2 for profiles.

The undisturbed wall model shall have the same area than the one considered for the disturbed wall model. See figure Q.3.2.2.3.

The dimensions and materials to be considered shall be the ones defined in table Q.3.2.2.1 specified in accordance with EN ISO 10456.

12 The wall model shall not be understood as a complete external wall but the specific specimen configuration.

The thickness of the thermal insulation layer “h” is described in clause Q.3.2.3. The anchors and profiles shall be arranged according to the Manufacturer’s Product Installation Instructions (MPII). The data concerning the wall model component layers shall remain untouched.

In the case of profiles, profile shall cover all the length of wall model (test specimen).

Table Q.3.2.2.1: Values of thermal conductivity of materials and dimensions of the wall model

Wall model layer	**Thermal conductivity [W/(m·K)]**	**Thickness of the layer [mm]**
Interior plaster: gypsum plaster without aggregate	0.57	10
Substrate (normal-weight concrete)	2.30	175
Thermal insulation layer	0.035 (*)	See Clause Q.3.2.3
Anchors / profile	According to the material (see EN ISO 10456)	According to the actual dimensions (**)
(*) In the case of testing, the thermal insulation layer shall be made of mineral wool in accordance with EN 13162 with a thermal conductivity in the range from 0.035 to 0.040 W/(m·K) and an airflow resistance in accordance with EN ISO 9053-1 in the range from 8 to 12 kPa·s/m^2.		
(**) At least the worst case shall be considered (i.e., the anchors or profiles with maximum area in contact with the thermal insulation layer, maximum thickness and maximum thermal conductivity).		

Legend to figures Q.3.2.2.1 to Q.3.2.2.3:

1 – Interior plaster.
2 – Concrete substrate wall.
3 – Thermal insulation layer.
4 – Rendering system layer.
5 – Anchor.
6 – Profile.
7 – Fastener of profile.

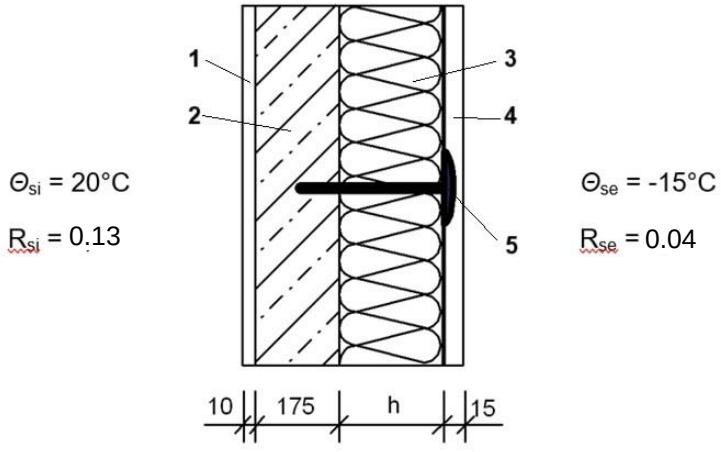


Figure Q.3.2.2.1: Cross-section scheme of the reference wall model considering an anchor (not full-scale). Top-view.

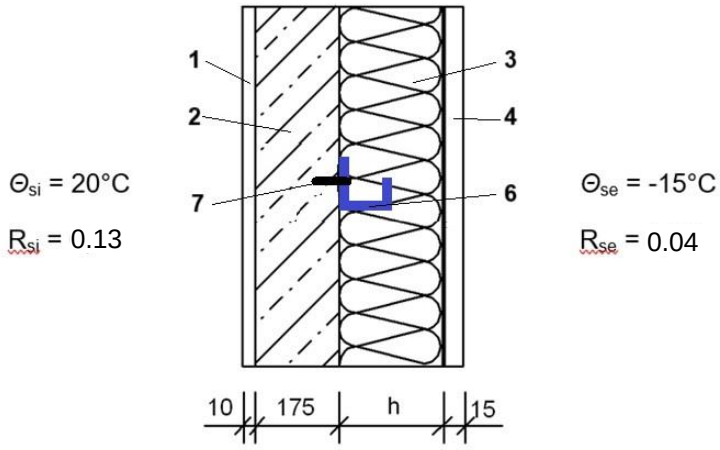


Figure Q.3.2.2.2: Cross-section scheme of the reference wall model considering a profile (not full-scale). Top-view in the case of a vertical profile or lateral-view in the case of horizontal profile**.**

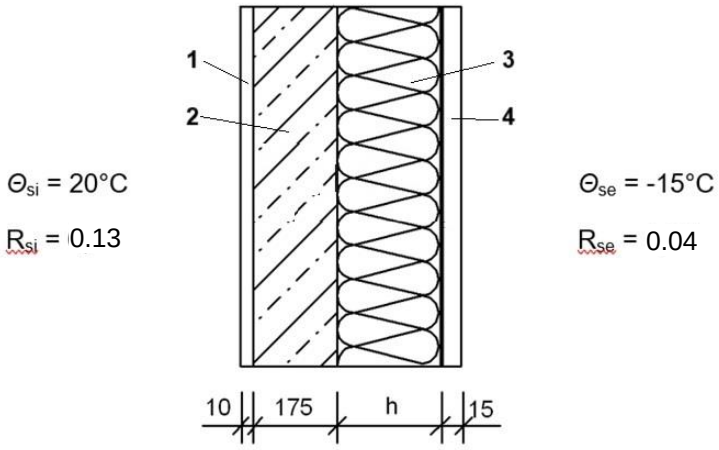


Figure Q.3.2.2.3: Cross-section scheme of the reference wall model for undisturbed wall (not full-scale). Top-view or lateral-view.

Q.3.2.3 Thickness of the thermal insulation layer

The thickness of the thermal insulation layer material has a significant influence on the point thermal transmittance χ-value and the linear thermal transmittance ψ-value.

The χ-value and ψ-value shall be determined for the ranges of thermal insulation layer thickness (h_{min} , h_{max}), in addition, when relevant, an intermediate reference thickness h = 200 mm also shall be considered.

The point thermal transmittance χ-value for the extreme thicknesses of thermal insulation layer (h_{min} , h_{max}), and additionally for the intermediate reference value (h_{200}) shall be determined as follows:

$\chi(h_{min})$ = for the minimum thickness (h_{min}) of the thermal insulation layer range intended to be used.

$\chi(h_{200})$ = for the reference thickness of the thermal insulation layer h = 200 mm.

$\chi(h_{max})$ = for the maximum thickness (h_{max}) of the thermal insulation layer range intended to be used.

In case of the result χ(200 mm) is smaller than $\chi(h_{min})$, calculation or testing of $\chi(h_{max})$ can be neglected. It is assumed that in any case $\chi(h_{max})$ is smaller than or equal to χ(200 mm).

The linear thermal transmittance ψ-value shall be determined in the same way:

$\psi(h_{min})$ = for the minimum thickness (h_{min}) of the thermal insulation layer range intended to be used.

$\psi(h_{200})$ = for the reference thickness of the thermal insulation layer h = 200 mm.

$\psi(h_{max})$ = for the maximum thickness (h_{max}) of the thermal insulation layer range intended to be used.

In case of the result ψ(200 mm) is smaller than $\psi(h_{min})$, calculation or testing of $\psi(h_{max})$ can be neglected. It is assumed that in any case $\psi(h_{max})$ is smaller than or equal to ψ(200 mm).

Q.3.2.4 Boundary conditions

The conventional surface resistances shall be used in accordance with EN ISO 6946 table 7, for the horizontal direction of the heat flow thermal conductivity, symbols given in clause 1.3.2:

R_{se} = 0.04 $(m^2 \cdot K)/W$

R_{si} = 0.13 $(m^2 \cdot K)/W$

For the measurement applies:

The temperature difference between inside and outside shall be ΔT = 35 K.

(e.g., θ_{se} = -15 °C ; θ_{si} = 20 °C , symbols given in clause 1.3.2).

The edge surfaces of the test specimen shall be considered as adiabatic.

Q.3.2.5 Calculations in accordance with EN ISO 10211

For the determination of the point thermal transmittance χ-value and the linear thermal transmittance ψ-value, the thermal transmittance of the wall with anchors or profiles U_c shall be determined for each of the wall model to be considered (see clause Q.3.2.2). The dimensions of the wall model area to be considered shall be chosen in accordance with EN ISO 10211 so that the disturbance caused by the anchors or profiles shall have no effects on the edges.

The thermal conductivity of potential cavities (e.g., in case of tested profile of U-shape, with cavity rotated into insulation surface) shall be determined in accordance with EN ISO 6946 table 8.

The subdivision of the wall model for calculation by means of the numerical method shall be accomplished in accordance with EN ISO 10211.

Annex A, clause A.2 (d) of this standard determines that the subdivision shall be sufficiently fine, that if “n” subdivisions are chosen, the sum resulting from the heat flows does not deviate from the subdivisions more than 1 % which would result in the case of second subdivisions.

The thermal transmittance U_c of the disturbed wall model area (with anchors or profiles) shall be determined in accordance with EN ISO 10211 by the thermal coupling coefficient calculated.

Where:

Deviating from EN ISO 10211 the thermal transmittance shall be determined with five decimal places. This is necessary because the point thermal transmittance χ-value and the linear thermal transmittance ψ-value, to be calculated shall be given rounded to four decimal places.

The thermal transmittance U of the undisturbed model wall (i.e., without anchors or profiles, see figure Q.3.2.2.3) shall be calculated in accordance with EN ISO 6946.

Q.3.2.6 Testing

The determination of the thermal transmittance U_c of the disturbed wall model (with anchors or profiles) shall be tested in accordance with EN ISO 8990 or EN 1934 (both methods are considered equivalent). A reference test specimen shall be used in accordance with clause Q.3.2.2.

The thermal transmittance U of the undisturbed model wall (without anchors or profiles) shall be measured in accordance with the same method and test specimen materials and dimensions as for the thermal transmittance U_c.

When placing the pieces (anchors or profiles), the distance to the edge and between them should not fall below 300 mm.

Q.3.3 Example for determining the point thermal transmittance χ-values of an anchor

Below there is an example for the expression of the results when determining the point thermal transmittance χ-value of a anchors.

Example:

Considering that an anchor is defined to be used for thicknesses of thermal insulation layer h_{min} = 50 mm to h_{max} = 320 mm, and the following values of point thermal transmittance χ-value in accordance with thicknesses of thermal insulation layer have been determined by calculation or testing:

$$\chi(h_{min}) = 0.159 \text{ W/K}; \qquad \chi(h_{200}) = 0.181 \text{ W/K} \qquad \text{and } \chi(h_{max}) = 0.215 \text{ W/K}.$$

One of the following cases may be used for the expression of the results depending on the range of thermal insulation thickness:

- Case 1: One χ-value for the whole area of insulation thicknesses from 50 mm to 320 mm:

  $\chi(h=50\div320 \text{ mm}) = 0.215 \text{ W/K}$

- Case 2: Two χ-values with distinction between areas of insulation thicknesses up to 200 mm and above 200 mm:

  $\chi(h\leq200 \text{ mm}) = 0.181 \text{ W/K}; \quad \chi(h>200 \text{ mm}) = 0.215 \text{ W/K}$

Q.4 Extended application rules

The worst-case scenario shall be selected by considering the following extended application rules for the relevant components:

- Thermal insulation product: Any of the same type (see clause 1.3.3.1) with higher thermal resistance (i.e., grater thickness or lower value of nominal thermal conductivity λ_D or both), as the one used for calculation.
- Adhesive or rendering system: Any adhesive or rendering system with higher thermal resistance (i.e., grater thickness or lower thermal conductivity or both) as the one used for calculation.
- Fixing devices: Any of the same type (see clause 1.3.4.2) with the same material or lower dimensions or both, as the one used for calculation.