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ETAG 17

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GUIDELINE FOR EUROPEAN TECHNICAL APPROVAL

of

VETURE KITS -

PREFABRICATED UNITS FOR

EXTERNAL WALL INSULATION

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FOREWORD

Background of the subject

This Guideline has been drawn up by the EOTA Working Group 04.04/2 – VETURES: Prefabricated Units for External Wall Insulation.

The WG consisted of members from six European countries (Belgium, France (Convenor), Germany, Slovakia, Slovenia and the United Kingdom).

The Guideline sets out the performance requirements for VETURE kits for the use as external insulation of building walls, the verification methods used to examine the various aspects of performance, the assessment criteria used to judge the performance for the intended use and the presumed conditions for the design and execution.

The UEAtc Directives for the Assessment of Prefabricated Units for External Wall Insulation (Insulating Cladding Panels) (November 1990) have formed part of the basis for the Guideline.

Reference documents

Reference documents are referred to within the body of the ETAG and are subject to the specific conditions mentioned therein

The **list of reference documents** (mentioning the year of issue) for this ETAG is given in annex B. When additional parts for this ETAG are written afterwards, they may comprise modifications to the list of reference documents applicable to that part.

Updating conditions

The edition of a reference document given in this list is that which has been adopted by EOTA for its specific use.

When a new edition becomes available, this supersedes the edition mentioned in the list only when EOTA has verified or re-established (possibly with appropriate linkage) its compatibility with the guideline.

EOTA Technical Reports go into detail in some aspects and as such are not part of the ETAG but express the common understanding of existing knowledge and experience of the EOTA-bodies at that moment. When knowledge and experience is developing, especially through approval work, these reports can be amended and supplemented.

EOTA Comprehension Documents permanently take on board all usefull information on the general understanding of this ETAG as developped when delivering ETA's in consensus by the EOTA members. Readers and users of this ETAG are advised to check the current status of these documents with an EOTA member.

EOTA may need to make alterations/corrections to the ETAG during its life. These changes will be incorporated into the official version on the EOTA website www.eota.be and the actions catalogued and dated in the associated **Progress File**.

Readers and users of this ETAG are advised to check the current status of the content of this document with that on the EOTA website. The front cover will indicate if and when amendment has taken place.

Section one:
INTRODUCTION

1. PRELIMINARIES

1.1 LEGAL BASIS

This ETAG has been established in compliance with the provisions of the Council Directive 89/106/EEC (CPD) and has been established taking into account the following steps:

- issuing of the final mandate by the EC: 02/10/00
- issuing of the final mandate by EFTA: 02/10/00
- adoption of the Guideline by the Executive Commission of EOTA : 23/10/03
- opinion of the Standing Committee for Construction: April 2005
- endorsement by the EC: 16/12/05

This document is published by the Member States in their official language or languages according to Art 11/3 of the CPD.

No existing ETAG is superseded.

1.2 STATUS OF ETAG

A) An ETA is one of two types of technical specifications in the sense of the EC 89/106 Construction Products Directive. This means that Member States shall presume that the approved products are fit for their intended use, i.e. they enable works in which they are employed to satisfy the Essential Requirements during an economically reasonable working life, provided that:

- The works are properly designed and built;
- The conformity of the products with the ETA has been properly attested.

B) This ETAG is a basis for ETA's, i.e. a basis for technical assessment of the fitness for use of a product for an intended use. An ETAG is not itself a technical specification in the sense of the CPD.
This ETAG expresses the common understanding of the approval bodies, acting together within EOTA, as to the provisions of the Construction Products Directive 89/106 and of the Interpretative Documents, in relation to the products and uses concerned, and is written within the framework of a mandate given by the Commission and the EFTA Secretariat, after consulting the Standing Committee for Construction.

C) When accepted by the European Commission after consultation with the Standing Committee for Construction, this ETAG is binding for the issuing of ETA's for the products for the defined intended uses

The application and satisfaction of the provisions of an *ETAG* (examinations, tests and evaluation methods) leads to an ETA and a presumption of fitness of a product for the defined use only through an evaluation and approval process and decision, followed by the

corresponding attestation of conformity. This distinguishes an ETAG from a harmonized European standard which is the direct basis for attestation of conformity.

Where appropriate, products which are outside of the precise scope of this ETAG may be considered through the approval procedure without guidelines according to art. 9.2 of the CPD.

The requirements in this ETAG are set out in terms of objectives and of relevant actions to be taken into account. It specifies values and characteristics, the conformity with which gives the presumption that the requirements set out are satisfied, wherever the state of art permits and after having been confirmed as appropriate for the particular product by the ETA.

2 SCOPE

2.1 SCOPE

This guideline deals with VETURE kits - « Prefabricated Units for External Wall Insulation » for use as external insulation to the *walls of buildings*. The walls are made of masonry (brick, block, stone etc ...) or concrete (*cast* on site *or as* prefabricated panels). Applications on timber and steel frame buildings are not covered by this guide.

VETURE kits are designed and installed in accordance with the ETA-holder's design and installation instructions. The kit comprises components which are factory-produced by the ETA-holder or the component suppliers. The ETA-holder is ultimately responsible for the kit. All components of the VETURE kits should be specified by the ETA-holder in the ETA.

A VETURE kit comprises external skin, an insulating layer and fixings devices, which are delivered together on site. The kits may include typical ancillary items such as fittings (e.g. base profiles, corner profiles ...) to connect them to adjacent building structures (apertures, corners, parapets, etc ...). The skin and the insulation are approximately the same length and height. The skin may or may not be bonded to the insulation layer. The VETURE unit is mechanically fixed directly to the wall structure with fixings (anchors, profile/rail, brackets, etc …). Usually there is no air gap between the skin and insulation layer. There is no ventilated air gap at the rear of the Veture element.

Fixings are usually kit-specific. However the mechanical resistance of the fixings in relation to the wall is not covered in this guide

Cladding kits with a support frame are not covered by this guide. Kits without thermal insulation are not covered by this guide, even if applied on a pre-installed thermal insulation layer.

The kits are designed to give the wall to which they are applied additionnal thermal insulation. The assembled kit should provide a minimal thermal resistance in excess of 0.5 m². K/W.

The kits can be used on new or existing (retrofit) vertical walls.

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

The kits are not intended to ensure the airtightness of the building structure.

Note: This guideline does not deal with VETURE units in contact with the ground. In these situations the Approval Body may need to develop additional tests subject to consensus with EOTA.

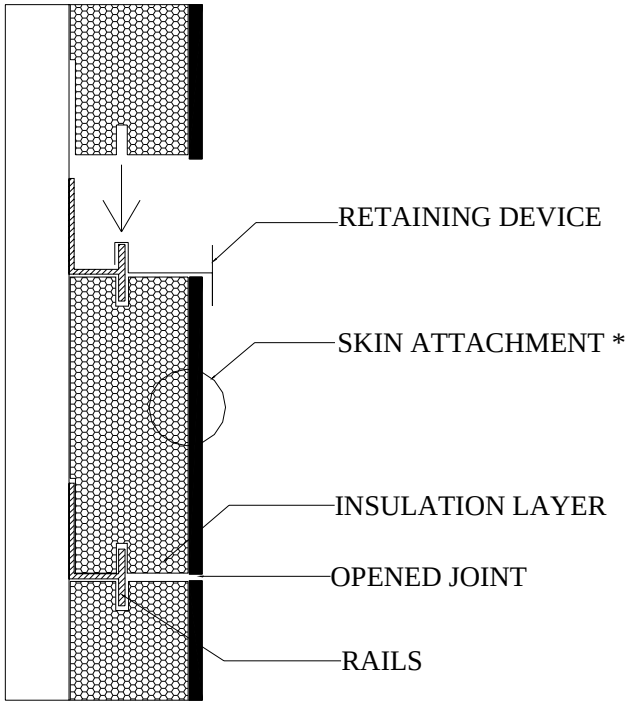
2.2 USE CATEGORIES, PRODUCT FAMILIES, KITS AND SYSTEMS

2.2.1 VETURE families

For mechanical design purposes, VETURE kits are differentiated according to the methods of fixing.

See examples below:

A- Grooved insulation fixed by profiles/rails

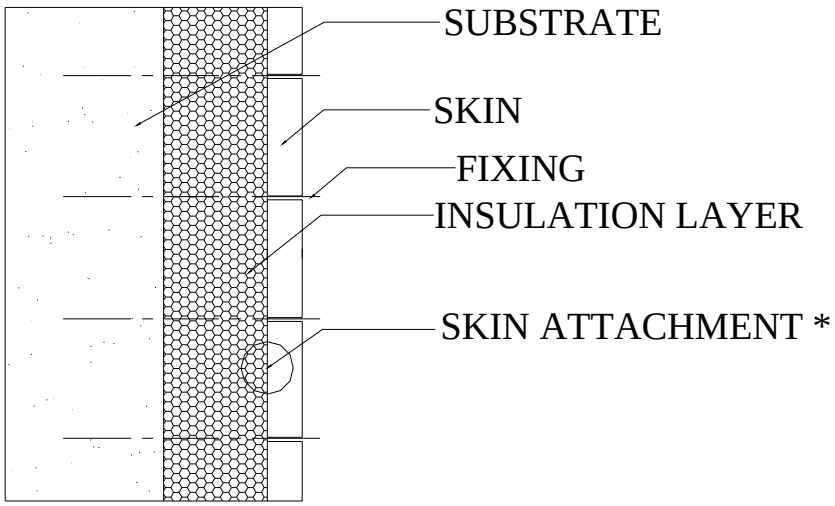


* Skin attachment: - Adhesively bonded:

- With specific adhesive
- Without adhesive (e.g. during the foaming process of insulation or organic/hydraulic mortar on insulation)

- Mechanical attachment (fitting)

B- VETURE unit fixed through insulation layer

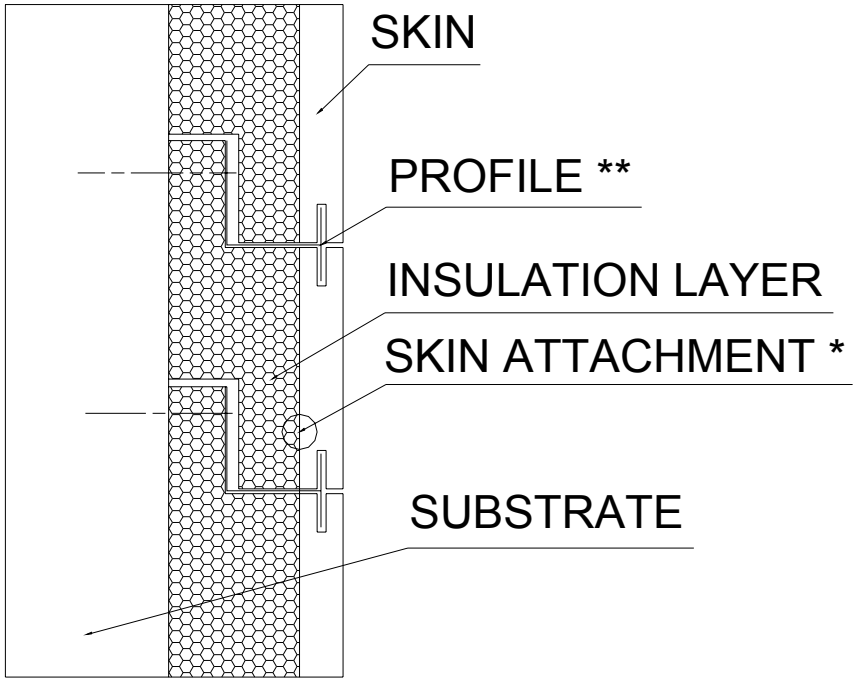


* Skin attachment: - Adhesively bonded:

- With specific adhesive
- Without adhesive (e.g. during the foaming process of insulation or organic/hydraulic mortar on insulation)

- Mechanical attachment (fitting)

C- Grooved skin fixed by profiles/rails



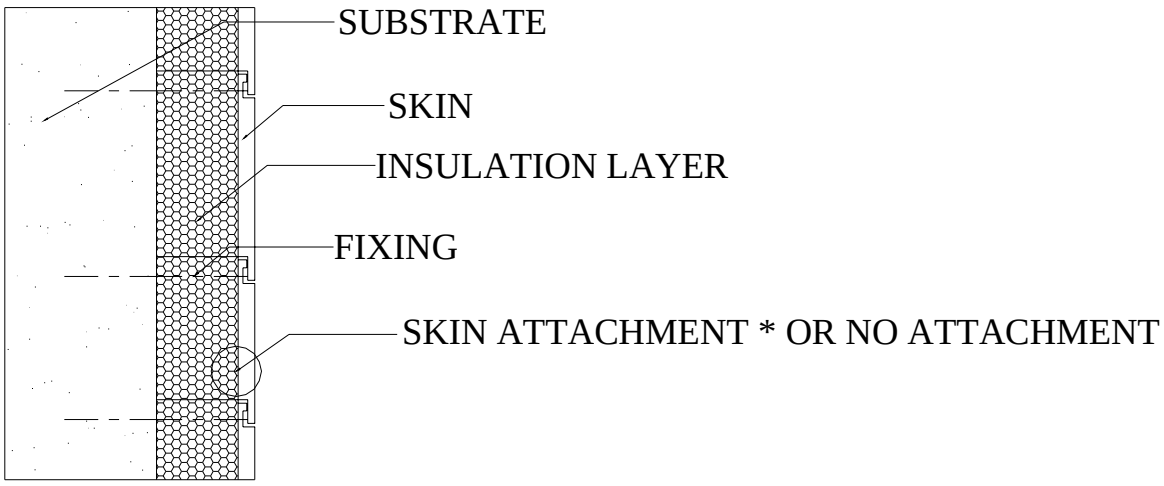
* Skin attachment: - Adhesively bonded:

- With specific adhesive
- Without adhesive (e.g. during the foaming process of insulation or organic/hydraulic mortar on insulation)

- Mechanical attachment (fitting)

** Directly applied on the wall or not

D- Skin mechanicaly fixed to the substrate through the insulation layer



* Skin attachment: - Adhesively bonded:

- With specific adhesive
- Without adhesive (e.g. during the foaming process of insulation or organic/hydraulic mortar on insulation)

- Mechanical attachment (fitting)

2.2.2 Use categories

Several use categories are associated with the degree of exposure:

- Impact (§ 6.3.1),
- Watertighness (§ 6.4.5).

2.3 ASSUMPTIONS

The state of the Art does not enable the development, within a reasonable time, of full and detailed verification methods and corresponding technical criteria/guidance for acceptance for some specific aspects or products. This ETAG contains assumptions taking account of the state of art and makes provisions for appropriate, additional case by case approaches when examining ETA-applications, within the general framework of the ETAG and under the CPD consensus procedure between EOTA members.

The guidance remains valid for other cases which do not deviate significantly. The general approach of the ETAG remains valid but the provisions then need to be used case by case in an appropriate way. This use of the ETAG is the responsibility of the ETA-body which receives the special application, and subject to consensus within EOTA. Experience in this respect is collected, after endorsement in EOTA-TB, in the ETAG-Format-Comprehension document.

General recommandations

The subject of an ETA may be:

- For all families of VETURE kits :
    - one case of VETURE kit
    - one skin material
    - one fixings type
- For family type A or B :
    - one insulation generic type
    - one attachment type between insulation and skin

One ETA could include:

- For all families of VETURE kits :
    - several VETURE unit dimensions (length, height, thickness)
    - several insulation thickness
    - several skin thickness
    - several skin colours
    - several retaining devices
    - several rails materials
    - several fixings densities
- For family type C or D :
    - Several insulation generic types
    - Several attachment types between insulation and skin

3 TERMINOLOGY

3.1 COMMON TERMINOLOGY AND ABBREVIATIONS

(See Annex A)

3.2 TERMINOLOGY AND ABBREVIATIONS SPECIFIC TO THIS ETAG

VETURE kit: A kit specific made of an external skin, an insulating layer and fixings devices. The kits may include ancillary items such as fittings (e.g. base profiles, corner profiles, etc ...) to connect them to adjacent building structures (apertures, corners, parapets, etc ...). The skin and the insulation are approximatively the same length and height. The skin may be bonded to the insulation layer or not. The VETURE unit is mechanically fixed directly to the wall structure with fixings (anchors, profile/rail, brackets, etc …). Usually there is no air gap between the skin and insulation layer.

VETURE unit°: The external skin and insulating layer which may be bonded together or not.

3.2.1 Substrates

The term "substrate" refers to a wall, which in itself already meets the necessary airtightness and mechanical strength requirements (resistance to static and dynamic loads).
It may be faced e.g. with mineral or organic renders or paints or with tiles.

- Masonry walls
  Walls constructed from units of bricks, blocks, stones, etc ….
- Concrete walls
  Walls made of concrete cast on site or as prefabricated panels.

3.2.2 Insulation product

A product such as mineral wool, EPS, XPS or PUR for which the main function is to impart the insulating properties to the wall to which it is applied.

3.2.3 Skin

Externals coverings such as sheets, tiles, boards, shingles or panels, made from durable materials such as wood based panels, fibre cement, concrete, factory applied render, stone, slate, ceramics, metal, glass, plastics, laminates and composites, bituminous shingles or brick slips.

3.2.4 Mechanical fixing devices

Profiles/rails brackets, screws/anchors or any special fixing devices used to secure the VETURE element to the substrate.

3.2.5 Retaining device

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

3.2.6 Ancillary item

Any supplementary element, component or product used in the kit, e.g. to form joints (sealant, corner strips, etc...) or to achieve continuity (mastic, joint-covers, gaskets, trims, etc...).

Section two:
GUIDANCE FOR THE ASSESSMENT OF THE FITNESS FOR USE

GENERAL NOTES:

a) Applicability of the ETAG

This ETAG provides guidance on the assessment of VETURE kits and their intended uses. It is the manufacturer or producer who defines the VETURE kits for which he is seeking ETA and how it is to be used in the works, and consequently the scale of the assessment.

It is therefore possible that for some products, which are fairly conventional, only some of the tests and corresponding criteria are sufficient to establish fitness for use. In other cases, e.g. special or innovative VETURE kits or materials the whole package of tests and assessment may be applicable.

b) General lay out of this section

The assessment of the fitness of products with regard to their fitness for intended use in construction works is a process with three main steps:

- Chapter 4 clarifies the specific requirements for the works relevant to the products and uses concerned, beginning with the Essential Requirements for works (CPD art. 11.2) and then listing the corresponding relevant characteristics of products.

- Chapter 5 extends the list in chapter 4 into more precise definitions and the methods available to verify product characteristics and to indicate how the requirements and the relevant product characteristics are described. This is done by test procedures, methods of calculation and of proof, etc. (selection of the appropriate methods)

- Chapter 6 provides guidance on the assessing and judging methods to confirm fitness for the intended use of the VETURE kits.

- Chapter 7, assumptions and recommendations are only relevant in as far as they concern the basis upon which the assessment of the VETURE kits is made concerning their fitness for the intended use.

c) Levels or classes or minimum requirements related to the essential requirements and to the product performance (see ID clause 1.2 and EC Guidance paper E)

According to the CPD "Classes" in this ETAG refer only to mandatory levels or classes laid down, in the EC-mandate.

This ETAG indicates however the compulsory way of expressing relevant performance characteristics for the VETURE kits. If, for some uses at least one Member state has no regulations, a manufacturer always has the right to opt out of one or more of them, in which case the ETA will state "no performance determined" against that aspect, except for those properties for which, when no determination has been made, the product doesn’t any longer fall under the scope of the ETAG; such cases shall be indicate in the ETAG.

d) Working life (durability) and serviceability

The provisions, test and assessment methods in this guideline or referred to, have been written, based upon the assumed intended working life of the VETURE kits for the intended use of at least 25 years, provided that the VETURE kits is subject to appropriate use and maintenance (cf. chapter 7). These provisions are based upon the current state of art and the available knowledge and experience.

An "assumed intended working life" means that it is expected that, when an assessment following the ETAG-provisions is made, and when this working life has elapsed, the real working life may be, in normal use conditions, considerably longer without major degradation affecting the essential requirements.

The indications given as to the working life of VETURE kits cannot be interpreted as a guarantee given by the producer or the approval body. They should only be regarded as a means for the specifiers to choose the appropriate criteria for VETURE kits in relation to the expected, economically reasonable working life of the works (based upon ID. par. 5.2.2).

e) **Fitness for the intended use**

According to the CPD it has to be understood that within the terms of this ETAG, products shall "have such characteristics that the works in which they are to be incorporated, assembled, applied or installed, can, if properly designed and built, satisfy the Essential Requirements" (CPD, art. 2.1). Hence, the VETURE kits must be suitable for use in construction works which (as a whole and in their separate parts) are fit for their intended use, account being taken of economy, and in order to satisfy the essential requirements. Such requirements must, subject to normal maintenance, be satisfied for an economically reasonable working life. The requirements generally concern actions which are foreseeable. (CPD Annex I, preamble).

4 REQUIREMENTS

For works, and their relationship to the products characteristics

This chapter sets out the aspects of performance to be examined in order to satisfy the relevant Essential Requirements, by:

- Expressing in more detail, within the scope of the ETAG, the relevant Essential Requirements of the CPD in the Interpretative Documents and in the mandate, for works or parts of the works, taking into account the actions to be considered, as well as the expected durability and serviceability of the works,
- Applying them to the scope of the ETAG (product and where appropriate its constituents, components and intended uses), and providing a list of relevant product characteristics and other applicable properties.
- When a product characteristic or other applicable property is specific to one of the Essential Requirements, it is dealt with in the appropriate place. If, however, the characteristic or property is relevant to more than one Essential Requirement, it is addressed under the most important one with cross reference to the other(s). This is especially important where a manufacturer claims “No performance determined” for a characteristic or property under one Essential Requirement and it is critical for the assessing and judging under another Essential Requirement. Similarly, characteristics or properties which have a bearing on durability assessments may be dealt with under ER 1 to ER 6 with reference under 4.7. Where there is a characteristic which only relates to durability, this is dealt with in 4.7.

This chapter also takes into account further requirements, if any (e.g. resulting from other EC Directives) and identifies aspects of serviceability including specifying characteristics needed to identify the products (cf. ETA-format par. II.2).

The following Table 1 presents an overview of the Essential Requirements, the relevant paragraphs of the corresponding Interpretative Documents and the related requirements to product performance.

Table 1. Relationship between ID paragraph for works, VETURE kits performance and product characteristic given in the mandate

ER	Corresponding ID paragraph for works	Corresponding ID paragraph for kit performance	Mandate product characteristic	ETAG paragraph on kit performance
1	-	-	-	-
2	4.2.3.4.2b Limitation of spread of fire and smoke beyond the room of origin: Walls	4.3.1.1 Products subject to reaction to fire requirements: Facades / external walls	Reaction to fire (for application of VETURE kits subject to fire regulations)	4.2.1 Reaction to fire
3	3.3.1.2 Indoor environment	3.3.1.2.2 Dampness control	Watertightness Water permeability Water vapour permeability Moisture behaviour	4.3.1 Indoor environment, dampness
	3.3.5 outdoor environment	3.3.5.3 : Release of pollutants to outdoor air, soil and water	Release of dangerous substances	4.3.2 outdoor environment
4	3.3.2 : Direct impacts Impacts of falling objects, forming part of the works, upon users	3.3.2.2 : Performance of the works	Resistance to wind load Mechanical resistance Resistance to horizontal loads Resistance to impact Shatter properties	4.4 Safety in use
5	4.2 Protection against airborne noise from	4.3.2 Acoustic properties and their expression	Airborne sound insulation	4.5 Protection against noise

	outside of the works	acoustic performance of the kit		
6	4.2.3 Expression of the energy requirements and their relation to the products characteristics	4.3.2 Characteristics of products which may be relevant to the essential requirement	Thermal resistance	4.6 Energy economy and heat retention
Aspects of durability and serviceability	Other durability aspects		Resistance to temperature variation, humidity and shrinkage moisture resistance Dimensional stability chemicals and biological resistance corrosion UV radiation	4.7 Aspects of durability and serviceability

4.1 MECHANICAL RESISTANCE AND STABILITY

Requirements with respect to the mechanical resistance and stability of non load bearing parts of the *works* are not included in this Essential Requirement but are treated under the Essential Requirement Safety in use (see Clause 4.4).

4.2 SAFETY IN CASE OF FIRE

The Essential Requirement laid down in the Council Directive 89/106/EEC is as follows:

The construction works must be designed and built in such a way that in the event of an outbreak of fire:

- The load bearing capacity of the construction can be assumed for a specific period of time
- The generation and spread of fire and smoke within the works are limited
- The spread of fire to neighbouring construction works is limited
- Occupants can leave the works or be rescued by other means
- The safety of rescue teams is taken into consideration

The following aspects of performance are relevant to this Essential Requirement for VETURE kits:

4.2.1 Reaction to fire

The reaction to fire performance of VETURE kits shall be in accordance with laws, regulations and administrative provisions applicable to the kit in its intended end use application. This performance shall be expressed in the form of a classification specified in accordance with the relevant EC Decision and the appropriate CEN classification standards.

4.3 HYGIENE, HEALTH AND ENVIRONMENT

4.3.1 Indoor environment, dampness

As far as dampness is concerned for external walls, two requirements have to be considered, for which VETURE kits have a favourable effect:

- Moisture proofing from outside damp.
  External walls shall resist the penetration of rain and snow to the inside of the building; they should not be damaged by rain and snow and should not carry moisture to any part where it could cause damage.
- Avoiding condensation on internal surfaces and interstitial condensation. Surface condensation is usually reduced by the application of VETURE kits.
  Under normal conditions of use, harmful interstitial condensation does not occur in the kit. Where there is a high incidence of water vapour internally, appropriate precautions must be taken to prevent the kit from becoming damp, for example by suitable design of the products and choice of materials.
  This means that for ER3 the following product characteristics have to be assessed for the kit and/or each of its components:
  - Watertightness,
  - Water permeability,
  - Water vapour permeability,
  - Moisture behaviour,
  - Thermal characteristics (covered under ER6),

4.3.2 Outdoor environment

The product/kit must be such that, when installed according to the appropriate provisions of the Member States, it allows for the satisfaction of the ER3 of the CPD as expressed by the national provisions of the Member States and in particular does not cause harmful emission of toxic gases, dangerous particles or radiation to the indoor environment nor contamination of the outdoor environment (air, soil or water).

4.4 SAFETY IN USE

Even though VETURE kit is a system without a structural intended use, mechanical resistance and stability is still required.
The VETURE kit shall be stable to the combined stresses generated by normal loads such *as* intrinsic weight, temperature, humidity and shrinkage, as well as movements of the main structure, direct impacts and wind forces (suction).

This means that for ER 4 VETURE kits the following products characteristics have to be assessed for the kit and/or its components.

Effect of intrinsic weight
The kit shall support itself without harmful deformation.

Performance on exposure to movements of the main structure
Normal movements of the main structure shall not give rise to any crack formation or loss of adhesion in the kit. It is considered that the VETURE kits should withstand movements due to the

temperature and stress variations except at structural joints where special precautions have to be taken.

Impact resistance

The kit shall be designed so that it retains its properties under the effect of impacts caused by normal traffic and normal use. Its performance should be such that the effect of normal accidental or deliberately caused unexceptional impact does not cause damage which results in injury to persons e.g. dangerous cutting edges or the falling of objects forming part of the works upon users. Damage caused by impacts shall not result in the kit failing to continue to satisfy any of the other relevant Essential Requirements, e.g. damage resulting in water penetration compromising ER 3.

Shatter properties

VETURE kits must not present sharp or cutting edges. Their surfaces must not cause bodily injury to the occupants or people nearby.

Retaining device

Depending on local regulations a retaining device may be required for VETURE units where the skin is bonded to the insulating layer and where the skin is not mechanically fastened to the substrate.

Horizontal point load

It should be possible to lean standard maintenance equipment against the kit, without causing damage which results in injury to persons e.g. dangerous cutting edges or the falling of objects forming part of the works upon users or which results in the kit failing to continue to satisfy any of the other relevant Essential Requirements, e.g. damage resulting in water penetration compromising ER 3.

Effect of the wind action

The kit shall exhibit appropriate mechanical resistance to the forces of pressure, suction and vibration, due to wind.

4.5 PROTECTION AGAINST NOISE

The constructions works shall be designed and built in such a way that noise transmitted through the facade from outside is kept down to a level that will not threaten the health of occupants and will allow them to sleep, rest and work in satisfactory conditions.

The facade shall be designed to meet the acoustic performance requirements for each project.

4.6 ENERGY ECONOMY AND HEAT RETENTION

The entire wall should satisfy this requirement.

VETURE kits improve thermal insulation and make it possible to reduce heating (in winter) and air conditioning (in summer).

Therefore the improvement of the thermal resistance of the wall introduced by the VETURE kits shall be assessed so that it can be introduced in the thermal calculations required by the national regulations on energy consumption.

Mechanical fixings or temporary anchor fixings can cause localised differences in temperature. Assurance must be obtained that this effect is small enough not to influence the thermal insulating properties.

In order to establish the benefits of the VETURE kits to the wall, relevant component characteristics shall be specified as follows:
- Thermal conductivity/resistance,
- Water vapour permeability (covered under ER3),
- Water permeability (covered under ER3).

4.7 ASPECTS OF DURABILITY AND SERVICEABILITY

All of the ER's mentioned above must be fulfilled for the life of the kit under the actions to which it is subjected.

Durability of the kit

The VETURE kits shall be stable to temperature variation, humidity and shrinkage.

Neither high nor low temperatures shall exercise a destructive or irreversibly deforming effect.
Low air temperatures of the order of - 20°C and high air temperatures of + 50°C are generally regarded as the extremes in temperature change. In northern European countries however, the temperatures of the air can decrease to - 40°C.
Solar radiation increases the surface temperatures of the VETURE kits when exposed. The increase depends on the radiation flow and the energy absorption of the surface (colour). It is generally considered that the maximum surface temperature is + 80°C (e.g. for opaque skins).
A change (of the order of 30°C) in the surface temperature shall not cause any damage, eg a sudden change due to prolonged exposure to solar radiation followed by intensive rain, or the change of temperature between sun and shade.
In addition, steps must be taken to prevent crack formation both at the expansion joints of the structure and where elements of the facade are of different materials, eg connections to windows.

Durability of the components

All components shall retain their properties during the overall service life of the kit under normal conditions of use and maintenance such that the kit quality is maintained. This requires the following:
- All components shall display chemical-physical stability and be at least reasonably predictable if not absolutely known.
- All materials shall be either naturally resistant to, or be treated or protected against attack by corrosion or fungus.
- All materials shall be compatible with each other.

5 METHODS OF VERIFICATION

This chapter refers to the verification methods used to determine the various aspects of performance of the products in relation to the requirements for the works (calculations, tests, engineering knowledge, site experience, etc...) as set out in chapter 4. The possibility exists to use existing data in accordance with the EOTA Guidance Document n° 004 on the "Provision of data for assessment leading to ETA".
The assessment programme (tests or calulations) in particular the relevance of the tests listed here after shall be decided by the approval body based on the design of the kit.

In order to assess and judge VETURE kits it is often necessary to adopt verification methods which require the testing of two or more components in a small scale assembly. As such, they are neither kits nor components. By taking this approach, it is possible to avoid a large number of full scale

tests or at least limit the number required, by enabling the selection of the appropriate combination of components to provide an assessment of the complete range.
Therefore, the structure of this chapter is that these tests relate to the kit rather than to the individual components.
In any test report, the tested products shall be described with information about material and geometry.
The relevant Essential Requirements, the relevant verification methods related to the essential requirements and the related product characteristics to be assessed are indicated in the following table (table 2)

Table 2 – Verification of performance

ER	ETAG Paragraph on product performance	Product characteristic	ETAG paragraph on verification method	
			Kit	Component
1	-	-	-	-
2	4.2.1 Reaction to fire	Reaction to fire	5.2.1 Reaction to fire	
3	4.3.1 Indoor environment, dampness	Watertightness	5.3.1 Watertightness	
		Water permeability	5.3.2 Water permeability	
		Water vapour permeability		5.3.3 Water vapour permeability (skin or VETURE unit)
		Moisture behaviour		5.3.4.1 capillarity test (VETURE unit)
			5.3.4.2 Hygrothermal *behaviour*	5.3.4.2 Hygrothermal *behaviour (VETURE unit)*
			5.3.4.3 Freeze/thaw *behaviour*	5.3.4.3 Freeze/thaw *behaviour (VETURE unit)*
	4.3.2 outdoor environment	Release of dangerous substances	5.3.5 Release of dangerous substances	

4	4.4 Safety in use	Resistance to wind load	*5.4.1.1* *Wind suction test* *5.4.1.2* *Fatigue test* *5.4.1.3* *Wind pressure test*	
		Mechanical resistance		5.4.2.1 Bond strength between skin and insulation product (VETURE unit)
			5.4.2.2 Pull-through tests of fixings 5.4.2.2.1 Through Insulation product 5.4.2.2.2 through skin	
				5.4.2.2.3 Resistance of grooved skin 5.4.2.2.4 Resistance of grooved insulation
			5.4.2.2.5 Pull-through resistance of fixings from profiles 5.4.2.3 Dead load test 5.4.2.4 Displacement test	
				5.4.3 Tests on retaining devices
		Resistance to horizontal loads	5.4.4 Resistance to horizontal point load	
		resistance to impact	5.4.5 Impact resistance	
		Shatter properties	5.4.6 Shatter properties	
5	4.5 Protection against noise	Airborne sound insulation	5.5 Protection against noise	
6	4.6 Energy economy and heat retention	Thermal resistance	5.6.1 Thermal resistance	
				5.6.2 Insulation product's thermal resistance 5.6.3 Skin's thermal resistance

Aspects of durability and serviceability	4.7 Aspects of durability and serviceability	Resistance to temperature variation, humidity and shrinkage	5.7.1 temperature variation, humidity and shrinkage 5.7.1.1 Kit	5.7.1.2 Insulation product
		moisture resistance	5.7.2.2 kit	5.7.2.1 skin 5.7.2.3 Adhesive
		Dimensional stability		5.7.3.1 Dimensional stability of skin 5.7.3.2 Dimensional stability of insulation product
			5.7.3.3 Thermal shock cycles	
		chemicals and biological resistance		5.7.4 chemicals and biological resistance (Skin)
		Corrosion		5.7.5 Corrosion (Skin, profiles and fixings)
		UV radiation		5.7.6 UV radiation (Skin)

Depending upon the nature and type of products, the text of the ETAG shall provide indications as to how products shall be identified for approval and other purposes. However what is written shall be flexible because of differences in manufacturing techniques, the possible range of sizes of factories/manufacturing facilities, size of batches and amount of product produced in a given time.

Because manufacturers have differing views as to what they are willing to provide to Approval bodies it is necessary to provide options from the list of example techniques and procedures below.

Example techniques and procedures to be considered either individually or in combination (not exhaustive)

- Fingerprinting (infrared, gas chromatography, ……..)
- Formulation (chemical constitution, recipes, composition of raw materials, amounts, components specified by characteristics, compliance with other specifications eg. ENs or by weight, volume, percentage……..)
- Manufacturing process parameters (temperature, pressure, time … product/production codes)
- Testing of physical characteristics - data (geometry, density, mechanical strength……). See Annex C.
- Calculations, detailing, drawings

Whichever method(s) is/are used it is necessary to recognise practical tolerances in relation to results/data collected.

It is however also essential that these techniques/methods shall be introduced only as far as they have or could have an influence on the fulfilment of the Essential Requirements, including aspects of durability.

5.1 Mechanical resistance and stability

This requirement is not relevant to VETURE kits (see ER4 Safety in Use).

5.2 Safety in case of fire

5.2.1 Reaction to fire

The VETURE kit and its components shall be tested, using the tests methods relevant for the corresponding reaction to fire class, in order to be classified according to EN 13501-1: 2002.

The potential contribution of a product to a fire does not only depend on its intrinsic properties and the thermal attack, but also to a large extent on its end-use situation when incorporated in the work. Tests shall be conducted therefore to simulate its end-use situation.

The reaction to fire classification and relevant testing should be given for the entire kit.

EN 13823 gives only a general description of the arrangement of the test specimen. Annex E includes precise, specific information about the SBI-Testing for VETURE kits.

For the time being, performing assessments according to the reaction to fire tests are judged sufficient in some countries for the determination of the behaviour in fire of the Veture kits; in countries requesting one or the other test for a façade fire scenario, an additional demonstration of the fitness for use in this context shall have to be given at national level, as long as the harmonised system is not available.

5.3 HYGIENE, HEALTH AND ENVIRONMENT

5.3.1 Watertightness (resistance to driving rain)

VETURE kits contribute to the watertighness of the wall. The degree of watertighness of a VETURE kit is generally assessed by appraisal of design, taking account of the characteristics of the materials used and the geometry of VETURE unit and joints.
If necessary, an artificial rain test may be carried out on the VETURE kit in accordance with EN 12865-1 Hygrothermal performance of buildings – Determination of resistance to driving rain under pulsating air pressure – Procedure A (600 Pa maximum).

5.3.2 Water permeability (resistance to water diffusion)

The penetration and the diffusion of water in the kit shall be visually assessed from the result of the watertightness test (according to § 6.3.1) and the possible alteration shall be evaluated with regard to the behaviour of the material when exposed to water and it's durability (see § 5.3.4.2 and § 5.3.4.3).

5.3.3 Water vapour permeability (resistance to water vapour diffusion)

The water vapour permeability test is required only if a condensation risk is identified.

Preparation of test specimen

It is possible to test VETURE samples with the skin and insulation layer assembled or skin samples obtained by separating the skin from the insulation product.

Five test samples are used. Their dimensions are at least 5000 mm².

Test procedure

The skin or VETURE unit test is carried out in accordance with EN ISO 12572 Hygrothermal performance of building materials and products - Determination of water vapour transmission properties.

The test should be carried out in an enclosure at (23 ± 2) °C and (50 ± 5) % RH. The dish contains a saturated solution of ammonium hydrogen phosphate ($NH_4H_2PO_4$).

Results

The water vapour permeance W is expressed in kg/(m^2.s.Pa) and the average value is determined.

Calculation

In the case where the skin is tested, the water vapour diffusion resistance Z of VETURE unit is calculated:

$$Z = d_{skin} / \delta_{skin} + d_{insulation} / \delta_{insulation}$$

Where d_{skin} = Skin thickness (in m)

δ_{skin} = Skin vapour permeance (in kg/(m.s.Pa)) = $W_{skin} \times d_{skin}$

$d_{Insulation}$= Insulation thickness (in m)

$\delta_{Insulation}$ = Insulation vapour permeance (known value of the generic type of insulation in accordance with EN 12524 or obtained in accordance with EN 12086)

In the case where the VETURE unit is tested, the water vapour diffusion resistance Z of VETURE unit is calculated:

$$Z = 1 / W_{Veture}$$

Where W_{Veture} = Veture vapour permeance (test result)

5.3.4 Moisture behaviour

5.3.4.1 Capillarity test

The capillarity test is required only where the skin material is known to be or suspected of being susceptible to water absorption.

For example°: Stone, fiber ciment, wood-based panels, brick slips, ceramics, factory applied render.

Preparation of the test specimens°:

Samples shall have a surface area of at least 200 mm x 200 mm.

Three samples are prepared.

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

The edges of the samples, including the insulation product (if attached), are sealed against water, to ensure that during subsequent testing, only the front face of the skin is subject to water absorption.

They are then subject to a series of 3 cycles comprising the following phases:

- 24 h partial immersion in a water bath (tap water) at (23 ± 2) °C. The samples are immersed face downwards, to a depth of 2 to 10 mm, the depth of immersion dependent upon surface roughness. To achieve complete wetting of rough surfaces, the samples 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.

- 24 h drying at (50 ± 5) °C.

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

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

Capillarity test procedure:
To start the capillarity test the samples are again immersed in a water bath as described above.

The samples are 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 sample is removed with a damp sponge cloth.

Footnote – Special requirements for some kits: If the VETURE kit is applied down to the ground and is therefore exposed to direct contact with earth and the risk of rising damp, the Approval Body may need to develop additional tests in an appropriate way subject to consensus within EOTA.

Test results:
Calculation is undertaken to determine the average water absorption of the three samples per square metre after 1 and 24 hours.

5.3.4.2 Hygrothermal Behaviour

This requirement is considered in paragraph 5.7.1.1.

5.3.4.3 Freeze-thaw behaviour

This requirement is considered in paragraph 5.7.2.

5.3.5 Release of dangerous substances

5.3.5.1 Presence of dangerous substances in the product

The applicant shall submit a written declaration stating whether or not the product/kit contains dangerous substances according to European and national regulations, when and where relevant in the Member States of destination, and shall list these substances

5.3.5.2 Compliance with the applicable regulations

If the product/kit contains dangerous substances as declared above, the ETA will provide the method(s) which has been used for demonstrating compliance with the applicable regulations in the Member States of destination, according to the dated EU data-base (method(s) of content or release, as appropriate).

5.3.5.3 Application of the precautionary principle

An EOTA member has the possibility to provide to the other members, through the Secretary General, warning about substances which, according to Health authorities of its country, are considered to be dangerous under sound scientific evidence, but are not yet regulated. Complete references about this evidence will be provided.

This information once agreed upon, will be kept in an EOTA data base, and will be transferred to the Commission services.

The information contained in this EOTA data base will also be communicated to any ETA applicant.

On the basis of this information, a protocol of assessment of the product, regarding this substance, could be established on request of a manufacturer with the participation of the Approval Body which raised the issue.

5.4 SAFETY IN USE

The admissible load in relation to the substrate to be applied to an anchor is that stated in an ETA or that determined according to the EOTA Guideline ETAG 014 "Plastic anchors for fixing of external thermal insulation composite systems with rendering".

A control of the mechanical properties of the products used for the tests has to be performed. If these are better than the mechanical properties to be declared in the ETA, so an appropriate correction of the test results is necessary.

5.4.1 Wind load resistance

Depending on the type of insulating product used in the veture unit, the wind suction test is either a static test (§ 5.4.1.1) or a fatigue test (§ 5.4.1.2) as follow:

- Cellular plastic or mineral wool : test according to § 5.4.1.1
- Other insulating products : test according to § 5.4.1.2

The VETURE kit can be tested without retaining device. If the purpose is to evaluate the bearing capacity of the retaining device, the prototype shall be designed in the way that only the retaining devices are transmitting the wind loads.

Note 1: In the particular case where the retaining device is operating as a mechanical fixing which contribute to the wind resistance of the veture kit, it can be tested with this retaining device.

Note 2: For non-vertical application, specific evaluation has to be made to incorporate the effect of the dead load of the veture unit in combination with the wind effect.

5.4.1.1 Wind suction test

VETURE kits are generally sensitive only to wind suction, therefore the principle of this test is to reproduce this action.

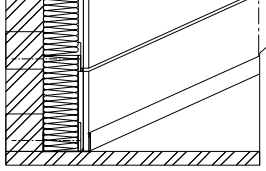
Both the tolerance due to manufacturing and/or installation and deformations due to temperature variations have to be taken into account and the more critical case shall be tested.

One test specimen for each chosen geometry is performed. If the test result obtained does not confirm the results obtained by mechanical tests in accordance with § 5.4.2, at least two other test specimen have to be tested.

Preparation of the test specimen

The test specimen shall be mounted in the test rig in accordance with the manufacturers instructions.
The test specimen comprises:

- A non airtight substrate (test rig) such as a rigid wooden or steel frame or masonry or concrete wall incorporating with holes with a minimum diameter at 15 mm/m².
- The VETURE unit secured with the specified fixing devices for the kit (adapted to the frame)
  The dimensions of the test specimen depend on the size of VETURE unit and the specified fixing devices:
  * If the VETURE units are mechanically independent (e.g. Family type B), at least one element shall be tested.
  * If the VETURE units are dependent on each other vertically and horizontally (e.g. Family type A or C), at least 3 x 3 elements shall be tested.
  * If the VETURE units are dependent on each other vertically or horizontally (e.g. Family type D), at least 4 elements shall be tested (see example below).



Test equipment

The test equipment consists of a suction chamber against which is placed the test rig. The depth of the pressure chamber shall be sufficient for an even pressure to be exerted on the test specimen (applied to the front surface of VETURE unit) irrespective of its possible deformation. The suction chamber is mounted on a rigid frame. The VETURE kit serves as the seal between pressure chamber and the environment. The connection between the skin and the chamber should be sufficient to allow a realistic deformation of the test kit under the influence of simulated wind uplift.

Test procedure

Uniformly distributed suction loads are exerted on the front face of VETURE kits.

Two pulses between zero and 300 Pa shall be applied.

The test is performed in successive steps of 500 Pa up to 1000 Pa and 250 Pa after 1000 Pa, with a return to zero at each level, until significant irreversible deformation occurs (see example fig 1bis).

The time for which the last is constant at each level (see fig. 1bis) shall be about 10 seconds. The time for each increase and decrease load shall be at least 1 second.

The test is then continued until failure occurs.

The deflection shall be measured at the centre of the VETURE element and on a fixing as a function of negative pressure and reported in tabular or graphic form.

With the differential pressure reduced to zero, the permanent deflection shall be noted after 1 minute recovery. The loads at which defects or damage occurs shall be noted.

Note: The mechanical fixing of the VETURE kit to the test rig should not be the failure point and shall therefore be chosen accordingly.

Sample failure is defined by any one of the following events e.g.:

1. The VETURE elements breaks,
2. Delamination occurs in the insulation product or between the insulation product and its facing,
3. The skin detaches,
4. The VETURE element is pulled off a fastener.

Test results

The test result is°:

- the load Q for which the test specimen fails (pressure step prior to the one at which failure occurs)
- the type of failure
- the value of maximum deflection

The test results are only valid for those fixing patterns tested.

Test specimen description

This should include the following details:

- VETURE unit (skin and insulation layer)
- Fixing system
- Fixing density
- Presence of retaining device

Fig. 1: Example of wind suction apparatus

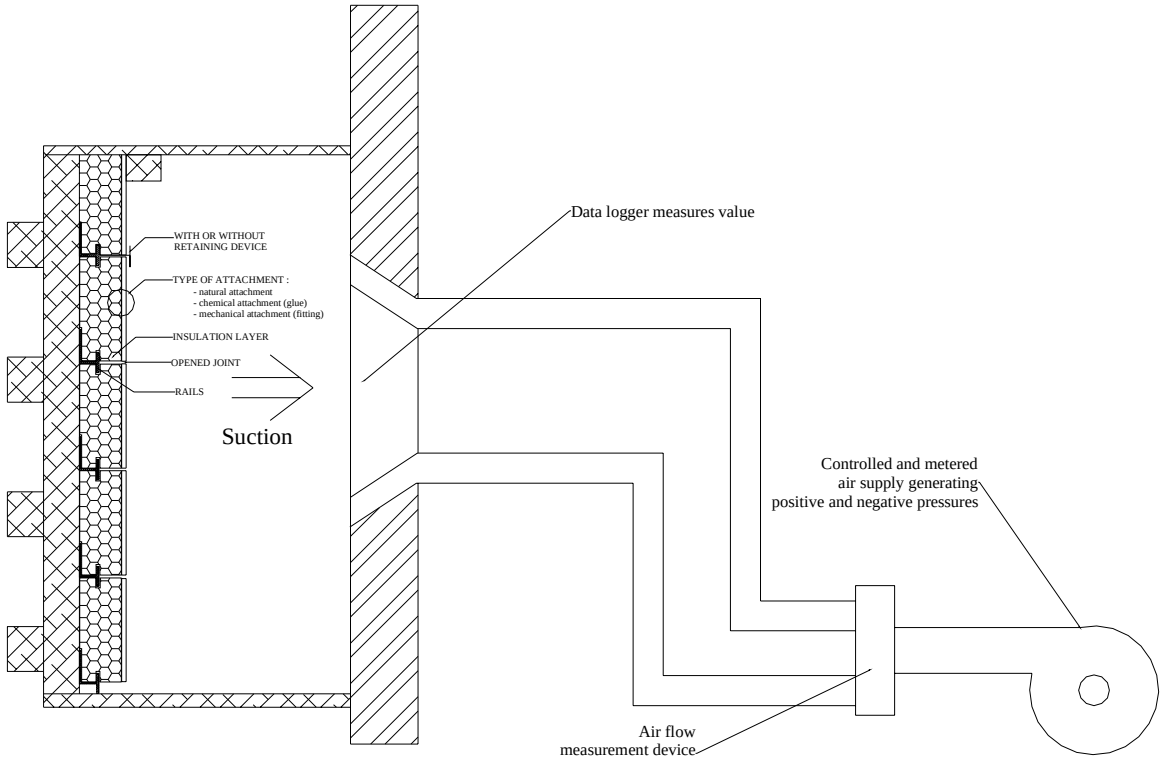
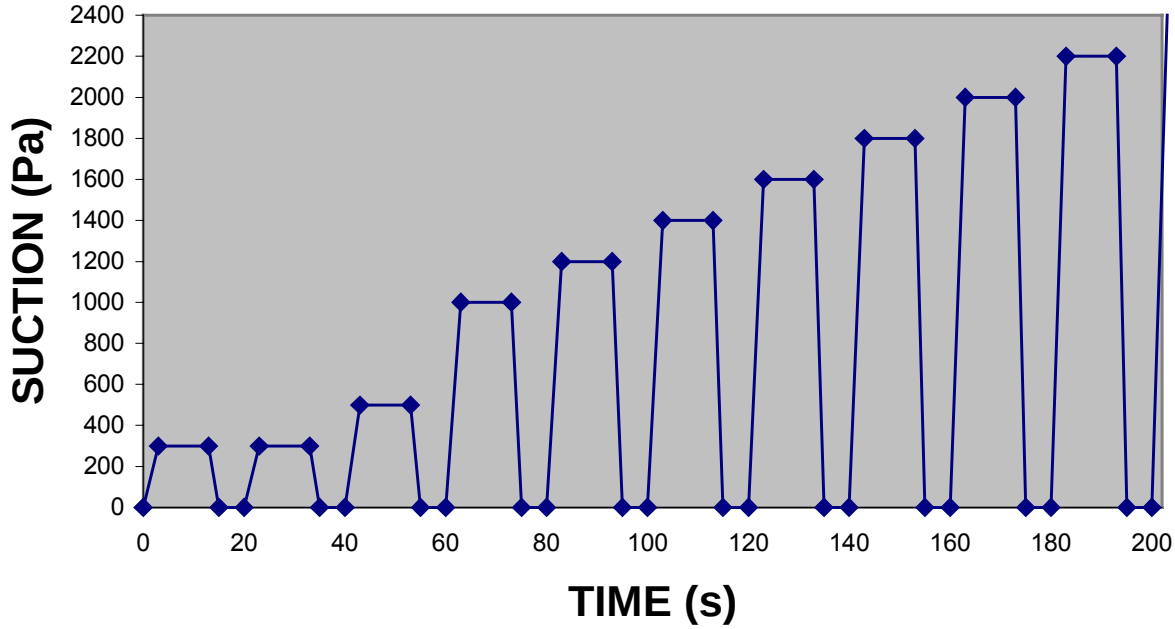


Fig. 1bis: Wind load (signal)



5.4.1.2 Fatigue test

It can be demonstrated by this test that the specimen resists fatigue.

Preparation of the test specimen

The test specimen shall be mounted in the test rig in accordance with the manufacturers instructions.

The test specimen comprises:

- A non airtight substrate (test rig) such as a rigid wooden or steel frame or masonry or concrete wall incorporating with holes with a minimum diameter of 15 mm/m^2.
- The VETURE units secured with the specified fixing devices for the kit (adapted to the frame)
- The dimensions of the test specimen depend on the size of VETURE unit and the specified fixing devices :
  * If the each VETURE units are mechanically independent, at least one element shall be tested.
  * If the VETURE units are dependent on each other vertically and horizontally, 3 x 3 elements shall be tested.
  * If the VETURE units are dependent on each other vertically or horizontally, at least 4 elements shall be tested.

Test equipment

The test equipment consists of a suction chamber against which is placed the test rig. The depth of the pressure chamber shall be sufficient for an even pressure to be exerted on the test specimen (applied to the front surface of VETURE unit) irrespective of its possible deformation. The suction chamber is mounted on a rigid frame. The VETURE kit serves as the seal between pressure chamber and the environment. The connection between the skin and the chamber should be sufficient to allow a realistic deformation of the test kit under the influence of simulated wind uplift.

Test procedure

The loads shown in Fig. 2 are applied, each gust having the profile shown in *Fig.* 2bis.

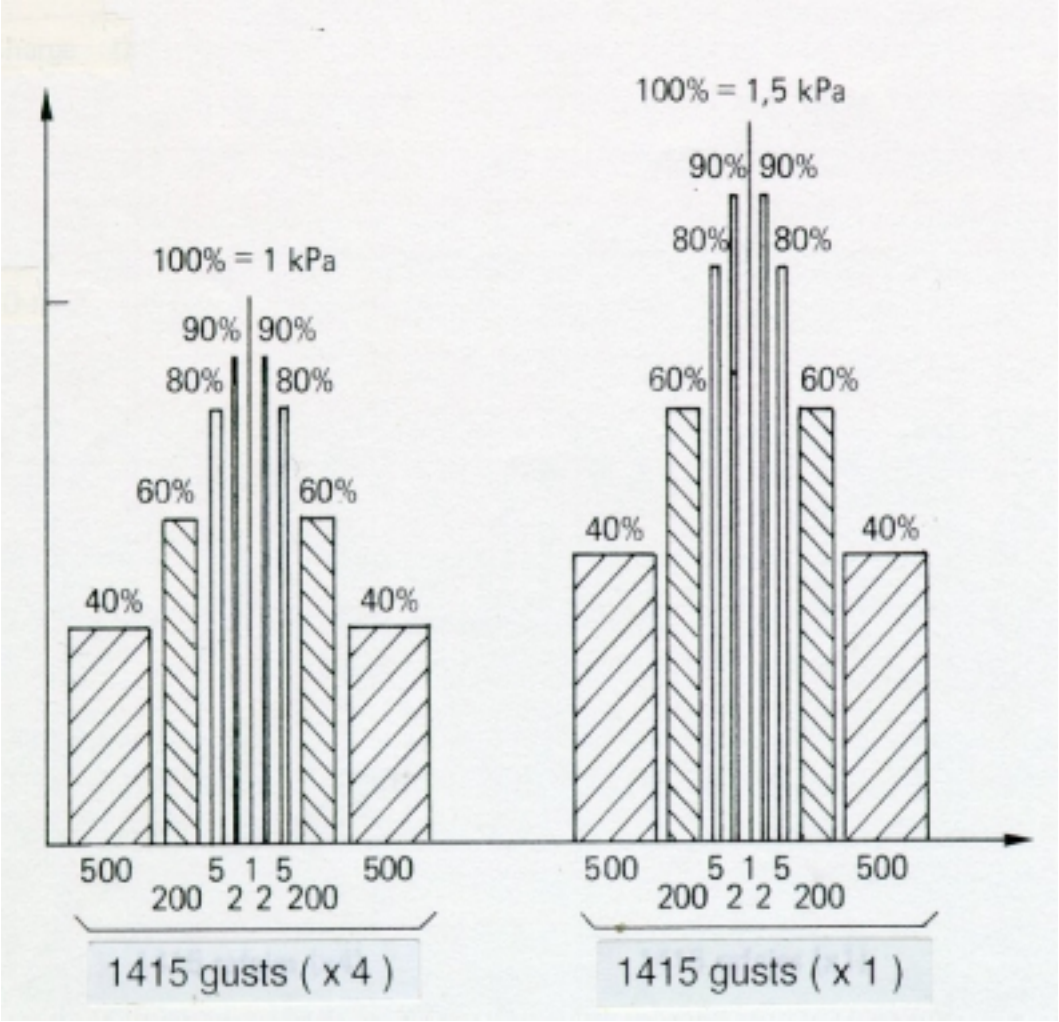


Figure 2: loads to be applied

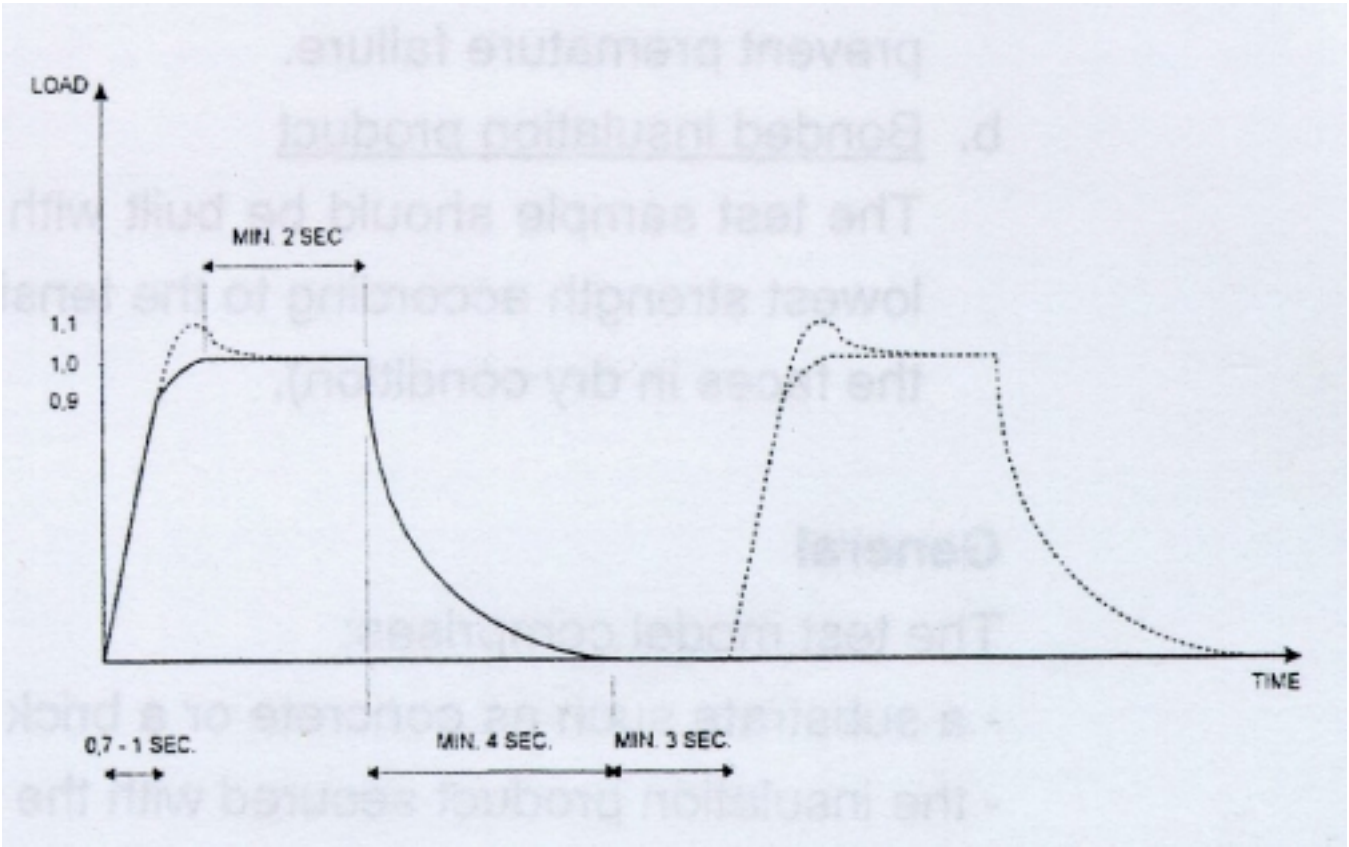


Figure 2bis: pressure/time profile of cyclic loads

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

Table 4 - 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 sample is tested until failure:

Failure is defined by any one of the following events:

1. The veture unit(s) breaks,
2. Delamination occurs in the insulation product or between the insulation product and its facing,
3. The skin detaches,
4. The veture unit is pulled off a fastener,

Test results

The test result Q_1 is the $W_{100\%}$ load in the cycle preceding that in which the test specimen fails.

5.4.1.3 Wind pressure test

In cases where wind pressure may be relevant (e.g. for some kits with air gap between the skin and the insulation layer), a supplementary test with a wind pressure load has to be performed. The test procedure is similar to § 5.4.1.1 or 5.4.1.2, only the wind action is inverse.

One test specimen for each chosen geometry is performed. If the test result obtained does not confirm the results obtained by mechanical tests in accordance with § 5.4.2, at least two other test specimen have to be tested.

5.4.2 Mechanical tests

The mechanical tests allow assessment of each part of VETURE kits.

The VETURE families A, B, C and D (see § 2.2.1) represent the most common kits and may be tested as detailed below. However different tests may be required depending on the design.

Family type A - Insulation grooved fixed by profiles : - Bond strength § 5.4.2.1 - Resistance of insulation grooved § 5.4.2.2.4 - Resistance of fixings from profiles § 5.4.2.2.5	Family type C – Skin grooved fixed by profiles : - Resistance of skin grooved § 5.4.2.2.3 - Resistance of fixings from profiles § 5.4.2.2.5
Family type B – VETURE unit fixed through	Family type D – Skin mechanicaly fixed to the

insulation layer : - Bond strength § 5.4.2.1 - Resistance of fixing through insulation layer § 5.4.2.2.1	substrate by ponctual fixing : - Resistance of fixing through the skin § 5.4.2.2.2

5.4.2.1 Bond strength between skin and insulation product

This test is required for VETURE where the skin bonds naturally to the insulation during the manufacturing process or is glued.

Both of the following tests are performed:

① On a panel of the insulation product faced with the skin

② On samples taken from the rig after hygrothermal cycles (heat-rain and heat-cold cycles) as foreseen in § 5.7.1.1.

③ On samples after the simulated freeze thaw frost test as foreseen in § 5.7.2.

Five squares, measuring 50 mm x 50 mm for cellular plastic and 200 mm x 200 mm for mineral wool, are cut through the skin *and just into* the insulation product layer using an angle grinder. Square metal plates of appropriate size are affixed to these areas with a suitable adhesive (*Fig. 3*).

Afterwards, the bond strength is measured at a tensioning speed of 10 mm/minute and individual and average values are recorded.

The results are expressed in MPa.

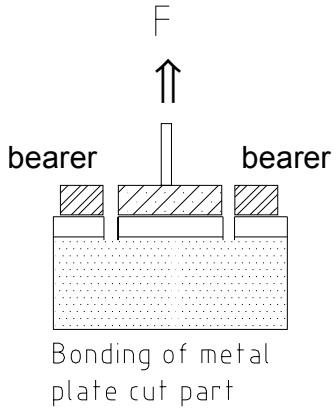


Fig. 3: Example of test device

The test report shall detail in accordance with Annex D:

- Each F_G value
- The average F_G value
- The characteristic $F_{G\ C}$ value giving 75 % confidence that 95 % of the test results will be higher than this value.
- The mode of failure description.

5.4.2.2 Pull-through tests of fixings

5.4.2.2.1 Through insulation product

This test is required only for VETURE kits with mechanical fixings through the insulation product.

The test is performed in ambient conditions.

Samples with a fixing driven through the centre of each sample are applied as show in Fig. 4.

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

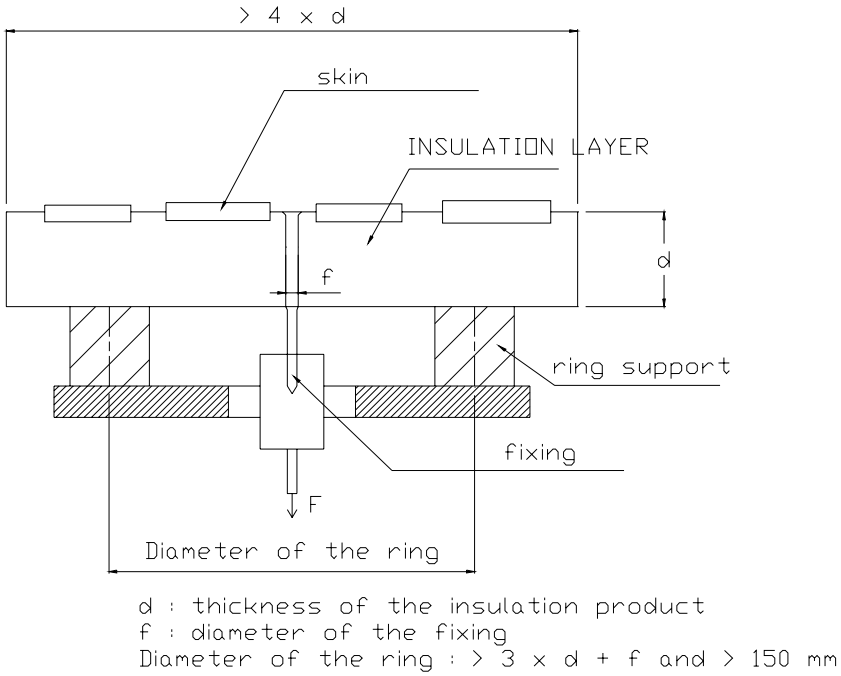


Fig. 4: Example of test of fixing

9 or more tests shall be carried out.

The results are expressed in N.

The test report shall detail the following in accordance with Annex D:

- Each F_I, value
- The average F_I, value
- The characteristic $F_{I\,C}$ value giving 75 % confidence that 95 % of the test results will be higher than this value
- The mode of failure description.

5.4.2.2.2 Through Skin

This test is required only for VETURE kits with mechanical fixings through the skin.

The test is performed in ambient conditions.

Samples, measuring 200 mm x 100 mm x the thickness of skin, with a fixing are applied to a rigid substrate as show in Fig. 5.

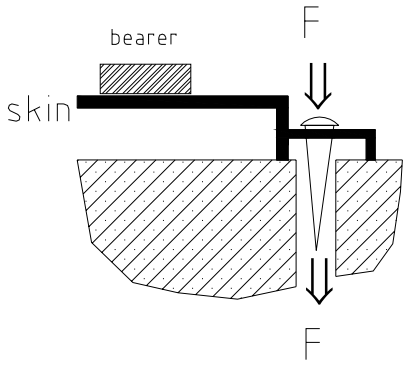


Fig. 5: Example of test of fixing

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

9 or more tests shall be carried out.

The results are expressed in N.

The test report shall detail the following in accordance with Annex D:
- Each F_S, value
- The average F_S, value
- The characteristic F_{SC} value giving 75 % confidence that 95 % of the test results will be higher than this value

- The mode of failure description.

5.4.2.2.3 Resistance of grooved skin

This test is required only for VETURE kits with a grooved skin which fits onto a profile.
The test is performed in ambient conditions.
Samples, with a fitting are applied to a rigid substrate as show in Fig. 6.

A force is exerted, at a speed rate of 5 mm/min on the profile. The force is applied by pulling the head of the profile. If brackets are used (instead of profile), then the length (L) of the brackets may be < 100 mm.

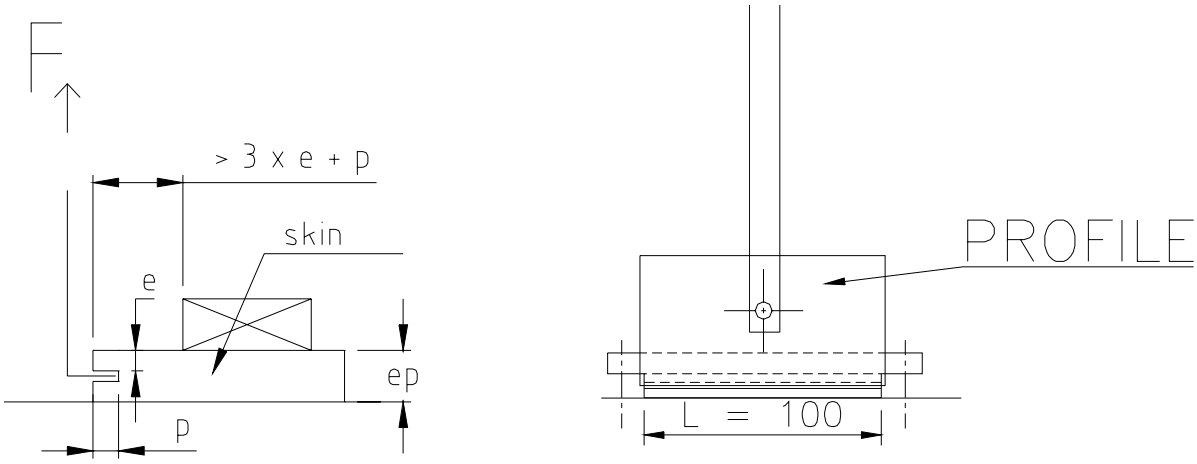


Fig. 6: Example of test of fixing

9 or more tests shall be carried out.

The results are expressed in N.

The test report shall detail the following in accordance with Annex D:
- Each F_f, value
- The average F_f, value

- The characteristic F_{fC} value giving 75 % confidence that 95 % of the test results will be higher than this value

- The mode of failure description.

5.4.2.2.4 Resistance of grooved insulation

This test is required only for VETURE kits with an insulation grooved to fit the profiles as shown below.
The test is performed in ambient conditions.
Samples incorporating the profile are applied to a rigid substrate (see Fig. 7).

A force is exerted, at a speed rate of 5 mm/min on the profile. The force is applied by pulling the head of the profile.

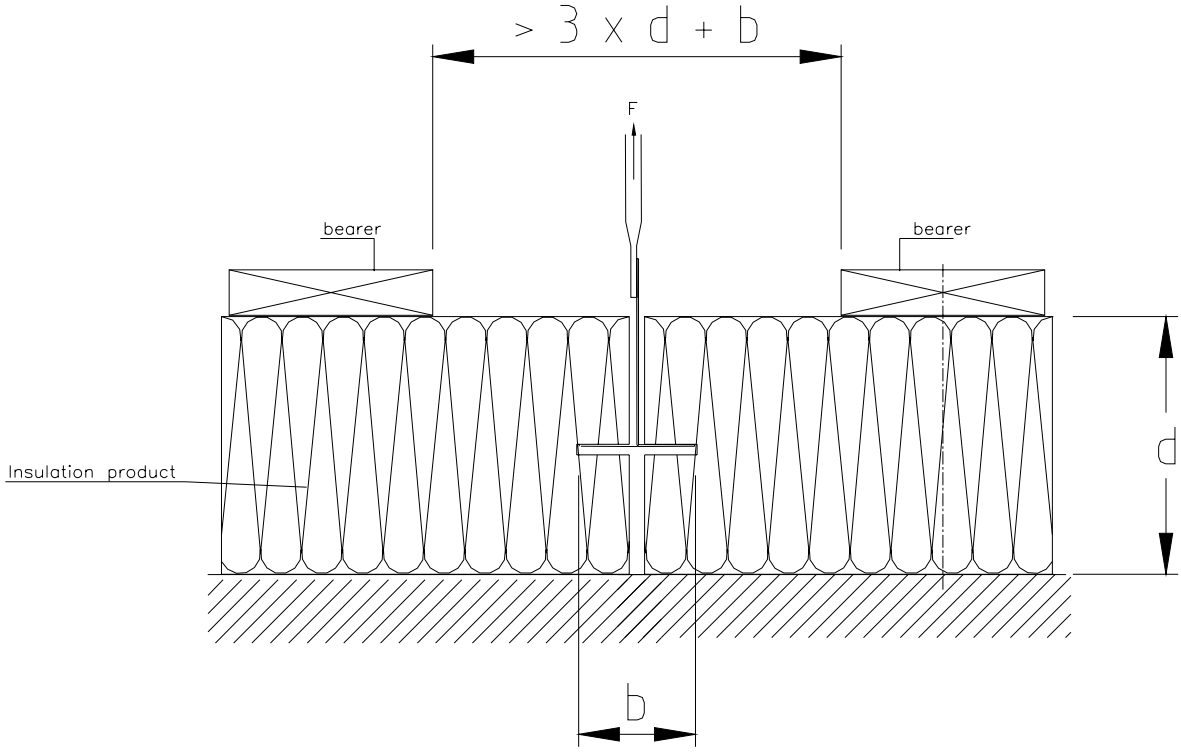


Fig. 7 : Example of test of fixing

9 or more tests shall be carried out.
The results are expressed in N.
The test report shall detail the following in accordance with Annex D:
- Each Fi_f value
- The Fi_f value
- The characteristic Fi_{fC} value giving 75 % confidence that 95 % of the test results will be higher than this value

- The mode of failure description.

5.4.2.2.5 Pull-through resistance of fixings from profiles

This test establishes the pull-through resistance of an anchor through the perforation in the profile.

The test is carried out on 9 samples each measuring 300 mm ± 20 mm and perforated in the centre, using a drill.
The apparatus consists of:
- A dynamometer,
- A support and metal screw as shown in Fig. 8.

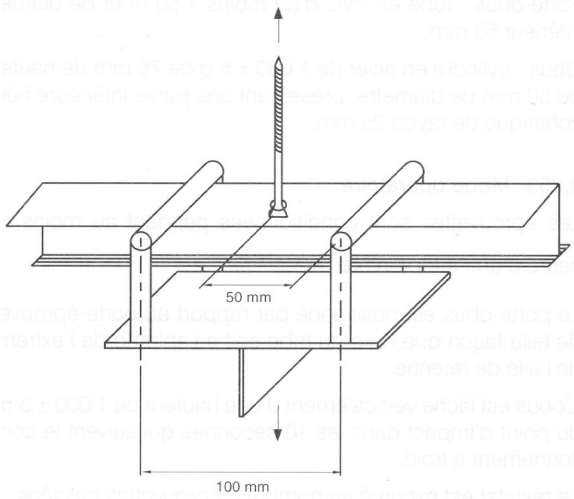


Fig. 8: Example of test

The samples are conditioned for at least 2 h at (23 ± 2) °C before the test.
The screw is placed perpendicular to the profile as described in Fig. 7.
The test is carried out at (23 ± 2) °C using a tensioning speed of 20 mm/min.
The pull-through resistance is expressed in N.
The test report shall detail the following in accordance with Annex D:

- Each R_S, value
- The average R_S, value
- The characteristic R_{SC} value giving 75 % confidence that 95 % of the test results will be higher than this value

- The mode of failure description.

5.4.2.3 Dead load test

This test is required for all families.
This test is performed in ambient conditions.
The veture kit is fixed to the wall, in accordance with the manufacters instructions.
The deflection of the profile or the veture unit shall be measured.
One VETURE unit is installed on the profile and an additional dead load equivalent to two VETURE units is added, on top of the first VETURE unit.
The test can be stopped when the deflection 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.

5.4.2.4 Displacement test

The displacement test is to assess the displacement of the kit at the edges of the wall and to determine the distance between the expansion joints in the kit.
These are not required for kits fulfilling one or more of the following criteria:

- The veture units are intended to be used with continuous areas of the skin (that means without expansion joints) less than 6 m x 6 m.
- The veture units are mechanically fixed on the substrate and are supplementary bonded on it with an appropriate adhesive (bonded area $\geq$ 40 % of the veture unit area).
- The E x d < 50 000 N/mm (E: modulus of elasticity of the skin, d: thickness of the skin)

Preparation of samples:

The test is performed with the thinnest insulation layer envisaged to be covered by the ETA.

A reinforced concrete slab measuring 1.0 m x 2.0 m with a thickness of 100 mm is prepared with a smooth surface. A small layer of sand is placed on the top of the slab to allow the insulation product to slide. The VETURE kit shall be fixed to the concrete slab with the minimum number of mechanical fixing devices according to the ETA-applicant's instructions.

The test shall be conducted at (23 $\pm$ 2) °C and (50 $\pm$ 5) % RH.

Before testing, a foam block is bonded to the skin; the skin is fixed to the clamping jaws over its full length.

Execution of test:

A simulated wind suction load of 2 000 Pa is applied to the VETURE kit via the foam block. Simultaneously, a normal tensile load is applied to the skin as indicated in fig. 9.

At a tensioning speed of 1 mm/min the resulting displacement of the kit relative to the concrete slab and the corresponding load is measured.

Preferably, the concrete slab is placed on the top and the VETURE kit is applied under the slab.

Analysis of results

The load/displacement curve is recorded until failure occurs and the displacement U_e corresponding to the limit of elasticity is determined (see Fig. 10).

The length of the wall or the distance between expansion joints is calculated using the following equation as a function of the claimed ΔT:

$$L = U_e / (\alpha_T \times \Delta T)$$

Where U_e = displacement corresponding to the elasticity limit

α_T = coefficient of linear thermal elongation

ΔT = temperature variations in the skin

L = length of wall or distance between expansion joints

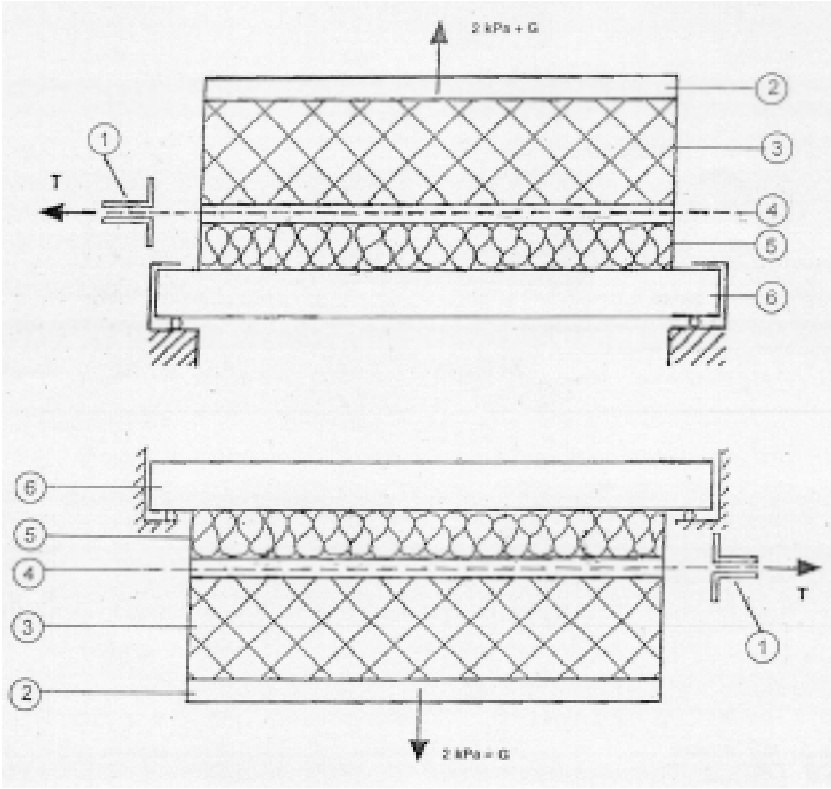


Fig. 9: Principle for displacement-test

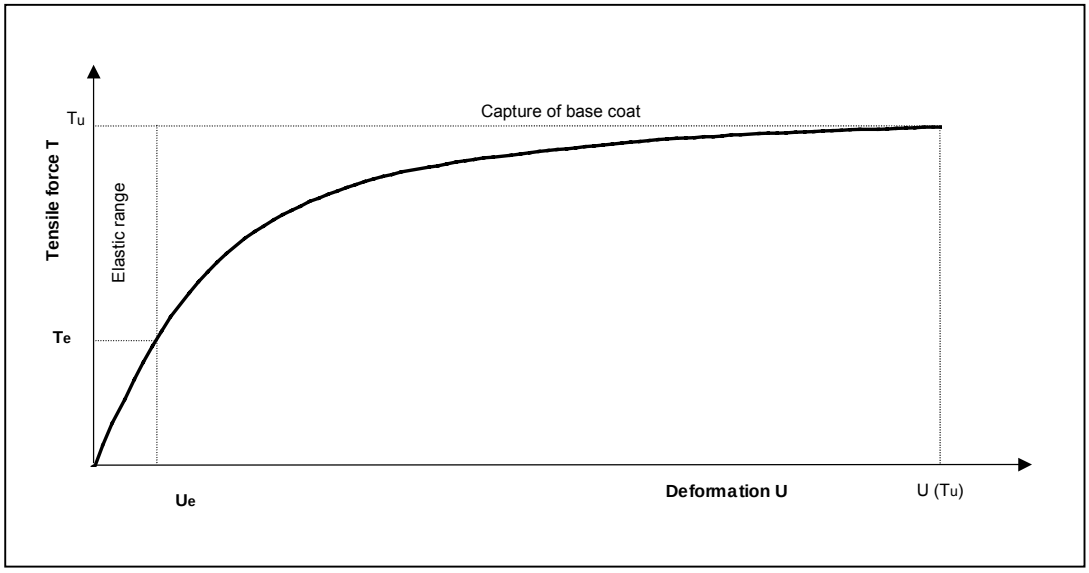


Fig. 10: Load/displacement curve

5.4.3 Tests on retaining devices

The performance of the devices shall be assessed by tests or calculations with consideration of the method of attachment to the substrate. Due to the variety of designs, the approval body will decide upon the relevant approach.

5.4.4 Resistance to horizontal point load

The VETURE kit shall be capable of accommodating the horizontally applied loads acting on its surface arising from maintenance such as a ladder bearing against it, without any reduction in its performances.

A static 500 N load applied horizontally to two square areas of 25 x 5 mm^2 and 440 mm apart on the surface of the VETURE kit.

Any permanent deformation such as rupture or perforation is noted.

5.4.5 Impact resistance

This test is performed in accordance with EOTA Technical Report (001).

5.4.5.1 Resistance to hard body impact

Hard body impact tests are performed as described in ISO 7892: 1988, “Vertical building elements – Impact resistance tests – Impact bodies and general test procedures”. The points of impact are selected taking into account various modes of behaviour of walls and their cladding, 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 VETURE unit).
Hard body impacts (10 Joules) are carried out with the steel ball weighing 1 kg and from a height of 1.02 m (At least three locations).
Hard body impacts (3 Joules) are carried out with the steel ball weighing 0.500 kg and from a height of 0.61 m (At least three locations).

Observations:
The presence of any micro cracks or cracks, at the impact point and at the circumference, is noted. The width of any crack is measured and noted.

5.4.5.2 Resistance to soft body impact

Soft body impact tests are performed as described in ISO 7892: 1988, “Vertical building elements – Impact resistance tests – Impact bodies and general test procedures”. The points of impact are selected taking into account various modes of behaviour of walls and their cladding, 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 VETURE unit).

Soft body impacts (10 to 60 Joules) are carried out with the ball weighing 3 kg and from a height of 0.34 to 2.04 m (At least three locations).

Soft body impacts (300 to 400 Joules) are carried out with the ball weighing 50 kg and from a height of 0.61 to 0.82 m (Approximately at the centre of a VETURE unit).

Observations:

- The width of the impact is measured and indicated,
- The presence of any micro cracks or cracks, at the impact point and at the circumference, is noted.

5.4.5.3 Resistance to perforation

This test is conducted on skin thicknesses that are less than 5 mm.
An example of the apparatus, which enables perforating impacts to be reproduced, is given in fig 11. It is calibrated with a hemispherical indentors (Fig. 12) reproducing the impact of a steel sphere weighing 0.500 kg falling from 0.765 m.
The measurements are taken from at least three locations with the perforating cylindrical indentors shown in the following pictures.
Observations:

The diameter of the indentor used without perforating the skin is to be noted.

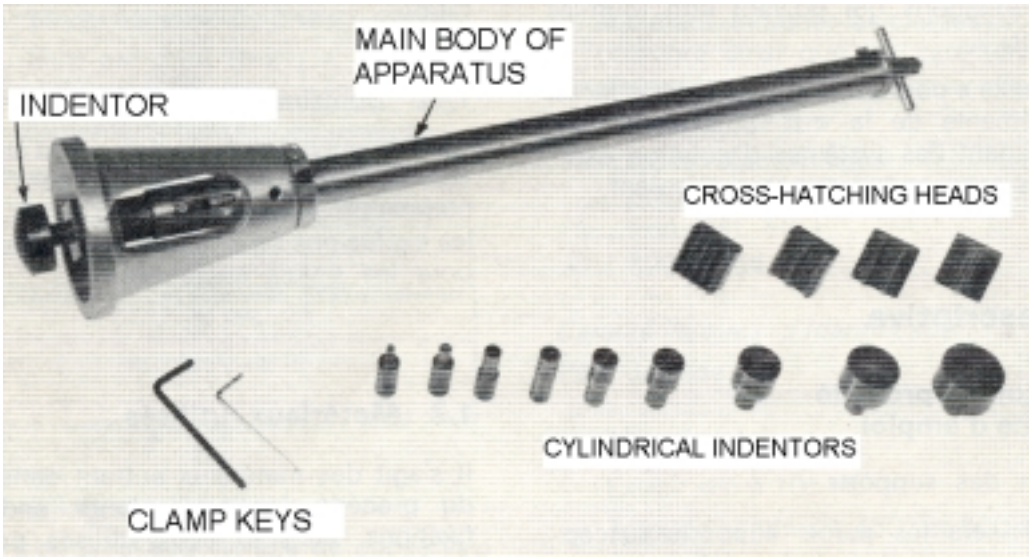


Fig. 11: Example of apparatus

No	1	2	3	4	5	6	7	8	9
Ø D	4	6	8	10	12	15	20	25	30
A	10	10	15	15	15	15	15	15	15
B	20	20	15	15	15	15	15	15	15

Quenched and tempered steel (R = 180 kgmm^{-2})

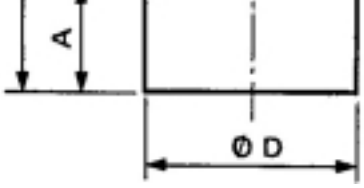


Fig.12: Indentors

5.4.6 Shatter properties

Before and after the impact test (§ 5.4.5), the Approval body shall examine the VETURE kit and note the presence of any sharp or cutting edges and if the surface could cause bodily injury.

5.5 PROTECTION AGAINST NOISE

The acoustic insulation of a facade will be governed by the design and the installation.
Where specific acoustic properties are claimed, the VETURE kit is assessed using EN-ISO 140-3 Acoustics – Measurement of sound insulation in buildings and of building elements – Part 3: Laboratory measurements of airborne sound insulation of building elements or EN ISO 717-1 Acoustics – Rating of sound insulation in buildings and of building elements Part 1: Airborne sound insulation, on the rig (at least 4 square meters).

It is only possible to assess the sound insulation if the VETURE kit is tested with the substrate (external wall). 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 weight/m^2 of the skin material and the type of fixings in the substrate have to be known.

NPD option should be allowed.

5.6 ENERGY ECONOMY AND HEAT RETENTION

5.6.1 Thermal resistance

The thermal resistance (R-value) is calculated from the thermal resistance of the insulation product, determined in accordance with 5.6.2, and from the tabulated R value of the skin, determined in accordance with 5.6.3, as described in:

- EN ISO 6946: Building components and building elements - Thermal resistance and thermal transmittance - Calculation method.
-EN ISO 10211-1: Thermal bridges in building construction - Heat flows and surface temperatures - Part 1: General calculation methods.

-EN ISO 10211-2: Thermal bridges in building construction - Heat flows and surface temperatures - Part 2: Linear thermal bridges.

The thermal bridges caused by mechanical fixing devices and air spaces shall be taken into account using the appropriate calculation method defined in these standards.

Note: For the measurement of R-value, the EN ISO 8990 Thermal insulation - Determination of steady-state specific thermal transmission properties – Calibrated and guarded hot box, may be used.

5.6.2 Insulation product's thermal resistance

The thermal resistance of the insulation product is determined as a characteristic value calculated as a fractile 90/90 according to:

- EN 12524: Building materials and products - Hygrothermal properties - Tabulated design values.

-EN ISO 10456: Building materials and products – Procedures for determining declared and design thermal values.

If appropriate, these values should be derived from the declared values according to EN 13162 to EN 13171 Thermal insulation products for buildings using the appropriate correction coefficents.

If the insulating product is changed or specific to the VETURE kit (e.g. PUR injected), the thermal resistance shall be evaluated as a fractile 90 value on the base of a mean value over 25 years according to chapter 4.2.1 of the corresponding EN standard (e.g. EN 13165 for PUR foam) and the annexes A and C (ageing if including any influence associated with humidity and all ageing factors).

If the insulating product is not defined by reference of a harmonised EN standard, the evaluation method shall refer to another ETA guideline or guideline according to Art. 9.2 of the CPD.

For the measurement of the R value, the following methods may be used:

-EN ISO 8990: Thermal insulation - Determination of steady-state specific thermal transmission properties – Calibrated and guarded hot box.

-EN 12667: Building materials - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods – Products of high and medium thermal resistance

-EN 12939: Building materials – Determination of thermal resistance by means of guarded hot plate and heat flow meter methods – Thick products of high and medium thermal resistance

5.6.3 Skin's thermal resistance

Thermal resistance of the skin is determined in accordance with:

-EN 12524: Building materials and products – Hygrothermal properties – Tabulated design values.

-EN ISO 10456: Building materials and products – Procedures for determining declared and design thermal values.

5.7 ASPECTS OF DURABILITY AND SERVICEABILITY

5.7.1 Temperature variation, humidity and shrinkage

5.7.1.1 Kit

This test is required only for VETURE kits, that are known to be or suspected of being sensitive to hygrothermal variation such as skins made from factory applied render, brick slips, and thin layers of stone.

Ten samples are prepared at the same time as the rig in order to evaluate the bond strength between the skin and insulation product after heat/rain and heat/cold cycles (see relevant test method § 5.4.2.1 for sample size and number). The five samples could also be taken out of the rig after heat/rain and heat/cold cycles.

Preparation of the rig

- The kit is applied, in accordance with the manufacturer's instructions, to a sufficiently stabilised masonry substrate (minimum 28 days).
- The kit may be applied to the lateral faces of the supporting wall.
- The installation details (quantities of material applied, position of the joints between elements, fixing devices, etc ...), have to be checked and registered by the laboratory.
- The dimensions of the rig shall be:
  - Surface $\geq$ 6 m²
  - Width $\geq$ 2.50 m
  - Height $\geq$ 2.00 m

Sealed joints shall be sufficiently stabilised prior to test (normally 28 days for cement seals).

Method of operation

The test apparatus is positioned against the front face of the rig at approximately 0.10 to 0.30 m from the edges. Five samples are inside the test apparatus.

The specified temperatures during the cycles are measured at the surface of the rig. The regulation shall be obtained by warm air.

Heat - rain cycles

The rig is subjected to a series of 80 cycles, comprising the following phases:

1 - Heating to + 70°C (rise for 1 hour) and maintaining at (+ 70 $\pm$ 5) °C and 10 to 30 % RH of air for 2 hours (total of 3 hours),
2 - Spraying for 1 hour (water temperature (+ 15 $\pm$ 5) °C, amount of water 1 l/m^2 min),
3 - Leave for 2 hours (drainage).

Heat-cold cycles

After at least 48 hours of subsequent conditioning at temperatures between + 10 and + 25°C and a minimum relative humidity of 50 %, the same test rig is 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 of air for 7 hours (total of 8 hours),
2 - Exposure to (- 20 ± 5) °C (fall for 2 hours) for 14 hours (total of 16 hours).

Bond strength between skin and insulation product

Five samples, prepared or taken out of the rig, are tested in according with 5.4.2.1, before and after cycles.

Observations during the test

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, loss of adhesion, bowing, formation of cracks, efflorescence, colour change, etc ...) are recorded as follows:

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

Following the completion of the test, a further investigation is conducted involving removal of sections to observe any water penetration within the kit.

5.7.1.2 Insulation product

In dry conditions

In accordance with EN 1607 "Determination of tensile strength perpendicular to the faces".

In wet conditions

If the characteristics of the insulation product could deteriorate with exposure to humidity, the test should be carried out in wet conditions.

The size of the test samples is 150 mm x 150 mm x thickness.

The testing is performed as a three test series with a minimum of 8 samples exposed for 5 days to vapour from a warm water bath.

The samples are placed over a container half filled with water. The temperature of the water is regulated at (60 ± 5) °C.

The spaces between the samples shall be filled with extruded polystyrene to prevent the water vapour passing through.

The upper surfaces are covered with an aluminium plate.

They are then removed and conditioned as follows:

Series 1: 7 days in a sealed plastic bag at (23 $\pm$ 2)°C followed by a drying period, out of the bag at (23 $\pm$ 2)°C and (50 $\pm$ 5) % RH until constant weight is achieved,

Series 2: 28 days in a sealed plastic bag at (23 $\pm$ 2)°C and 2 hours out of the bag at (23 ± 2)°C and (50 ± 5) % RH,

Series 3: 28 days in a sealed plastic bag at (23 $\pm$ 2)°C following by a drying period out of the bag at (23 $\pm$ 2)°C and (50 $\pm$ 5) % RH until constant weight is achieved.

The plastic bag consists of polyethylene material 0.2 mm thick.

The tensile strength perpendicular to the face is determined after each conditioning, and expressed in MPa.

Remark: The weight is considered constant when the weight difference between two measurements carried out at intervals of 24 hours is within 5 %.

5.7.2 Freeze-thaw

5.7.2.1 Skin

The freeze/thaw resistance of the skin shall be assessed according to the relevant EN standards. The following list of examples is not exhaustive, but gives some relevant standards:

- Stone prEN 12371 Determination of frost resistance
- Terra cotta EN 539-2 Determination of frost resistance
- Fiber-cement flat sheets EN 12467 Fibre-cement flat sheets – Products specifications and test methods
- Ceramics EN ISO 10545-12 Determination of frost resistance

5.7.2.2 Kit

This test is required only for VETURE kits that are known to be or suspected of being sensitive to freeze-thaw cycles, such as factory applied render, stone, fibre cement, woodbased panels, brick slips and ceramics.

For skins made with factory applied render, the freeze/thaw test shall be conducted except if the water absorption after 24 hours VETURE unit is less than 0.5 kg/m²(§ 5.3.4.1).

For VETURE unit with skin made of an other material, the approval body shall decide if the freeze/thaw test shall be conducted based on the result of water absorption after 24 hours (§ 5.3.4.1).

Ten samples are prepared at the same time as the rig in order to evaluate the bond strength between the skin and insulation product after heat/rain and heat/cold cycles (see relevant test method § 5.4.2.1 for sample size and number). The five samples could also be taken out of the rig after freeze/thaw cycles.

Preparation of the rig

- The kit is applied, in accordance with the manufacturer's instructions, to a sufficiently stabilised masonry substrate (minimum 28 days).
- The kit may be applied to the lateral faces of the supporting wall.
- The installation details (quantities of material applied, position of the joints between elements, fixing devices, etc ...), have to be checked and registered by the laboratory.
- The dimensions of the rig shall be:
  - Surface $\geq$ 6 m²
  - Width $\geq$ 2.50 m
  - Height $\geq$ 2.00 m

Sealed joints shall be sufficiently stabilised prior to test (normally 28 days for cement seals).

Method of operation

The test apparatus is positioned against the front face of the rig at approximately 0.10 to 0.30 m from the edges. Five samples are inside the test apparatus.
The specified temperatures during the cycles are measured at the surface of the rig.

Cycles

The rig is then subjected to a series of 30 cycles comprising:
- Exposure to water for 8 hours at (+ 23 ± 2) ° C
- Freezing to (- 20 ± 2) °C (fall for 2 hours) for 14 hours (total of 16 hours).

Bond strength between skin and insulation product

Five samples, prepared or taken out of the rig, are tested in according with 5.4.2.1, before and after cycles.

Observations during the test

At periods of every three cycles during the freeze-thaw cycles, observations relating to a change in characteristics of the surface or to the behaviour of the entire kit are recorded according to § 5.3.4.2.

Alternative freeze thaw test:

It's possible to use the alternative test.

The test shall be carried out on three VETURE samples 500 mm x 500 mm.

These samples are prepared according to the manufacturer's instructions and then stored for 28 days at (23 + 2) °C and (50 + 5) % RH.

Cycles

The samples are then subjected to a series of 30 cycles comprising:

- *Exposure to water for 8 hours at (+ 20 ± 2) °C by immersion of the samples, render face downwards, in a water bath, by the method described in 5.1.3.4.1 Capillarity test.*
- Freezing to (- 20 ± 2) °C (fall for 2 hours) for 14 hours (total of 16 hours).

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

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

Observations during the test:

At periods of every three cycles during the freeze-thaw cycles, observations relating to a change in characteristics of the surface or to the behaviour of the entire system are recorded according to 5.7.1.1.

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

5.7.2.3 Adhesive

If necessary, the freeze/thaw resistance of the adhesive may be assessed according to the EN 29142 Adhesives – Guide to the selection of standard laboratory ageing conditions for testing bonded joints and EN 1465 Adhesives – Determination of tensile lap-shear strength of rigid-to-rigid bonded assemblies.

5.7.3 Dimensional stability

5.7.3.1 Skin

The dimensional stability is determined using the following°:

- for the PVC : EN 479 Unplasticized polyvinychloride (PVC-U) profiles for the fabrication of windows and doors – Determination of heat reversion

- for the laminates panels : EN 438-2 Decorative high-pressure laminates (HPL) – Sheets based on thermosetting resins – Part 2: Determination of properties
- for the wood based panels : EN 318 Wood based panels – Determination of dimensional changes associated with changes in relative humidity
- for ceramics : EN ISO 10545-8 Determination of linear thermal expansion or EN ISO 10545-10 Determination of moisture expansion
- EN or ISO standard, otherwise, suitable internal procedures for other materials can be used.

5.7.3.2 Insulation product

In accordance with EN 1604 "Determination of dimensional stability under specified temperature and humidity conditions" (exposition at 70°C for 7 days).

5.7.3.3 Thermal shock cycles

The test is required for VETURE unit where the skin may be sensitive to dimensional variations such as woodbased panel, plastics, laminates, fibre cement, metal, etc.

This test is not needed if the VETURE kit has already been subjected to the test describe in § 5.7.1.1.

Preparation of specimen test°:

The test specimen shall be mounted in the test rig in accordance with the manufacturer instructions.

The test specimen comprises:

- a substrate (test rig) such as a timber or steel frame (which will not warp)

- the VETURE kit secured with the specified fixing devices for the kit (adapted to the frame)

Equipment

Equipment shall be provided to heat and cool the exterior face of the test specimen. It shall be designed to measure and record the interior and exterior VETURE surface temperatures at critical points of interest.

Method of operation

Phase I

The exterior of the test specimen is heated from ambient temperature (+20 ± 5°C) so that the average surface temperature of exterior test specimen surface reaches +70°C (± 3°C) if the sun absorption coefficient of the skin is less than 0,7 or +80 °C (± 3°C) if it's more than 0,7.

Once these conditions are achieved, they are maintained for at least 4 hours.

Phase II

The heat equipment is turned off and the exterior of the specimen allowed cooling to ambient temperature without assistance. Once steady temperature is achieved, this shall be maintained for at least 1 hour.

Phase III

The exterior of the test specimen is heated from ambient temperature so that the average surface temperature of exterior test specimen surface reaches +70 or +80 °C. Once these conditions are achieved, they are maintained for at least 1 hour.

Phase IV

The heating equipment is turned off and the exterior of the specimen is cooled quickly (less than 20 min) to ambient temperature (20 ± 5°C).

Once these conditions are achieved, they are maintained for only 1 minute.

A temperature cycle comprises one set of Phase III and IV involves three of these cycles.

Observations during the test

After each cycle, observations relating to a change in characteristics or performance (blistering, detachment, loss of adhesion, bowing, formation of cracks, efflorescence, colour change, etc ...) are recorded as follows:

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

5.7.4 Chemical and biological resistance

The test is required for VETURE kits with a skin which is known to be or suspected of being sensitive to chemical and biological attack such as woodbased panel, plastics, etc.

Assessment is conducted in accordance with the latest European Standards adapted for the relevant product. The following list which is not exhaustive, give examples of some standards:

- To assess durability of woodbased panel:
  - EN 321 Wood based panels – Determination of moisture resistance under cyclic test conditions
  - EN 335-1 Durability of wood and wood based products – Definition of hazard classes of biological attack – Part 1: General
  - EN 335-2 Durability of wood and wood based products – Definition of hazard classes of biological attack – Part 2: Application to solid wood
  - EN 335-3 Durability of wood and wood based products – Definition of hazard classes of biological attack – Part 3: Application to wood based panels

- EN 350-2 Durability of wood and wood based products – Natural durability of solid wood – Part 2: Guide to natural durability and treatability of selected wood species of importance in Europe

- EN 351-1 Durability of wood and wood based products – Preservative-treated solid wood – Part 1: Classification of preservative penetration and retention

- EN 460 Durability of wood and wood based products – Natural durability of solid wood – Guide to the durability requirements for wood to be used in hazard classes

- EN 599-1 Durability of wood and wood based products – Performance of preventive wood preservative as determined by biological tests – Part 1: Specification according to hazard class

- EN 599-2 Durability of wood and wood based products – Performance of preventive wood preservative as determined by biological tests – Part 2: Classification and labelling

• To assess durability of plastics :

- ISO 846 Plastics – Methods of assessing of microorganism action

• To assess durability of stone :

- PrEN13919 Ageing test with SO2 and moisture

• To assess durability of fibre-ciment product :

- UEATc technical guide for the assessment of the durability of thin fibre reinforced cement products (without asbestos) for external use

5.7.5 Corrosion

5.7.5.1 Skin made of steel, steel alloys or stainless steel

The skin is defined in accordance with the following standards:

- EN 10020 Definition and classification of grades of steel

- EN 10147 Continuously hot-dip Zinc coated structural steels strip and sheet – Technical delivery conditions

- EN 10088-1 Stainless steels – Part 1: List of stainless steels

- EN 10088-2 Stainless steels – Part 2: Technical delivery conditions for sheet/plate and strips for general purposes

5.7.5.2 Skin made of aluminium or aluminium alloys

The skin is defined in accordance with the following standards:

- EN 485-2 Aluminium and aluminium alloys – Sheet, strip and plate – Part 2: Mechanical properties

- EN 573-3 Aluminium and aluminium alloys – Chemical composition and form of wrought product – Part 3: Chemical composition

- EN 755-1 Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles - Part 1: Technical conditions for inspection and delivery

- EN 755-2 Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles - Part 2: Mechanical properties

- EN 1396 Aluminium and aluminium alloys – Coil coated sheet and strip for general applications – Specification

5.7.5.3 Fixations

To assess the corrosion of fixations, the approval body will make reference to the following European Standard:

- EN ISO 898-1 Mechanical properties of fasteners made of carbon steel and alloy steel – Part 1: Bolts, screws and studs.

- EN ISO 3506-1 Mechanical properties of corrosion-resistant stainless-steel fasteners – Part 1: Bolts, screws and studs.

- ISO 9227 Corrosion test in artificial atmospheres – Salt spray tests

5.7.6 UV radiation

The test is required for VETURE kits with a skin known to be or suspected of being sensitive to UV radiation such as polyester, plastics, laminates, coated skin products (steel, alumuinium, fibre ciment, PVC, polyester, etc…).

The approval body will make reference, for the methods of exposure to laboratory light sources, to the following standard:

- ISO 877 Plastics – Methods of exposure to direct weathering, to weathering using glaa-filtered daylight, and to intensified weathering by daylight using Fresnel mirrors

- ISO 4607 Plastics – Methods of exposure to natural weathering

- EN ISO 4892-1 Plastics – Methods of exposure to laboratory light sources – Part 1: General guidance

- EN ISO 4892-2 Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc sources

- EN ISO 4892-3 Plastics – Methods of exposure to laboratory light sources – Part 3: Fluorescent UV lamps

- EN ISO 4892-4 Plastics – Methods of exposure to laboratory light sources – Part 4: Open-flame carbone-arc lamps

After the ageing test, the approval body can assess the change in the characteristics by identification tests (e.g. Modulus of elasticity, hardness) as described in Annex B.

Note: The colour change can be measured in accordance with:

- ISO 7724-1 Paints and varnishes – Colorimetry – Part 1 : Principles
- ISO 7724-2 Paints and varnishes – Colorimetry – Part 2 : Colour measurement
- ISO 7724-3 Paints and varnishes – Colorimetry – Part 3 : Calculation of colour differences
- ISO 105 A01 Textiles – Tests for colour fastness – Part A01: General principles of testing
- ISO 105 A02 Textiles – Tests for colour fastness – Part A02: Grey scale for assessing change in colour
- ISO 105 A03 Textiles – Tests for colour fastness – Part A03: Grey scale for assessing staining

6 ASSESSING AND JUDGING THE FITNESS OF PRODUCTS FOR AN INTENDED USE

This chapter details the performance requirements to be met (chapter 4) in precise and measurable (as far as possible and proportional to the importance of the risk) or qualitative terms, related to the products and its intended use, using the outcome of the verification methods (chapter 5).

Each performance requirement to be met for a given intended use, in general, is assessed for classes, use categories or numerical values. The ETA in general shall indicate either the results of these assessments or state « No performance determined » (for countries/regions/buildings where no requirements given in laws, regulations and administrative provisions are applicable). This statement does not mean that the VETURE kit performs badly, but merely that this specific performance property has not been tested and assessed.

For results outside the requirements given below, the approval body may subject them to further analysis based on a larger number of test pieces, repeating any questionable tests or other measurements related to the problem concerned.

Table 3. Relationship between kit and component performance to be assessed and expressions of classification, categorisation and declaration.

ER	ETAG paragraph on product performance to be assessed	Class, use category, criterion	« No Performance Determined Option » allowed
1	-	-	-
2	6.2.1 Reaction to fire	Euroclasses A_1 to F	YES
3	6.3.1 Watertightness	Classes I or II	YES
	6.3.2 Water permeability	Classes I or II	YES
	6.3.3 Water vapour permeability	Value or not relevant	YES
	6.3.4.1 capillarity test	Value or not relevant	YES
	6.3.4.2 Hygrothermal behaviour	Pass/fail	YES
	6.3.4.3 Freeze/thaw behaviour	Pass/fail	YES
	6.3.5 Release of dangerous substances	Indication of dangerous substances incl. concentration etc. ”No dangerous substances”	NO

4	6.4.1.1 Wind suction test	Resistance	NO
	6.4.1.2 Fatigue test	Resistance	NO
	6.1.4.3 Wind pressure test	Resistance	NO
	6.4.2 Mechanical resistance	Characteristic resistance	NO
	6.4.2.3 Dead load test	Resistance	YES
	6.4.2.4 Displacement test	Value of Ue and L	YES
	6.4.3 Test on retaining devices	Characteristic resistance	YES
	6.4.4 Resistance to horizontal loads	Pass/fail	YES
	6.4.5 Impact resistance	Categories I, II, III	YES
	6.4.6 Shatter properties	Pass/fail	YES
5	6.5 Protection against noise	Rw value	YES
6	6.6.1 Thermal resistance	*R value*	NO
	6.6.2 Insulation product's thermal resistance	*R value*	NO
	6.6.3 Skin's thermal resistance	*R value*	YES
Aspects of durability and serviceability	6.7.1.1 Temperature variation, humidity and shrinkage of kit	Pass/fail	YES
	6.7.1.2 Temperature variation, humidity and shrinkage of insulation product	Pass/fail	YES
	6.7.2.1 Freeze-thaw resistance of skin	Pass/fail	YES
	6.7.2.2 Freeze/thaw resistance of kit	Pass/fail	YES
	6.7.2.3 Freeze/thaw resistance of adhesive	Pass/fail	YES
	6.7.3.1 Dimensional stability of skin	declared/measured value	YES
	6.7.3.2 Dimensional stability of insulation product	declared/measured value	YES
	6.7.3.3 Thermal shock cycles	Pass/fail	YES
	6.7.4 Chemical and biological resistance	Pass/fail	YES
	6.7.5 Corrosion	Pass/fail	YES
	6.7.6 UV radiation	Pass/fail	YES

6.1 MECHANICAL RESISTANCE AND STABILITY

Not relevant

6.2 SAFETY IN CASE OF FIRE

6.2.1 Reaction to fire

The VETURE kit and its components shall be classified according to EN 13501-1 (2002) Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests (To be applied in accordance with the provision of relevant EC Decision).

It should be indicated that, since the veture kit has not been assessed according to façade fire scenarios, an additional demonstration of the fitness for use in this context could have to be given in some countries at national level, as long as the harmonised system is not available.

6.3 HYGIENE, HEALTH AND ENVIRONMENT

6.3.1 Watertightness

Two requirements shall be satisfied:

- The rain shall not reach the inside face of the wall
- Materials likely to be adversely affected by water (adhesives, etc) shall not become damp.

There are two acceptable categories of VETURE kits, classified according to the degree of protection provided. Their use will depend on the severity of the climate and their exposition with regard to the supporting wall.

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 equipped with a pressure equilibrium space and drainage arrangements).
Note: These VETURE kits are regarded as satisfactory in all situations exposed to rain, except for buildings close to the sea (< 20 km).

Type II

A VETURE kit in which the outer skin rejects the penetration of water, and therefore protects the inner part of the VETURE kit and the joints between the VETURE units from water penetration.

Note: These VETURE kits can be used regardless of the rain exposure.

The Approval Body will establish the degree of protection against rain (Type I or II).

6.3.2 Water permeability

The penetration and the diffusion of water in the kit shall be visually assessed (in case of type I according to § 6.3.1) and the possible alteration shall be evaluated in regard of the behaviour of the VETURE kits to water and durability (see § 6.3.4.2 and § 6.3.4.3).

6.3.3 Water vapour permeability

The water vapour permeability test is required only if a condensation risk is identified.

It's possible to assess the risk of interstitial condensation from:

The water vapour diffusion resistance of the skin (Z_{skin}) and of the insulation ($Z_{insulation}$):

These values shall be stated in the ETA, in order to enable the designer to evaluate the risk of interstitial condensation.

The water vapour diffusion resistance of VETURE unit (Z):

From the result value of the water vapour diffusion resistance of VETURE unit (Z), the Approval Body should assess the risk of interstitial condensation between the skin and insulation layer.

Note 1:

If no test is performed on insulation layer in accordance with EN 12086, tabular value is given in accordance with EN 12524.

Note 2:

The resistance to water vapour diffusion of the equivalent air thickness of the skin (S_d in m $= \delta_a \times Z_{skin}$ where δ_a is the air water vapour permeability in kg/(m.s.Pa)) should normally not exceed:

- 3.0 metres if the combination involves a cellular plastic insulation product.
- 1.0 metre if the combination involves a mineral wool insulation product.

6.3.4 Moisture behaviour

6.3.4.1 Capillarity test

Calculation is undertaken to determine the average water absorption of the three samples per square metre after 1 and 24 hours:

- The water absorption of VETURE kit after 1 hour shall be less than 1 kg/m^2.

- The freeze/thaw test (§ 5.7.2) is necessary if the water absorption of skin is greater or equal than 0.5 kg/m² after 24 hours.

The average water absorption per m^2 after 1 hour and 24 hours shall be indicated in the ETA.

6.3.4.2 Hygrothermal performance

The performance requirements are assessed in § 6.7.1.1.

6.3.4.3 Freeze-thaw performance

The performance requirements are assessed in § 6.7.2.

6.3.5 Release of dangerous substances

The product/kit shall comply with all relevant European and national provisions applicable for the uses for which it is brought to the market. The attention of the applicant should be drawn to the fact that for other uses or other Member States of destination there may be other requirements which would have to be respected. For dangerous substances contained in the product but not covered by the ETA, the NPD option (no performance determined) is applicable.

6.4 SAFETY IN USE

6.4.1 Wind load resistance

The appraisal is based on data from the wind suction and wind pressure tests (see § 5.4.1) and mechanical tests (see § 5.4.2).
If mechanical tests are used, the calculation of the characteristic wind resistance $Q_{5\%}$ from characteristic value of resistance of the components shall be defined in the ETA.

6.4.1.1 Wind suction test

The load Q for which the test specimen fails, the type of failure and the value of maximum deflection, shall be indicated in the ETA.
In addition, the points of measurement shall be indicated on a drawing of the test specimen and the deflections at each measurement point shall be tabulated for each depressure step.

6.4.1.2 Fatigue test

The value of the load $W_{100\,\%}$ shall be indicated in the ETA.

The points of measurement shall be indicated on a drawing of the test specimen and the deflections at each measurement point shall be tabulated for each pressure step (at the beginning and end of each group of cycles).

6.4.1.3 Wind pressure test

The load Q for which the test specimen fails, the type of failure and the value of maximum deflection, shall be indicated in the ETA.
In addition, the points of measurement shall be indicated on a drawing of the test specimen and the deflections at each measurement point shall be tabulated for each depressure step.

6.4.2 Mechanical resistance

6.4.2.1 Bond strength between skin and insulation product

The characteristic bond strength of the VETURE unit should be greater or equal than 0.08 N/mm^2 and the rupture shall be $\geq$ 90 % cohesive.

The bond strength value (§ 5.4.2.1) after hygrothermal or freeze-thaw cyclic test $F_{mean,c}$ should be greater or equal than 75 % of the value in the initial test $F_{mean,n}$.

6.4.2.2 Pull through tests

The following characteristics are evaluated:

6.4.2.2.1 Tensile strenght of insulation product

The average and characteristic value shall be indicated in the ETA.

6.4.2.2.2 Resistance of fixing through skin

The average and characteristic value shall be indicated in the ETA.

6.4.2.2.3 Resistance of grooved skin

The average and characteristic value shall be indicated in the ETA.

6.4.2.2.4 Resistance of grooved insulation

The average and characteristic value shall be indicated in the ETA.

6.4.2.2.5 Pull-through resistance of fixings from profiles

The average and characteristic value shall be indicated in the ETA.

6.4.2.3 Dead load test

The Approval Body shall assess if the deformation from dead load is compatible with the VETURE kit.

6.4.2.4 Displacement test

The Ue value and equation for determining L as a function of ΔT shall be stated in the ETA.

6.4.3 Test on retaining devices

The variety of designs is such that the approval body shall decide upon the relevant approach.

6.4.4 Resistance to horizontal loads

There shall be no permanent deformation to any component such that any of the relevant Essential Requirements are no longer met.

6.4.5 Impact resistance

The categories given in the following table correspond to the degrees of exposure in use. They do not include any allowance for acts of vandalism.

Table 5: Definition of use categories

Use category	Description
I	A zone readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use.
II	A zone liable to impacts from thrown or kicked objects, but in public locations where the height of the kit will limit the size of the impact; or at lower levels where access to the building is primarily to those with some incentive to exercise care.
III	A zone not likely to be damaged by normal impacts caused by people or by thrown or kicked objects.

The hard body impact with steel ball and the dynamic perforation with Perfotest represent the action from heavy, non-deformable or pointed objects, which accidentally hit the kit. Based upon the data generated, the kit is assessed as being in category I, II or III as follows:

Table 6: Categorisation

	Category III	Category II	Category I
Test 5.1.4.5.1 Impact 3 joule	skin not penetrated[2)]	skin not cracked	No deterioration[1)]
Test 5.1.4.5.1 Impact 10 joule	-------	Skin not penetrated[2)]	No deterioration[1)]
Test 5.1.4.5.2 Impact 10 joule	No deterioration[1)]	-------	-------
Test 5.1.4.5.2 Impact 60 joule	-------	No deterioration[1)]	No deterioration[1)]
Test 5.1.4.5.2 Impact 300 joule	-------	No deterioration[1)]	-------
Test 5.1.4.5.2 Impact 400 joule	-------	-------	No deterioration[1)]
Test 5.1.4.5.3	Not perforated[3)] by using an indentor of 20 mm	Not perforated[3)] by using an indentor of 12 mm	Not perforated[3)] by using an indentor of 6 mm

[1)] Superficial damage, provided there is no cracking, is considered as showing "no deterioration".

[2)] The test result is assessed as being "penetrated" if circular cracking penetrating as far as the insulation product is observed.

[3)] The test result is assessed as being "perforated" if a destruction of the skin is shown up to a level in at least 3 of the 5 impacts.

6.4.6 Shatter properties

The approval body shall establish that the VETURE kits don't present sharp or cutting edges and their surface don't cause bodily injury, to the occupants or people nearby.

6.5 PROTECTION AGAINST NOISE

The Rw value measured according to EN ISO 140-3 Acoustics – Measurement of sound insulation in buildings and of building elements – Part 3: Laboratory measurements of airborne sound insulation of building elements, and rated in accordance with EN ISO 717-1 Acoustics – Rating of sound insulation in buildings and of building elements, can be indicated with the description of the supporting wall.
No Performance Determination Option is possible.

6.6 ENERGY ECONOMY AND HEAT RETENTION

6.6.1 Thermal resistance

The thermal resistance values of the kit shall be declared in the ETA as the total thermal resistance in m^2 K/W including any thermal bridges (e.g. fixations) in accordance with chapter 5.6.
This thermal resistance should exceed 0.5 m^2 K/W.

6.6.2 Insulation product's thermal resistance

The characteristic thermal resistance value shall be indicated in the ETA.

6.6.3 Skin's thermal resistance

The characteristic thermal resistance value shall be indicated in the ETA or considered as negligible.

6.7 ASPECTS OF DURABILITY AND SERVICEABILITY

6.7.1 Temperature, humidity and shrinkage

6.7.1.1 Kit

The following defects should neither occur during, nor at the end of the test 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
- Irreversible deformation

At the end of test programmme, no water penetration shall be evident up to the interface kit/substrate.
The bond strength value (§ 5.4.2.1) after hygrothermal cyclic test $F_{mean,c}$ should be greater or equal than 75 % of the value in the initial test $F_{mean,n}$.
The standard deviation of the bond stress values shall be indicated in the ETA.

6.7.1.2 Insulation product

The average value (§ 5.7.1.2) in wet conditions (Series 1,2 and 3) should be greater or equal than 50 % of the average value in dry conditions.

The average value, in dry and wet conditions, should be indicated in the ETA.

6.7.2 Freeze-thaw

6.7.2.1 Freeze/thaw resistance of the skin

The skin should be freeze-thaw resistant in accordance with the relevant EN standard.

6.7.2.2 Freeze/thaw resistance of the kit

The kit is assessed as being freeze-thaw resistant if the water absorption of the VETURE unit is less than 0.5 kg/m² after 24 hours.
In all other cases, analysis of results from the tests in 5.3.4.1 is necessary.
The performance requirement for the kit is judged to be satisfactory if the following defects don't occur during, or at the end of the test programme (§ 5.7.2.2):

- Cracking or delamination of the skin that allows water penetration to the insulation.
- Cracking or delamination of seals between VETURE units
- Detachment of the skin
- Irreversible deformation

The bond strength value (§ 5.4.2.1) after freeze-thaw cyclic test $F_{mean,c}$ should be greater or equal than 75 % of the value in the initial test $F_{mean,n}$.
The standard deviation of the bond stress values shall be indicated in the ETA.

6.7.2.3 Freeze/thaw resistance of adhesive

The approval body will establish if the mainfailure patterns and the variation of the strength (before and after ageing conditions) will prevent the proper functioning of the VETURE kit under the service ability loads.

6.7.3 Dimensional stability

6.7.3.1 Skin

The average, characteristic or tabulated value should be indicated in the ETA.

6.7.3.2 Insulation product

The average or tabulated value shall be indicated in the ETA and should not exceed 1.5 mm/m.

6.7.3.3 Thermal shock cycles

The following defects should not occur during, or at the end of the thermal cycles:

- Deterioration or cracking of the skin that allows water penetration to the insulation.
- Deterioration or cracking of seals between VETURE units

- Detachment of the skin or VETURE unit
- Irreversible deformation

6.7.4 Chemical and biological resistance

If necessary, the performance deterioration caused by chemical and biological attack should be declared.
The Approval Body will establish if any deterioration will prevent the proper functioning of the VETURE kit under the serviceability loads.

6.7.5 Corrosion

If necessary, the performance deterioration caused by corrosion should be declared.
The Approval Body will establish if any deterioration will prevent the proper functioning of the VETURE kit under the serviceability loads.

6.7.6 UV radiation

If appropriate, the performance deterioration caused by UV radiation should be declared.
The Approval Body will establish if any deterioration will prevent the proper functioning of the VETURE kit under the serviceability loads.
The appraisal shall also take into account any determined safety factors.
The expected colour change can be also declared for information.

7 ASSUMPTIONS AND RECOMMENDATIONS UNDER WHICH THE FITNESS FOR USE OF THE PRODUCT IS ASSESSED

This chapter sets out the assumptions and recommendations for design, installation and execution, packaging, transport and storage, use, maintenance and repair under which the assessment of the fitness for use according to the ETAG can be made (only when necessary and in so far as they have a bearing on the assessment or on the products).

The wall, on which the kit is applied, shall be sufficiently airtight.

The sound insulation factor of the wall may change after application of a VETURE kit.

7.1 DESIGN OF THE WORKS

The works including the details (connection, joint, etc ...) should be designed in order to avoid water penetration behind the kit or interstitial condensation.

It should be possible to attach fixtures (down pipes, etc) into the substrate without damaging the integrity of the VETURE kit to a degree likely to reduce the overall performance.

The fixings to the VETURE substrate should be designed on a project per project basis in order to transmit with an appropriate safety factor, the dead load of the VETURE kit when relevant and the load applied to the VETURE kit.

The design of the work (wall upgraded with the VETURE kit) should be established on the hygrothermal point of view in order to determine the susceptibility of intersticial condensation.

7.2 EXECUTION OF THE WORKS

The works should be executed by trained installers.

The ETA and the supporting documents should include a detailed description of the installation of the kit specifying the required procedures (preparation of substrates, especially in the case of old walls, etc), the sequence and timing of operations and the method of fixing (machinery, equipment, tools).

7.2.1 Substrate

The substrate should be sound and dry.

The acceptable substrate flatness compatible with the VETURE kit should be given in the ETA.

Note: Current acceptable substrate flatness is:

Maximum deviation under a flat rule 5 mm for a 0.2 metre rule
Maximum deviation under a flat rule 10 mm for a 2 metres rule

Concrete (acc. to EC 2) or masonry (acc. to EC 6) walls for which anchors have been accepted are deemed to satisfy the requirements.

For other substrates, the suitability should be verified by in-situ tests as described in the EOTA Guideline for Plastic Anchors.

7.2.2 Execution of the kit

VETURE units are positioned with continuous or discontinuous vertical joints.

The execution of the VETURE kit should be limited to facades between expansion joints.

7.2.3 Maintenance and repair

It is accepted that, for the kit to fully preserve its performance, the skin should subject to normal be maintenance.

Maintenance includes:
- Repairs to localised damaged areas due to accidents,
- The application of various products or paints, possibly after washing or ad hoc preparation.

Necessary repairs should be affected rapidly.

It is important to be able to carry out maintenance as far as possible using readily available products and equipment, without spoiling the appearance.

Comment: Care should be taken to use products which are compatible with the kit.

Section three:
ATTESTATION AND EVALUATION

OF CONFORMITY

8 EVALUATION OF CONFORMITY

8.1 EC DECISIONS

The systems of attestation of conformity specified by the European Commission in Mandat Construct 00/411 rev 1 Annex 3 are system 1, 3 or 4 described in Council Directive (89/106/EEC) Annex III2(i) – 2 or 2(ii) - 3 and are detailed as follows:

System 1 for VETURE kit for which the following is valid:
- Intended use in external walls subject to fire regulations,
- Reaction to fire classes A1, A2, B or C,
- Made of 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),

a) Tasks for the manufacturer
   - Factory production control,
   - Further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan.

b) Tasks for the approved body
   - Initial type-testing of the product,
   - Initial inspection of the factory and of factory production control,
   - Continuous surveillance, assessment and approval of factory production control.

System 3 for VETURE kit for which the following is valid:
- Intended use in external walls subject to fire regulations,
- Reaction to fire classes A1, A2, B, C, D or E,
- Made of products/materials not covered by system 1,

a) Tasks for the manufacturer
   - Factory production control,

b) Tasks for the approved body
   - Initial type-testing of the product by an approved laboratory,

System 4 for VETURE kit for which the following is valid:
- Intended use in external walls subject to fire regulations,
- Reaction to fire classes A1 or E and class F,
- Made of products/materials that do not require to be tested for reaction to fire (e.g. Products/materials of classes A1 to E according to Commission Decision 96/603/EC, as manded),

a) Tasks for the manufacturer
   - Factory production control,

- Initial type-testing,

8.2 RESPONSIBILITIES

8.2.1 Tasks for the manufacturer

8.2.1.1 Factory production control (All Systems of A/C)

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures. This production control system shall ensure that the product is in conformity with the European Technical Approval (ETA).

Manufacturers having an FPC system which complies with EN ISO 9000 and which addresses the requirements of an ETA are recognized as satisfying the FPC requirements of the Directive.

8.2.1.2 Testing of samples taken at the factory – Prescribed Test Plan (system 1)

Both large and small companies produce the various components of the VETURE kits and there is a wide variation in the volume and in the production processes. Therefore a precise test plan can only be set up on a case by case basis. These tasks shall be specified in a deposited test plan, in documentation which acconpanies the ETA as to type, extend and frequency of testing and control.

8.2.1.3 Declaration of Conformity (for all AoC system)

When all the criteria of the Conformity Attestation are satisfied the manufacturer shall make a Declaration of Conformity.

The EC declaration of conformity shall contain in particular:

- Name and address of the manufacturer or his agent established in the Community,
- Description of the product (type, identification, use, etc…),
- Provisions to which the product conforms,
- Particular conditions applicable to the use of the product,
- Name and address of the approved body, where applicable,
- Name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or of his authorised representative,

The declaration of conformity shall be presented in the official language or languages of the Member State in which the product is to be used.

8.2.2 Tasks of the manufacturer or the approved body

8.2.2.1 Initial Type Testing

Approval tests will have been conducted by the approval body or under its responsibility (which may include a proportion conducted by an indicated laboratory or by the manufacturer, witnessed by the approval body) in accordance with section 5 of this ETAG. The approval body will have assessed the results of these tests in accordance with section 6 of this ETAG, as part of the ETA issuing procedure.

These tests should be used for the purposes of Initial Type Testing(1).

For system 1, this work should be validated by the Approved Body for Certificate of Conformity purposes.

For system 3, this work should be validated by an Approved Laboratory for Declaration of Conformity purposes by the manufacturer.

For system 4, this work should be taken over by the manufacturer for Declaration of Conformity purposes.

8.2.3 Tasks for the approved body

8.2.3.1 Assessment of the factory production control - initial inspection only or initial inspection and continuous surveillance

Assessment of the factory production control is the responsibility of the approved inspection body.

An assessment shall be carried out of each production unit to demonstrate that the factory production control is in conformity with the ETA and any subsidiary information. This assessment shall be based on an initial inspection of the factory and of the factory production control.

Subsequently continuous surveillance of factory production control is necessary to ensure continuing conformity with the ETA.

Continuous surveillance inspections should be conducted at least twice a year.

These tasks shall be specified in a deposited surveillance plan, in documentation which accompanies the ETA as to type, extend and frequency of testing and control.

8.2.3.2 Certification of the product conformity (for system 1)

The approved body shall issue a certificate of Conformity of the product.

The certificate shall contain in particular:

(1) In this respect Approval Bodies shall be able to have open arrangements with relevant Approved Bodies to avoid duplication, respecting each others responsibilities.

- Name and address (identification number) of the certification body,
- Name and address of the manufacturer or his agent established in the Community,
- Description of the product (type, identification, use, etc…),
- Provisions to which the product conforms,
- Particular conditions applicable to the use of the product,
- The certificate's number,
- Conditions and period of validity of the certificate, where applicable,
- Name of, and position held by, the person empowered to sign the certificate.

The certificate shall be presented in the official language or languages of the Member State in which the product is to be used.

8.3 DOCUMENTATION

The approval body issuing the ETA shall supply the information detailed below. The information given below together with the requirements given in EC Guidance Paper B will generally form the basis on which the factory production control (FPC) is assessed.

This information shall initially be prepared or collected by the approval body and shall be agreed with the manufacturer. The following gives guidance on the type of information required:

1) The ETA
   See section 9 of this Guideline.
   The nature of any additional (confidential) information shall be declared in the ETA.

2) Basic manufacturing process
   The basic manufacturing process shall be described in sufficient detail to support the proposed FPC methods.

3) Product and materials specifications
   These may include:
   - Detailed drawings (including manufacturing tolerances),
   - Incoming (raw) materials specifications and declarations,
   - References to European and/or international standards or appropriate specifications manufacturers data sheets.

4) Prescribed control plan
   The manufacturer and the approval body issuing the ETA shall agree a prescribed control plan. This shall be deposited with the approval body in documentation which accompanies the ETA.
   An agreed FPC test plan is necessary as current standards relating to quality management systems (Guidance Paper B, EN 29002, etc), do not ensure that the product specification remains unchanged and they cannot address the technical validity of the type of frequency of

checks/tests.
The validity of the type and frequency of checks/tests conducted during production and on the final product shall be considered. This will include the checks conducted during manufacture on properties that cannot be inspected at a later stage and checks on the final product.
The following table gives a first approach for the approval bodies and shall be detailled case by case.

- Incoming products

  - Insulation products

Characteristic	Frequency
Length and width	1 per batch or 1 per day
Thickness	
Squareness	
Flatness	
Thermal resistance	1 per year or CE marking
Density	1 per batch or 1 per day

  - Skin

Characteristic	Frequency
Length and width	1 per batch or 1 per day
Thickness	
Squareness	
Flatness	
Mechanical test in accordance with the paragraph C.1.2 or C.1.3	Dependent on the skin

  - Adhesive (if it exists)

Characteristic	Frequency
Viscosity	Either by the surface (number of square metres of products) Or Either 1 per batch
Pot life	
Curring time	
Handling time	

- Testing of samples

Characteristic	Frequency
Length and width	1 per batch and 1000 VETURE units
Thickness	
Squareness	
Flatness	
Mechanical test in accordance with the paragraph 5.4.2	Dependent on the VETURE kit
Weight per unit area or per VETURE unit	1 per day
Reaction to fire And Indirect test (loss ignition, …)	1 per 5 years 1 per batch and 1 per 1000 VETURE units

The test method is to be defined in each test plan product by product

Where materials/components are not manufactured and tested by the supplier in accordance with agreed methods, then where appropriate they shall be subject to suitable checks/tests by the manufacturer before acceptance.

5) Prescribed control plan (for system 1)

The manufacturer and the approval body issuing the ETA shall agree a prescribed control plan. This has to be deposited with the approval body in documentation which accompanies the ETA. The characteristic to be addressed as described in the mandate is reaction to fire. This will be controlled by the approved body at least twice a year by analysis/measurement of the relevant characteristics for components of the VETURE unit from the following list:

- composition
- dimensions
- physical properties
- mechanical properties
- production

8.4 CE MARKING AND INFORMATION

The ETA shall indicate the information to accompany the CE marking and the placement of CE marking and the accompanying information (the kit/components itself/themselves, an attached label, the packaging, or the accompanying commercial documents).

According to the CE Guidance Paper D on CE marking, the required information to accompany the symbol "CE" is:

- Identification number of the notified body (system 1),
- Name or identifying mark of the producer,
- Last two digits of the year in which the marking was affixed,
- Number of the EC certificate of conformity (system 1),
- Number of the ETA (valid as indications to identify the characteristics of the VETURE kit and the characteristics where the "no performance determined" approach is used),
- Name of the product,
- Reaction to fire.

Example of CE marking and accompanying information:

CE 1234	Letters "CE" Identification number of notified certification body *(for AoC systems 1+, 1 and 2+)*
Any Company Street 1, City, Country 04 1234-CPD-0321	Name and address of the producer (legal entity responsible for the manufacture) Two last digits of year of affixing CE marking Number of EC certificate of conformity *(for AoC systems 1+ and 1)* or EC certificate for the FPC *(for AoC systems 2+)*
ETA-04/2135 ETAG 092 Reaction to fire: Euroclass D-s2,d0 Watertightness: type I Impact resistance: use category II Protection against noise: NPD Thermal resistance: R=2 m^2.K/W Wind load resistance : 1000 Pa No dangerous substances	ETA number ETAG number *(where relevant)* Type / intended use / use category / declared values and/or classes in accordance with section(s) ... of the ETA

Section four:
ETA CONTENT

9 THE ETA CONTENT

9.1 THE ETA-CONTENT

9.1.1 Model ETA

The ETA-content shall be in accordance with the Commission Decision 97/571/EC, dated 22 July 1997.

9.1.2 Additional information

The technical part of the ETA shall contain the following information as applicable to the system (hence given with a reference to the relevant clause of this guideline) or – where relevant - indicate"no performance determined option".
Information on the kit:

- Indication of the assumed working life (Section two, GENERAL NOTES d)
- Classification of the kit with respect to reaction to fire (Euroclass) (Clause 6.2.1 and 6.2.2). This veture kit has not been assessed according to façade fire scenarios.
- Classification of the kit with respect to watertighness (class) (Clause 6.3.1)
- Indication of water vapour permeability (Clause 6.3.3)
- Indication of capillarity of the VETURE unit (Clause 6.3.4.1): water absorption after 1 and 24 hours
- Statement on acceptable resistance to hygrothermal cycles (Clause 6.3.4.2)
- Statement on acceptable resistance to freeze-thaw (Clause 6.3.4.3)
- Statement on the presence or otherwise of harmful substances including concentration (Clause 6.3.5)
- Declaration of the resistance of the kit to wind load (static test) (Clause 6.4.1.1 and 6.4.1.3)
- Declaration of the resistance of the kit to wind load (Fatigue test) (Clause 6.4.1.2)
- Declaration of the mechanical resistance of the kit (Clause 6.4.2)
- Declaration of the distance L between the expansion joints (Clause 6.4.2.4)
- Statement on acceptable resistance of retaining devices (Clause 6.4.3)
- Statement on acceptable resistance to horizontal point load (Clause 6.4.4)
- Statement on the most severe use application for impact resistance for which the kit has been assessed (use category I, II or III, including description) (Clause 6.4.5)

- Statement on shatter properties (Clause 6.4.6)
- Declaration of the acoustic resistance of the kit (Clause 6.5)
- Declaration of the calculated thermal resistance of the kit (Clause 6.6)
- Statement on acceptable resistance to temperature, humidity and shrinkage (clause 6.7.1)
- Statement on acceptable resistance to freeze/thaw (clause 6.7.3)
- Statement on acceptable resistance to dimensional variation (Clause 6.7.3)
- Statement on acceptable resistance to chemical and biological attack (Clause 6.7.4)
- Statement on acceptable resistance to corrosion (Clause 6.7.5)
- Statement on acceptable resistance to UV radiation (Clause 6.7.6): the expected colour change can be given in the ETA

For each of the above listed items, the ETA shall either give an indication/classification/ statement/description or state that the verification/assessment of this item has not been carried out (no performance determined).

Information on the design:

The acceptable substrate flatness shall be given.

The ETA shall include annotated drawings with the dimensions marked and drawn to an adequate scale for components of the kit such as insulation boards, skin, profiles, mechanical fixings, etc. as well as a series of annotated detailed drawings with the dimensions.

The ETA should include a selection of annotated drawings, to an adequate scale, of sections of the kit chosen from the following examples:

- Vertical and horizontal sections of apertures (windows and doors),
- Horizontal sections of internal and external angles,
- Horizontal and vertical sections of VETURE units' joints,
- Wall/roof junction (pitched or flat),
- Section of expansion joint in substrate,
- Section of dividing joint in the VETURE kit.

These drawings should be accompanied in each case by a description of the particular installation details.

Information on the components :

- Minimum informations
- Major characteristics described in Annex C.

9.1.3 Note concerning dangerous substances

In section II 2 "characteristics of products and methods of verification" the ETA shall include the following note:

"In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

9.1.4 Identification

The ETA shall contain information and/or references allowing for, where there is a need eg. attestation of Conformity [see Chapter 8 clause 8.2.3.3 certification, evaluation of conformity Systems 1 & 2], market surveillance, complaints or accidents [all Systems of A/C]), to determine that the products on the market, or intended to be put on the market are in compliance with the approved product as described in the ETA.

When such information/references are of a confidential nature it/they shall exist on the ETA file managed by the Approval body and as necessary on the relevant file of any notified body involved.

These information/references shall also be of assistance in any renewal of the ETA.

The type, scale, range of information will be based on the identification clauses in Chapter 5 of the ETAG.

The ETA is issued for the VETURE kit on the basis of agreed data/information, which identifies the kit that has been assessed and judged. Changes to the product/production process/kit, which could result in this deposited data/information being incorrect, should be notified to the Approval Body, before the changes are introduced. The Approval Body will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment/alterations to the ETA, shall be necessary.

Annex A:
COMMON TERMINOLOGY
(definitions, clarifications, abbreviations)

A.1 WORKS AND PRODUCTS

A.1.1 Construction works (and parts of works) (often simply referred to as "works") (ID 1.3.1)

Everything that is constructed or results from construction operations and is fixed to the ground. (This covers both building and civil engineering works, and both structural and non-structural elements).

A.1.2 Construction products (often simply referred to as "products") (ID 1.3.2)

Products which are produced for incorporation in a permanent manner in the works and placed as such on the market.
(The term includes materials, elements, components of prefabricated systems or installations).

A.1.3 Incorporation (of products in works) (ID 1.3.2)

Incorporation of a product in a permanent manner in the works means that:
- Its removal reduces the performance capabilities of the works, and
- That the dismantling or the replacement of the product are operations which involve construction activities.

A.1.4 Intended use (ID 1.3.4)

Role(s) that the product is intended to play in the fulfilment of the essential requirements.
(N.B. This definition covers only the intended use as far as relevant for the CPD).

A.1.5 Execution (ETAG-format)

Used in this document to cover all types of incorporation techniques such as installation, assembling, incorporation, etc...

A.1.6 System (EOTA/TB guidance)

Part of the works realised by:
- particular combination of a set of defined products, and
- particular design methods for the system, and/or
- particular execution procedures.

A.2 PERFORMANCES

A.2.1 Fitness for intended use (of products) (CPD 2.1)

Means that the products have such characteristics that the works in which they are intended to be incorporated, assembled, applied or installed, can, if properly designed and built, satisfy the essential requirements.
(N.B. This definition covers only the intended fitness for intended use as far as relevant for the CPD).

A.2.2 Serviceability (of works)

Ability of the works to fulfill their intended use and in particular the essential requirements relevant for this use.
The products must be suitable for construction works which (as a whole and in their separate parts) are fit for their intended use, subject to normal maintenance, be satisfied for an economically reasonable working life. The requirements generally concern actions which are foreseeable (CPD Annex I, Preamble).

A.2.3 Essential requirements (for works)

Requirements applicable to works, which may influence the technical characteristics of a product, and are set out in terms of objectives in the CPD, Annex I (CPD, art. 3.1).

A.2.4 Performance (of works, parts of works or products) (ID 1.3.7)

The quantitative expression (value, grade, class or level) of the behaviour of the works, parts of works or of the products, for an action to which it is subject or which it generates under the intended service conditions (works or parts of works) or intended use conditions (products).
As far as practicable the characteristics of products, or groups of products, should be described in measurable performance terms in the technical specifications and guidelines for ETA. Methods of calculation, measurement, testing (where possible), evaluation of site experience and verification, together with compliance criteria shall be given either in the relevant technical specifications or in references called up in such specifications.

A.2.5 Actions (on works or parts of the works) (ID 1.3.6)

Service conditions of the works which may affect the compliance of the works with the essential requirements of the Directive and which are brought about by agents (mechanical, chemical, biological, thermal or electro-mechanical) acting on the works or parts of the works.
Interactions between various products within a work are considered as "actions".

A.2.6 Classes or levels (for essential requirements and for related product performances)) (ID 1.2.1)

A classification of product performance(s) expressed as a range of requirement levels of the works, determined in the ID's or according to the procedure provided for in art. 20.2a of the CPD.

A.3 ETAG-FORMAT

A.3.1 Requirements (for works) (ETAG-format 4)

Expression and application, in more detail and in terms applicable to the scope of the guideline, of the relevant requirements of the CPD (given concrete form in the ID's and further specified in the mandate, for works or parts of the works, taking into account the durability and serviceability of the works).

A.3.2 Methods of verification (for products) (ETAG-format 5)

Verification methods used to determine the performance of the products in relation to the requirements for the works (calculations, tests, engineering knowledge, evaluation of site experience, etc...).

These verification methods are related only to the assessment of, and for judging the fitness for use. Verification methods for particular designs of works are called here "project testing", for identification of products are called "identification testing", for surveillance of execution or executed works are called "surveillance testing", and for attestation of conformity are called "AC-testing".

A.3.3 Specifications (for products) (ETAG-format 6)

Transposition of the requirements into precise and measurable (as far as possible and proportional to the importance of the risk) or qualitative terms, related to the products and their intended use.

The satisfaction of the specifications is deemed to satisfy the fitness for use of the products concerned.

Specifications may also be formulated with regard to the verification of particular designs, for identification of products, for surveillance of execution or executed works and for attestation of conformity, when relevant.

A.4 WORKING LIFE

A.4.1 Working life (of works or parts of the works) (ID 1.3.5 [1])

The period of time during which the performance will be maintained at a level compatible with the fulfilment of the essential requirements.

A.4.2 Working life (of products)

The period of time during which the performances of the product are maintained - under the corresponding service conditions - at a level compatible with the intended use conditions.

A.4.3 Economically reasonable working life (ID 1.3.5 [2])

Working life which takes into account all relevant aspects, such as costs of design, construction and use, costs arising from hindrance of use, risks and consequences of failure of the works during its working life and cost of insurance covering these risks, planned partial renewal, costs of inspections, maintenance, care and repair, costs of operation and administration, of disposal and environmental aspects.

A.4.4 Maintenance (of works) (ID 1.3.3 [1])

A set of preventive and other measures which are applied to the works in order to enable the works to fulfill all its functions during its working life. These measures include cleaning, servicing, repainting, repairing, replacing parts of the works where needed, etc...

A.4.5 Normal maintenance (of works) (ID 1.3.3 [2])

Maintenance, normally including inspections, which occurs at a time when the cost of the intervention which has to be made is not disproportionate to the value of the part of the work concerned, consequential costs (e.g. exploitation) being taken into account.

A.4.6 Durability (of products)

Ability of the product to contribute to the working life of the work by maintaining its performances, under the corresponding service conditions, at a level compatible with the fulfilment of the essential requirements by the works.

A.5 CONFORMITY

A.5.1 Attestation of conformity (of products)

Provisions and procedures as laid down in the CPD and fixed according to the directive, aiming to ensure that, with acceptable probability, the specified performance of the product is achieved by the ongoing production.

A.5.2 Identification (of a product)

Product characteristics and methods for their verification, allowing to compare a given product with the one that is described in the technical specification.

A.6 APPROVAL AND APPROVED BODIES

A.6.1 Approval Body

Body notified in accordance with Article 10 of the CPD, by an EU Member State or by an EFTA State (contracting party to the EEA Agreement), to issue European Technical Approvals in (a) specific construction product area(s). All such bodies are required to be members of the European Organisation for Technical Approvals (EOTA), set up in accordance with Annex II.2 of the CPD.

A.6.2 Approved Body(*)

Body nominated in accordance with Article 18 of the CPD, by an EU Member State or by an EFTA State (contracting party to the EEA Agreement), to perform specific tasks in the framework of the Attestation of Conformity decision for specific construction products (certification, inspection or testing). All such bodies are automatically members of the Group of Notified Bodies.

(*) also known as Notified Body

A.7 Abbreviations

Concerning the Construction products directive:

AC: Attestation of conformity
CEC: Commission of the European Communities
CEN: Comité européen de normalisation / European Committee for Standardization
CPD: Construction products directive
EC: European communities
EFTA: European free trade association
EN: European Standard
FPC: Factory production control
ID: Interpretative documents of the CPD
ISO: International standardisation organisation
SCC: Standing committee for construction of the EC

Concerning approval:

EOTA: European organisation for technical approvals

ETA: European technical approval

ETAG: European technical approval guideline

TB: EOTA-Technical board

UEAtc: Union Européenne pour l'Agrément technique / European Union of Agrement

General

TC: Technical committee

WG: Working group

Annex B:
REFERENCE DOCUMENTS

Reference documents

EOTA Guidance Document n° 004	Guidance Document on the Provision of Data for Assessments Leading to ETA
COMMISSION DECISION	00/411 rev.1
EN ISO 9000	Quality management systems – Fundamentals and vocabulary
UEAtc	Guideline for the Assessment of Prefabricated Units for Externall Wall Insulation (Insulating Cladding Panels)
EN 1990	Basis of structural design

Verification of reaction to fire

EN 13501-1	Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests
EN ISO 1716	Gross calorific value
EN ISO 1182	Reaction to fire tests for building products – Non-combustibility test
EN ISO 13823	Reaction to fire tests for building products – Building products excluding floorings exposed to the thermal attack by a single burning item
EN ISO 11925-2	Reaction to fire tests for building products – Ignitability of building products subjected to direct impingement of flame – Single flame source test
ISO 390	Products in fibre-reinforced cement – sampling and inspection

Verification of permeability

EN 12865-1	Hygrothermal performance of buildings – Determination of resistance to driving rain under pulsating air pressure – Part 1: External wall systems
EN ISO 12572	Hygrothermal performance of building materials and products - Determination of water vapour transmission properties
EN 12524	Hygrothermal performance of building materials and products - Determination of water vapour transmission properties
EN 12086	Thermal insulation products for buildings - Determination of water vapour transmission properties

Verification of safety in use

EN 1991-2-4	Eurocode 1: Basis of design and actions on structures and national application document – Part 4: Actions on structures – Wind actions
ISO 7892	Vertical building elements - Impact resistance test - Impact bodies and general test procedures

Verification of sound insulation

EN ISO 140-3	Acoustics – Measurement of sound insulation in buildings and of building elements – Part 3: Laboratory measurements of airborne sound insulation of building elements
EN ISO 717-1	Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation
EN ISO 717-2	Acoustics – Rating of sound insulation in buildings and of building elements – Part 2: Impact sound insulation

Verification of thermal insulation

EN ISO 6946	Building components and building elements - Thermal resistance and thermal transmittance - Calculation method
EN 12524	Building materials and products - Hygrothermal properties - Tabulated design values
EN ISO 10211-1	Thermal bridges in building construction - Heat flows and surface temperatures - Part 1: General calculation methods
EN ISO 10211-2	Thermal bridges in building construction - Heat flows and surface temperatures - Part 2: Calculation of linear thermal bridges
EN ISO 8990	Thermal insulation - Determination of steady state thermal transmission properties - Calibrated and guarded hot box
EN 12667	Building materials - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods – Products of high and medium thermal resistance
EN 12939	Building materials – Determination of thermal resistance by means of guarded hot plate and heat flow meter methods – Thick products of high and medium thermal resistance
EN ISO 10456	Building materials and products – Procedures for determining declared and design thermal values

Insulation product

EN 13162	Thermal insulation products for buildings - Factory made mineral wool (MW) products – Specification

EN 13163	Thermal insulation products for buildings - Factory made products of expanded polystyrene (EPS) – Specification
EN 13164	Thermal insulation products for buildings - Factory made products of extruded polystyrene foam (XPS) – Specification
EN 13165	Thermal insulation products for buildings - Factory made rigid polyurethane foam (PUR) products – Specification
EN 13166	Thermal insulation products for buildings - Factory made products of phenolic foam (PF) – Specification
EN 13167	Thermal insulation products for buildings - Factory made cellular glass (CG) products – Specification
EN 13168	Thermal insulation products for buildings - Factory made wood wool (MW) products – Specification
EN 13169	Thermal insulation products for buildings - Factory made products of expanded perlite (EPB) – Specification
EN 13170	Thermal insulation products for buildings - Factory made products of expanded cork (ICB) – Specification
EN 13171	Thermal insulation products for buildings - Factory made wood fibre (WF) products – Specification
EN 822	Thermal insulating products for building application - Determination of length and width
EN 823	Thermal insulating products for building application - Determination of thickness
EN 825	Thermal insulating products for building application - Determination of flatness
EN 826	Thermal insulating products for building application - Determination of compression behaviour
EN 1602	Thermal insulating products for building application - Determination of the apparent density
EN 1603	Thermal insulating products for building application - Determination of dimension and shape stability under constant normal laboratory conditions (23°C/ 50 % RH)
EN 1604	Thermal insulating products for building application - Determination of dimensional stability under specified temperature and humidity conditions
EN 1607	Thermal insulating products for building application - Determination of tensile strength perpendicular to the faces

EN 12086	Thermal insulating products for building application - Determination of water vapour transmission properties
EN 12090	Thermal insulating products for building application - Determination of shear behaviour

Verification of durability

EN ISO 846	Plastics – Determination of behaviour under the action of fungi and bacteria – Evaluation by visual examination or measurement of change in mass or physical properties
EN ISO 877	Plastics – Methods of exposure to direct weathering, to weathering using glass-filtered daylight, and to intensify weathering by daylight using Fresnel mirrors
ISO 4607	Plastics – Methods of exposure to natural weathering
EN ISO 4892-1	Plastics – Methods of exposure to laboratory light sources – Part 1: General guidance
EN ISO 4892-2	Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc sources
EN ISO 4892-3	Plastics – Methods of exposure to laboratory light sources – Part 3: Fluorescent UV lamps
EN ISO 4892-4	Plastics – Methods of exposure to laboratory light sources – Part 4: Open-flame carbone-arc lamps
ISO 105 A01	Textiles – Tests for colour fastness – Part A01: General principles of testing
ISO 105 A02	Textiles – Tests for colour fastness – Part A02: Grey scale for assessing change in colour
ISO 105 A03	Textiles – Tests for colour fastness – Part A03: Grey scale for assessing staining
ISO 7724-1	Paints and varnishes – Colorimetry – Part 1: Principles
ISO 7724-2	Paints and varnishes – Colorimetry – Part 2: Colour measurement
ISO 7724-3	Paints and varnishes – Colorimetry – Part 3: Calculation of colour differences
EN 29142	Adhesives – Guide to the selection of standard laboratory ageing conditions for testing bonded joints

Natural stone

EN 1936	Determination of the apparent density

EN 12372	Determination of modulus of elasticity in bending and of bending strength
EN 12371	Determination of frost resistance
EN 14581	Determination of linear thermal expansion
EN 13919	Ageing test with SO_2 and moisture
EN 14205	Determination of KNOOP

Terra cotta

EN 538	Determination of modulus of rupture and breaking strength
EN 539-2	Determination of frost resistance

Fibre-cement

UEATc	Technical guide for the assessment of the durability of thin fibre reinforced cement products (without Asbestos) for external use
EN 12467	Fibre-cement flat sheets – Products specifications and test methods

Glass-fibre reinforced cement

EN 1170-4	Test method for glass-fibre reinforced cement – Part 4: Measuring bending strength – Simplified flexural tensile test method
EN 1170-5	Test method for glass-fibre reinforced cement – Part 5: Measuring bending strength – Complete bending test method
EN 1170-6	Test method for glass-fibre reinforced cement – Part 6: Determination of the absorption of water by immersion and determination of the dry density
EN 1170-7	Test method for glass-fibre reinforced cement – Part 7: Measurement of extremes of dimensional variations due to moisture content

Plastics

EN 477	Unplasticized polyvinychloride (PVC-U) profiles for the fabrication of windows and doors – Determination of the resistance to impact of main profiles by falling mass
EN 479	Unplasticized polyvinychloride (PVC-U) profiles for the fabrication of windows and doors – Determination of heat reversion
EN ISO 178	Plastics – Determination of flexural properties
EN ISO 179-1	Plastics – Determination of Charpy impact test – Part 1: Determination of Charpy impact strength

EN ISO 179-2	Plastics – Determination of Charpy impact test – Part 2: Instrumented impact test
EN ISO 527-1	Plastics – Determination of tensile properties – Part 1: General principles
EN ISO 527-2	Plastics - Determination of tensile properties – Part 2: Test conditions for moulding and extrusion plastics
EN ISO 527-3	Plastics - Determination of tensile properties – Part 3: Test conditions for films and sheets
EN ISO 527-4	Plastics - Determination of tensile properties – Part 4: Test conditions for isotropic and orthotropic fibre-reinforced plastic composites
EN ISO 527-5	Plastics - Determination of tensile properties – Part 5: Test conditions for unidirectional fibre-reinforced plastic composites
EN ISO 1183	Plastics – Methods for determining the density and relative density of non-cellular plastics
EN ISO 8256	Plastics – Determination of tensile-impact strength

Laminates

EN 438-1	Decorative high-pressure laminates (HPL) – Sheets based on thermosetting resins – Part 1: Specifications
EN 438-2	Decorative high-pressure laminates (HPL) – Sheets based on thermosetting resins – Part 2: Determination of properties

Wood based product

EN 310	Wood based panels – Determination of modulus of elasticity in bending and of bending strength
EN 318	Wood based panels – Determination of dimensional changes associated with changes in relative humidity
EN 321	Wood based panels – Determination of moisture resistance under cyclic test conditions
EN 323	Wood based panels – Determination of density
EN 335-1	Durability of wood and wood based products – Definition of hazard classes of biological attack – Part 1: General
EN 335-2	Durability of wood and wood based products – Definition of hazard classes of biological attack – Part 2: Application to solid wood
EN 335-3	Durability of wood and wood based products – Definition of hazard classes of biological attack – Part 3: Application to wood based panels

EN 350-2	Durability of wood and wood based products – Natural durability of solid wood – Part 2: Guide to natural durability and treatability of selected wood species of importance in Europe
EN 351-1	Durability of wood and wood based products – Preservative-treated solid wood – Part 1: Classification of preservative penetration and retention
EN 460	Durability of wood and wood based products – Natural durability of solid wood – Guide to the durability requirements for wood to be used in hazard classes
EN 599-1	Durability of wood and wood based products – Performance of preventive wood preservative as determined by biological tests – Part 1: Specification according to hazard class
EN 599-2	Durability of wood and wood based products – Performance of preventive wood preservative as determined by biological tests – Part 2: Classification and labelling
EN 1058	Wood based panels – Determination of characteristic values of mechanical properties and density
EN 1910	Wood and parquet flooring and wood panelling and cladding – Determination of dimensional stability

Steel, Aluminium and aluminium alloys

EN 10020	Definition and classification of grades of steel
EN 10147	Continuously hot-dip Zinc coated structural steels strip and sheet – Technical delivery conditions
EN 10088-1	Stainless steels – Part 1: List of stainless steels
EN 10088-2	Stainless steels – Part 2: Technical delivery conditions for sheet/plate and strips for general purposes
EN 485-2	Aluminium and aluminium alloys – Sheet, strip and plate – Part 2: Mechanical properties
EN 573-3	Aluminium and aluminium alloys – Chemical composition and form of wrought product – Part 3: Chemical composition
EN 755-1	Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles - Part 1: Technical conditions for inspection and delivery
EN 755-2	Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles - Part 2: Mechanical properties
EN 1396	Aluminium and aluminium alloys – Coil coated sheet and strip for general applications - Specification

Polyester panels

EN ISO 10352	Fibre-reinforced plastics – Moulding compounds and prepregs – Determination of mass per unit area
EN ISO 14125	Fibre-reinforced plastics composites – Determination of flexural properties

Ceramics

EN ISO 10545-6	Ceramic tiles – Part 6: Determination of hardness
EN ISO 10545-3	Ceramic tiles – Part 3: Determination of water absorption, apparent porosity, apparente relative density and bulk density
EN ISO 10545-4	Ceramic tiles – Part 4: Determination of modulus of rupture and breaking strength
EN ISO 10545-5	Ceramic tiles – Part 5: Determination of impact resistance by measurement of coefficient of restitution
EN ISO 10545-8	Ceramic tiles – Part 8: Determination of linear thermal expansion
EN ISO 10545-10	Ceramic tiles – Part 10: Determination of moisture expansion
EN ISO 10545-12	Ceramic tiles – Part 12: Determination of frost resistance

Adhesive

EN ISO 868	Plastics and ebonite – Determination of indentation hardness by means of a durometer (Shore hardness)
ISO 4660	Standard colour scale
ISO 7111	Thermogravimetry of Polymers
EN 1465 (ISO 4587)	Adhesives – Determination of tensile lap-shear strength of rigid-to-rigid bonded assemblies

Fixing

EOTA	ETAG n°014 “Plastic anchors for fixing of external thermal insulation composite systems with rendering”
EN ISO 898-1	Mechanical properties of fasteners made of carbon steel and alloy steel – Part 1: Bolts, screws and studs.
EN ISO 3506-1	Mechanical properties of corrosion-resistant stainless-steel fasteners – Part 1: Bolts, screws and studs.
ISO 9227	Corrosion test in artificial atmospheres – Salt spray tests

These documents are referred to in the ETAG and are subject to the specific conditions mentioned therein.

Annex C:
METHODS RELATED TO THE IDENTIFICATION OF THE COMPONENTS

All components of the VETURE kit shall be identified clearly. Where possible, reference to harmonised European Standards or European Technical Approvals shall be made.

Where components are not covered by harmonised European Standards or European Technical Approvals, they shall be precisely defined by reference to characteristics, when relevant, as specified in this paragraph, in accordance with appropriate CEN, EOTA, ISO test methods as far as they exist.

Nature of the components

The nature of the components shall be defined in conformity with European product standards or ETAs.

Geometry

The following dimensional properties for components and VETURE unit, including tolerances, shall be considered:

- Thickness of skin and insulation product
- Length and height of skin and insulation product
- Squareness
- Straightness
- Bowing
- Flatness
- Depth of profile

Physical and mechanical properties

The physical and mechanical properties of the components shall be determined in accordance with the methods described below:

C.1 Skin

C.1.1 Specific mass or density

Determination of the specific mass or density on twelve specimens in accordance with the Standard°:

- for stone : EN 1936 Determination of the apparent density
- for fibre cement flat sheet : EN 12467 Fibre-cement flat sheets – Products specifications and test methods

- for composite glass fibre reinforced cement : EN 1170-6 Test method for glass-fibre reinforced cement – Part 6: Determination of the absorption of water by immersion and determination of the dry density
- for steel : EN 10147 Continuously hot-dip Zinc coated structural steels strip and sheet – Technical delivery conditions
- for aluminium : EN 1396 Aluminium and aluminium alloys – Coil coated sheet and strip for general applications - Specification
- for polyester compound moulded panel : EN ISO 10352 Fibre-reinforced plastics – Moulding compounds and prepregs – Determination of mass per unit area
- for PVC : Method A of ISO 1183 Plastics – Methods for determining the density and relative density of non-cellular plastics
- for wood based panels : EN 323 Wood based panels – Determination of density
- for ceramics : EN ISO 10545-3 Ceramic tiles – Part 3: Determination of water absorption, apparent porosity, apparente relative density and bulk density
- EN or ISO standard ortherwise internal procedure for other materials

C.1.2 Bending strength, Modulus of elasticity or Modulus of rupture

Determination of the bending strength, Modulus of elasticity or Modulus of rupture on twelve specimens in accordance with the Standard°:

- for stone : EN 12372 Determination of modulus of elasticity in bending and of bending strength
- for fibre cement flat sheet : EN 12467 Fibre-cement flat sheets – Products specifications and test methods
- for composite glass fibre reinforced cement : EN 1170-4 Test method for glass-fibre reinforced cement – Part 4: Measuring bending strength – Simplified flexural tensile test method
- for steel : EN 10147 Continuously hot-dip Zinc coated structural steels strip and sheet – Technical delivery conditions
- for aluminium : EN 485-2 Aluminium and aluminium alloys – Sheet, strip and plate – Part 2: Mechanical properties
- for PVC, the polyester compound moulded panel, the laminates panels : EN ISO 178 Plastics – Determination of flexural properties
- for wood based panels : EN 310 Wood based panels – Determination of modulus of elasticity in bending and of bending strength
- for panel of mortar polyester : EN ISO 14125 Fibre-reinforced plastics composites – Determination of flexural properties
- for ceramics : EN ISO 10545-4 Ceramic tiles – Part 4: Determination of modulus of rupture and breaking strength
- for terra cotta : EN 538 Determination of modulus of rupture and breaking strength
- EN or ISO standard ortherwise internal procedure for other materials

C.1.3 Hardness

Determination of the hardness on three specimens in accordance with the Standard°:

- for stone : PrEN 14205 Determination of KNOOP
- for panel of mortar polyester : EN ISO 179 Plastics – Determination of Charpy impact test
- for laminates panels : EN 438-2 Decorative high-pressure laminates (HPL) – Sheets based on thermosetting resins – Part 2: Determination of properties
- for PVC : EN 477 Unplasticized polyvinychloride (PVC-U) profiles for the fabrication of windows and doors – Determination of the resistance to impact of main profiles by falling mass
- for ceramics : EN ISO 10545-6 Ceramic tiles – Part 6: Determination of hardness
- EN or ISO standard ortherwise internal procedure for other materials

C.1.4 Freeze-thaw sensitivity

Determination of the freeze-thaw sensitivity in accordance with the following Standard°:

- for stone : PrEN 12371 Determination of frost resistance
- for terra cotta : EN 539-2 Determination of frost resistance
- for fibre cement flat sheet : EN 12467 Fibre-cement flat sheets – Products specifications and test methods
- for PVC : EN 477 Unplasticized polyvinychloride (PVC-U) profiles for the fabrication of windows and doors – Determination of the resistance to impact of main profiles by falling mass
- for ceramics : EN ISO 10545-12 Ceramic tiles – Part 12: Determination of frost resistance
- EN or ISO standard ortherwise internal procedure for other materials

C.2 Adhesive

C.2.1 Generic type

Declaration of the generic type of the adhesive

C.2.2 Specific mass

Determination of the specific mass on three specimens in accordance with the Method A.of standard ISO 1183 Plastics – Methods for determining the density and relative density of non-cellular plastics.

C.2.3 Hardness

Measurement of the Shore A hardness in accordance with the Standard EN ISO 868 Plastics and ebonite – Determination of indentation hardness by means of a durometer (Shore hardness).

The measurement shall be carried out on three test pieces after full polymerization.

C.2.4 Viscosity

Determination of the viscosity in accordance with the EN or ISO standard.

C.2.5 pH

Determination of the pH in accordance with the EN or ISO standard.

C.2.6 Colour

The colour shall be observed visually, by reference to the colour scale in ISO 4660 Standard colour scale.

C.2.7 Thermogravimetric analysis

This identification test seeks to determine the products of the thermal decomposition. Losses are quantified as a function of an even temperature increase.
The test shall be carried out on one specimen in accordance with ISO 7111 Thermogravimetry of Polymers.

The results are drawn from the graph of the readings expressed in terms of:

- TG, the percentage of cumulative losses up to 900°C
- DTG, the zones of maximum loss through volatilization
- DTA, the exo-or endothermial conversion zones.

C.3 Insulation product

C.3.1 Generic type

Declaration of the generic type of the insulation product according to the following standard :

- EN 13162 Thermal insulation products for buildings - Factory made mineral wool (MW) products – Specification
- EN 13163 Thermal insulation products for buildings - Factory made products of expanded polystyrene (EPS) – Specification
- EN 13164 Thermal insulation products for buildings - Factory made products of extruded polystyrene foam (XPS) – Specification
- EN 13165 Thermal insulation products for buildings - Factory made rigid polyurethane foam (PUR) products – Specification
- EN 13166 Thermal insulation products for buildings - Factory made products of phenolic foam (PF) – Specification

C.3.2 Density

Determination of density in accordance with EN 1602 "Determination of the apparent density".

C.3.3 Tensile test

Determination in accordance with EN 1607 "Determination of tensile strength perpendicular to the faces".

C.3.4 Shear strength and shear modulus of elasticity test

Determination in accordance with EN 12090 "Determination of shear behaviour".

C.3.5 Compression test

In accordance with EN 826: "Determination of compression behaviour".

C.4 Fixings

C.4.1 Generic type

Declaration of the generic type of the fixings

C.4.2 Dimensions and performances

Fixings should be evaluated according to ETAG Guideline 014 "plastic anchors for fixings of external thermal of insulation composite systems with rendering" or having obtained an ETA which gives dimensions, characteristics and performances.

C.5 Profiles

Declaration of the generic type, dimensions and mechanical properties (e.g. elastic limit, tensile strength, etc …).

C.6 Retaining device

Declaration of the generic type, dimensions and mechanical properties (e.g. elastic limit, tensile strength, etc …).

Annex D:
GENERAL TEST RESULTS STATISTICAL INTERPRETATION

General-test result statistical interpretation

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

$$\Delta F_{mean} = F_{mean,c} / F_{mean,n}$$

Where

$F_{u,5}$	=	the caracteristic breaking force giving 75 % confidence that 95 % of the test results will be higher than this value
F_{mean}	=	the average breaking force, either under tension or shear
$F_{mean,n}$	=	the average breaking force, either under tension or shear in the initial state
$F_{mean,c}$	=	the average breaking force, either under tension or shear after conditioning or ageing
k_η	=	the eccentricity of 5 % with 75 % confidence (see table 3)
S	=	the standard deviation of series under consideration

The variable k_η as a function of the number of test pices (see EN 1990 Eurocode : Basis of structural design, Table $D_{1,Vx,unknown}$)

Nuber of pieces	3	4	5	6	8	10	20	30	∞
Variable k_η	3,37	2,63	2,33	2,18	2,00	1,92	1,76	1,73	1,64

Note : Type of rupture

A number of tests prescribe « Rupture > 90 % cohesive », ie the rupture of the samples shall be located at least 90 % within the product and a maximum 10 % at the interface between the adhesive and the skin or insulation product.

Annex E:
MOUNTING AND FIXING PROVISIONS

The reaction to fire testing should be given for the entire kit, in simulating its end-use conditions.

The testing standard EN 13823 Reaction to fire tests for building products – Building products excluding floorings exposed to the thermal attack by a single burning item gives a general description of the arrangement of the test specimen for SBI test.

This annex precises specific provisions for VETURE kits.

The specimen shall be installed on fibre-cement sheet 6 mm thickness in accordance with standard ISO 390 Products in fibre-reinforced cement – sampling and inspection, without air space.

The fixing devices of VETURE units shall be adapted to the fibre-cement sheet.

The VETURE kit shall be installed with maximum fixing devices density defined by the manufacturer and with a profile in the low part of the specimen as specified in the ETA.

A horizontal and vertical joint (according to the specifications of the kit) shall be present in accordance with the following figure (if there is no opened joint in the kit, a 3 mm joint in the skin is made).

- Either the VETURE kit is tested with the different parameters such as length, width, thickness of insulation, thickness of skin, type of fixings, etc…

- Either the VETURE kit is tested in a limited number of configurations to cover the influence of the above parameters, for instance high thickness of insulation (120 mm is usually the maximum allowed for SBI apparatus), lower and high thickness of the skin, lower height and lower width, maximum density of fixings.

The internal vertical angle can be installed with a profile or special VETURE unit, if specified of normal use in situ. Otherwise, no profile should be used.

Usually the vertical and upper edges are not protected by a profile.

The joints between elements are defined first by the above sketch then by the dimensions of the elements.

Example of installation