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ETAG 031

GUIDELINE FOR
EUROPEAN TECHNICAL APPROVAL
Of

Inverted Roofs Insulation Kits

Part 2: Insulation with Protective Finishing

Version November 2010

This Guideline for European Technical Approval is established and published in accordance with Article 11 of the Construction Products Directive as a basis for the preparation and issue of European Technical Approvals in accordance with Article 9.1 of the Construction Products Directive.

European Technical Approvals are issued by approval bodies authorised and notified in accordance with Article 10 of the Construction Products Directive. These bodies are organized in EOTA.

The European Technical Approval, according to the Construction Products Directive, is a favourable technical assessment of the fitness for use of a construction product and the technical specification of the assessed product, serving as basis for the CE marking of this product when and where a harmonised standard according to the Directive is not or not yet available.

Due to technical innovation and the progress of the state of the art, guidelines for technical approval might not reflect the latest developments and experiences gained in approval procedures. The reader of this Guideline is therefore advised to check with an EOTA member whether there are further provisions which have to be taken into account in the use of the Guideline.

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FOREWORD

- Background of the subject

This Guideline has been drawn up by the EOTA Working Group 04.01/02 Inverted Roofs Insulation Kits.

This ETAG 031 - Part 2 Insulation with Protective Finishing shall be used in conjunction with Part 1 – General.

This Complementary Part expands and/or modifies the requirements given in Part 1 - General, taking into account the specific family of products referred to.

- **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** (2006) for this ETAG additional part is given in annex A.

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 useful information on the general understanding of this additional part of the ETAG as developed when delivering ETA's in consensus by the EOTA members. Readers and users of this additional part of the ETAG are advised to check the current status of these documents with an EOTA member.

EOTA may need to make alterations/corrections to this additional part and Part 1 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 additional part and Part 1 ETAG are advised to check the current status of the content of these documents 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

The legal basis of the ETAG is given in clause 1.1 of ETAG 031 - Part 1.

No existing ETAG is superseded

1.2 Status of ETAG

The Status of the ETAG is given in clause 1.2 of ETAG 031 - Part 1.

2 SCOPE

2.1 Scope

This ETA-Guideline Part 2: Insulation with Protective Finishing – covers inverted flat roof kits using insulation with protective finishing combined with a separation layer, depending on the technical solution.

Insulation with protective finishing comprises thermal insulation with integral screed, ceramic or similar protection. These thermal insulation kits are loose-laid for use in fully supported specifications above a waterproofing layer for flat roofs including untrafficked and pedestrian uses. The integral protection functions as ballast and UV protection for the thermal insulation and suitable integral protections can be used in pedestrian trafficked areas.

The composite components are manufactured using extruded polystyrene foam boards to EN 13164: 2008 and a suitable factory applied protective finishing.

The factory production control procedures outlined in Chapter 8 of this Part of the ETAG cover the composite component and protective finish. The FPC procedures for the XPS, as well as the separation layer, are outlined in Part 1 of this ETAG.

Where necessary the composite components are used in conjunction with a separation layer. This component will be taken into account in so far as it may affect, or is affected by, the performance of the thermal insulation with protective finishing. Additional ballast may be required due to wind uplift forces acting on the roof.

When assessing thermal insulation with a finishing protection this Part 2 – shall be used in conjunction with ETA-Guideline Part 1: General.

2.2 Use categories/Product families/ Systems

2.2.1 Families

Current insulations with protective finishing are based on the following thermal insulation products:

– Extruded Polystyrene (XPS)

Other insulations with protective finishing, such as, thermal insulation based on EPS, shall be assessed using the CUAP route using this Guideline as a framework.

2.2.2 Use Categories

The areas of use are categorised in order to facilitate the assessment processes:

– Untrafficked
– Pedestrian

Other use categories, as listed in Part 1 of this Guideline, shall be assessed using the CUAP route.

2.2.3 Levels and classes

External fire performance
Reaction to fire

2.3 Assumptions

The ‘State of the Art’ doesn't enable the development, within a reasonable time, of full and detailed verification methods and corresponding technical criteria/guidance for acceptance for some particular 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.

This ETAG may also be used for kits for which the test and assessment methods defined in the ETAG shall be applicable. 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.

List of main assumptions

- The existing waterproofing layer shall be watertight and is in good condition
- The roof shall be designed to avoid surface condensation within the building and deleterious condensation within the roof structure
- The building shall be sufficiently structurally sound to carry the additional imposed load exerted by the assembled system
- The roof shall be properly designed with adequate falls/drainage
- Regular maintenance of the roof shall be conducted
- The protective finish affords protection to the thermal insulation against the effects of ultra violet radiation.

3 TERMINOLOGY

3.1 Common terminology and abbreviations

Common Terms are available in the public area of the EOTA website www.eota.be

3.2 Terminology and abbreviations

3.2.1 Terminology and abbreviations specific to this ETAG

For Terminology and abbreviations specific to this ETAG see ETAG 031 Part1 – General – Chapter 3 Terminology.

3.2.2 Terminology and abbreviations specific to this Complementary Part

Adhesive – Used for bonding the protective finishing to the thermal insulation in some boards. Examples of types of adhesives used for this purpose are polyurethane, cementitious and water based.

Insulation with protective finishing – A factory-made composite component constituted by a thermal insulation and a protective finishing. When installed on an inverted roof, this component permits the execution in one single operation of both the thermal insulation and the protection layer of the roof. This protection also acts as the ballast of the thermal insulation, though some additional ballast may be needed in some cases, depending on wind uplift requirements of each site.

Mechanical key – A machined profile (e.g. grooves) of the thermal insulation to allow interlocking between the thermal insulation and the protective finish.

Methods of attachment –The insulation and the protective layer are combined together either by:

- mechanical key
- adhesive
- mechanical key and adhesive
- no adhesive or mechanical key.

Protective finishing – The protective finishing allows the diffusion of water vapour (the limit is given in Chapter 6). Diffusion tight layers are not used. The materials used are screeds, mortars, ceramics or similar toppings.

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

4 REQUIREMENTS

4.0 General

The performance requirements, establishing the fitness for use of insulation with protective finishing, shall be in accordance with Chapter 4 of ETAG 031 Part 1 – General, and with the following specific stipulations for this family of kits.

4.1 ER1: Mechanical resistance and stability

No additional requirements with regard to Part 1.

4.2 ER2: Safety in case of fire

The following aspects of performance are relevant to this Essential Requirement with regard to thermal insulation with protective finishing:

4.2.1 Reaction to fire – no additional requirements with regard to Part 1.

4.2.2 External fire performance – additional specific requirements.

4.3 ER3: Hygiene, Health and the Environment

4.3.1 Water vapour transmission – additional specific requirements.

4.3.2 Release of dangerous substances – no additional requirements with regard to Part 1.

4.4 ER4: Safety in use

4.4.1 Resistance to wind loads – additional specific requirements.

4.4.2 Slip resistance – additional specific requirements.

4.4.3 Mechanical damage – specific requirements.

4.5 ER5: Protection against noise

No additional requirements with regard to Part 1.

4.6 ER6: Energy economy and heat retention

4.6.1.1 Thermal resistance – additional specific requirements.

4.6.1.2 Thermal conductivity (Lambda) – additional specific requirements.

4.6.2 Compressive strength– additional specific requirements.

4.7 Aspects of durability, serviceability and identification

4.7.1 Aspects of durability

The kits assessed under the scope of this complementary Part shall meet the additional requirements related to the following aspects.

4.7.1.2 Compressive strength– additional specific requirements.

4.7.1.3 Heat – additional specific requirements.

4.7.1.5 Freeze-thaw – additional specific requirements.

4.7.1.6 Mechanical damage – specific requirements.

4.7.1.7 Chemical resistance – No additional requirements with regard to Part 1.

4.7.1.8 Compatibility of kit components with the other components of the assembled system – No additional requirements with regard to Part 1.

4.7.2 Aspects of serviceability

No additional requirements with regard to Part 1.

4.7.3 Aspects of Identification

The materials used in the Inverted Roofs shall be identifiable to the extent that their properties might influence the kit's ability to fulfil the Essential Requirements.

5 METHODS OF VERIFICATION

5.0 General

The methods of verification given in Chapter 5 of ETAG 031 - Part 1 shall be applied, except where identified below. Tests carried out under Chapter 5 of ETAG 031 - Part 1 shall be on the thermal insulation only unless otherwise stated.

5.1 Mechanical resistance and stability

No requirements.

5.2 Safety in case of fire

5.2.1 Reaction to fire

Method of verification according to clause 5.2.1 of ETAG 031 - Part 1.

5.2.2 External fire performance

The kit shall be tested as part of a roof system in accordance with ENV 1187 to the appropriate test method for the corresponding external fire performance roof class for the Member State concerned, in order to be classified according to EN 13501-5.

5.3 Hygiene, Health and the Environment

5.3.1 Water vapour transmission

The water vapour transmission, for the thermal insulation, shall be determined in accordance with EN 12086: 1997 and declared as the water vapour diffusion resistance factor (μ). The water vapour transmission, for the protective layer (and adhesive if used(1)), shall be determined in accordance with EN 1015-19 : 1999 or EN ISO 12572 : 2001(2) and declared as the water vapour diffusion resistance factor (μ).

(1) A minimum slice of the thermal insulation shall be included in the sample.
(2) The appropriate test shall be laid down by the Approval Body dependant on the protective layer type.

5.3.2 Release of dangerous substances

5.3.2.1 Presence of dangerous substances in the components

By declaration according to clause 5.3.1.1 of ETAG 031 - Part 1.

5.3.2.2 Compliance with the applicable regulations

If the 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).

5.3.2.3 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 database, and will be transferred to the Commission services.

The information contained in this EOTA database will also be communicated to any ETA applicant. On the basis of this information, a protocol of assessment of the kit, 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

5.4.1 Resistance to wind loads

The calculation and assessment of the suitability of the assembled system to resist wind loading shall be carried out in conjunction with the ETA Applicant, in accordance with Euro Code EN 1991-1-4 and the Nationally Determined Parameters.

For each specific building, the calculation of the required ballast to resist the wind up lift force shall be carried out by the roof designer.

5.4.2 Slip resistance

Slip resistance shall be determined in accordance with EN 13036-4 : 2003 using a 4S rubber slider.

5.4.3 Mechanical damage

See clause 5.7.1.6.

5.5 Protection against noise

No requirements.

5.6 Energy economy and heat retention

5.6.1 Thermal characteristics

5.6.1.1 Thermal resistance

The total thermal resistance of the kit is the sum of the thermal resistance of the kit's components. Since the thermal insulation is the major contributor to the kit's thermal resistance it shall be addressed in detail as follows:

Method of verification according to clause 5.6.1.1 of ETAG 031 - Part 1. It shall be assumed the protective finishing has a negligible effect on the thermal resistance of the component provided the thermal insulation profile has not been changed e.g. to provide a mechanical key.

Components with a mechanical key shall be dealt with either by excluding the profiled (grooved) area of the thermal insulation or by calculation using EN ISO 6946.

5.6.1.2 Thermal conductivity (Lambda)

Method of verification according to clause 5.6.1.2 of ETAG 031 - Part 1 on the thermal insulation only.

5.6.1.3 Correction factor for thermal transmittance

The method of verification according to clause 5.6.1.3 of ETAG 031 - Part 1 with the following changes:

- A ballast covering is not used.
- Run-off into W_2 is from the upper surface of the boards under test.

In the case of lower *fx* values than those quoted in 6.6.1.3, the *fx* value shall be determined on the kit in accordance with Annex C of Part 1 of this ETAG.

The *fx* value for kits of a smaller than size 600 mm x 1200 mm shall also be determined on the kit in accordance with Annex C of Part 1 of this ETAG due to the increase in joint area.

5.6.2 Compression characteristics

See clause 5.7.1.2.

5.7 Aspects of durability, serviceability and identification

5.7.1 Aspects of durability

5.7.1.1 General

The most important aspects related to the durability of thermal insulation with protective finishing, and which shall be taken into account, shall be the retention of characteristics after exposure to:

- Compression characteristics
- Heat
- Water absorption
- Freeze thaw
- Mechanical damage
- Chemical resistance
- Compatibility of kit components with the other components of the assembled system.

5.7.1.2 Compression characteristics

5. 7.1.2.1 Compressive strength/stress of the thermal insulation

Method of verification according to clause 5.7.1.2.1 of ETAG 031 - Part 1 on the insulation only.

5.7.1.2.2 Compressive strength of protective finish (excluding ceramic finishes)

The compressive strength shall be determined in accordance with 1015-11 : 1999. This test shall not be used for ceramic protective finishes. Ceramic protective finishes shall be assess on result of modulus of rupture and breaking strength (see clause 5.7.3.2.5).

5.7.1.2.3 Compressive creep of the thermal insulation

Method of verification according to clause 5.7.1.2.2 of ETAG 031 - Part 1 on the thermal insulation only.

5.7.1.2.4 Deformation under specified compressive load and temperature of the thermal insulation

Method of verification according to clause 5.7.1.2.3 of ETAG 031 - Part 1 on the thermal insulation only.

5.7.1.3 Heat

5.7.1.3.1 Dimensional stability

Method of verification according to clause 5.7.1.3.1 of ETAG 031 - Part 1 on the thermal insulation with and without the protective finishing.

5.7.1.3.2 Ageing of insulation with protective finishing

Ageing of the thermal insulation with protective finishing shall be carried out using the heat-rain ageing regime of 80 cycles in line with ETAG 004 in a horizontal rig capable of holding at least three standard boards (1200 x 600 mm) or six half boards. The rig has to be capable of heating and water spraying the test specimens in line with the cycles set out below. Samples shall be cut from the boards after the conditioning.

The cycles shall be as follows:

- Gradual heating to 70 ± 5ºC for one hour
- Maintain temperature at 10-15% RH for two hours
- Water spray at 15 ± 5ºC for one hour at a volume of one litre per metre squared per minute
- Leave to drain for two hours and then repeat.

Following completion of the ageing, water absorption by capillary action shall be determined in accordance with ETAG 004, clause 5.1.3.1 and further conditioning by freeze-thaw (see clause 5.7.1.5.2) shall be carried out.

5.7.1.4 Water absorption

5.7.1.4.1 Long-term water absorption by diffusion

Method of verification according to clause 5.7.1.4.1 of ETAG 031 - Part 1. The conditioning shall be carried out on the insulation with protective finishing. The thermal insulation shall be separated from the protective finish layer following conditioning, measured and the results expressed separately. The results for the thermal insulation shall be expressed as a percentage volume increase and for the protective finish as a percentage mass increase.

5.7.1.4.2 Long-term water absorption by immersion

Method of verification according to clause 5.7.1.4.2 of ETAG 031 - Part 1. The conditioning shall be carried out on the full board. The thermal insulation shall be separated from the protective finish layer following conditioning, measured and the results expressed separately. The results for the thermal insulation shall be expressed as a percentage volume increase and for the protective finish as a percentage mass increase.

5.7.1.5 Freeze-thaw

5.7.1.5.1 Freeze-thaw – thermal insulation

Method of verification according to clause 5.7.1.5 of ETAG 031 - Part 1. If the thermal insulation is mechanically keyed then, tests shall be carried out by both diffusion and immersion of the insulation.

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5.7.1.5.2 Freeze-thaw – insulation with protective finishing

Following the procedure laid out in clause 5.7.1.3.2 freeze-thaw shall be carried out for 30 cycles using the cycle as set out in ETAG 004, clause 5.1.3.2.2 (simulated method).

The test shall be carried out on three samples of 500mm x 500mm. Before freeze-thaw cycling the samples shall be stored totally immersed in water for 28 days.

Cycles

- Exposure to water for 8 hours at 20 ± 2ºC by total immersion
- Freezing –20 ± 2ºC (fall for 2 hours) for 14 hours (total of 16 hours)

Following completion of the conditioning, hard body impact and tensile bond strength shall be determined in accordance with clauses 5.7.1.6.1 and 5.7.1.6.2. A visual inspection of the sample shall also be carried out and any damage recorded.

5.7.1.6 Mechanical damage

5.7.1.6.1 Hard body impact resistance

Hard body impact resistance shall be determined in accordance with EOTA Technical Report TR 001 using samples prepared by ageing and freeze-thaw in accordance with clause 5.7.1.5.2. Time between manufacture and testing is dependant on the cure rate of the protective finish but shall be a minimum of 28 days after manufacture.

A 1kg steel ball shall be used at a drop height of 1,02m to give an impact energy of 10 Joules.

5.7.1.6.2 Tensile bond strength

Tensile bond strength between the protective finishing and thermal insulation, on all types of attachment, shall be determined in accordance with EN 1607: 1997. Samples shall not be tested before at least 28 days after manufacture.

5.7.1.6.3 Static indentation (Point loading)

Static indentation (point loading) of the component shall be determined generally in accordance with EOTA TR 007 with the following modifications:

- Test shall be carried out using the component without a support material.
- Assessment of damage to surface of the protection shall be visual.
- The frame shall not be used as test specimen does not require clamping.

5.7.1.6.4 Wear resistance

Wear resistance shall be determined in general accordance with DD ENV 12633: 2003 with the following modifications:

Slip resistance shall be determined using a 4S rubber slider.

Ten samples shall be tested for the purposes of ETA assessment.

5.7.1.7 Chemical resistance

5.7.1.7.1 Insulation with protective finishing

This shall be assessed by the Approval Body with reference to published chemical resistance data for the insulation type and the ETA Applicant's declaration. The ETA Applicant shall provide a list of chemicals or chemical families the insulation shall not come into contact with.

5.7.1.7.2 Separation layer

This shall be assessed by the Approval Body with reference to published chemical resistance data for the separation layer type and the ETA Applicant's declaration

5.7.1.8 Compatibility of kit components with the other components of the assembled system

The ETA Applicant shall declare the compatibility of the kit components with the other components of the kit and the assembled system.

5.7.2 Aspects of serviceability

No additional requirements with regard to Part 1.

5.7.3 Aspects of Identification

5.7.3.1 The composite component as placed on the market

5.7.3.1.1 Mass per unit area

Mass per unit area of the whole board shall be declared.

5.7.3.2 Protective finish

5.7.3.2.1 Type

The type (e.g. mortar, ceramic) shall be declared.

5.7.3.2.2 Thickness

The thickness of the protective finish shall be determined using a Vernier calliper, measuring 10 cross-sectional test specimens across a board.

5.7.3.2.3 Density (non-ceramic only)

The density of non-ceramic protective finishes shall be determined in accordance with EN 1015-10: 1999.

5.7.3.2.4 Flexural strength (non-ceramic only)

Flexural strength of the protective finish shall be determined in accordance with EN 1015-11: 1999 for non-ceramic protective finishes.

5.7.3.2.5 Modulus of rupture and breaking strength (ceramic only)

Modulus of rupture and breaking strength shall be determined in accordance with EN ISO 10545-4: 1998 for ceramic protective finishes.

5.7.3.3 XPS

No additional requirements.

5.7.3.4 Adhesive

5.7.3.4.1 Type

The type (e.g. polyurethane, cementitious and water based) shall be declared.

5.7.3.4.2 Coating weight

The coating weight shall be declared.

5.7.3.5 Separation layer

5.7.3.5.1 Type

The type (e.g. non-woven polyester) shall be declared.

5.7.3.5.2 Mass per unit area

The mass per unit area shall be determined in accordance with EN 29073-1.

5.7.3.5.3 Tensile properties

The tensile strength and elongation at break shall be determined in accordance with EN 29073-3

6 ASSESSING AND JUDGING THE FITNESS OF KITS

6.0 General

The requirements given in Chapter 6 of ETAG 031 - Part 1 shall be applied, except where identified below.

6.1 Mechanical resistance and stability

No requirements.

6.2 Safety in case of fire

6.2.1 Reaction to fire

The kit components shall be classified in accordance with the provisions given in clause 6.2.1 of ETAG 031 - Part 1.

6.2.2 External fire performance

Classification in accordance with the provisions given in clause 6.2.2 of ETAG 031 - Part 1.

6.3 Hygiene, Health and the Environment

6.3.1 Water vapour transmission

Expressed in accordance with the provisions given in clause 6.3.1 of ETAG 031 - Part 1.

The protective finishing layer shall have a s_d value less than or equal to 8 m.

6.3.2 Release of dangerous substances

Declaration in accordance with the provisions given in clause 6.2.3 of ETAG 031 - Part 1.

6.4 Safety in use

6.4.1 Resistance to wind loads

Calculated in accordance with the provisions given in clause 6.4.1 of ETAG 031 - Part 1.

6.4.2 Slip resistance

The slip resistance determined in accordance with clause 5.4.2 shall be greater than a reading of 35.

6.4.3 Mechanical damage

See clause 6.7.1.6.

6.5 Protection against noise

No requirements.

6.6 Energy economy and heat retention

6.6.1 Thermal characteristics

6.6.1.1 Thermal resistance

Declaration in accordance with the provisions given in clause 6.6.1.1 of ETAG 031 - Part 1.

6.6.1.2 Thermal conductivity (Lambda)

Declaration in accordance with the provisions given in clause 6.6.1.2 of ETAG 031 - Part 1.

6.6.1.3 Correction value for thermal transmittance

The correction value for thermal transmittance (*fx*) determined in accordance with clause 5.6.1.3.

The *fx* values due to the water flow beneath the boards (600mm x 1200mm board size) to be used shall be as follows:

0,03 $W \cdot day \cdot m^{-2} \cdot K^{-1} \cdot mm^{-1}$ for a system using boards with profiled joints (e.g. scarf, tongue and groove)
0,04 $W \cdot day \cdot m^{-2} \cdot K^{-1} \cdot mm^{-1}$ for an open system with boards with butted joints

For values lower than above or smaller board dimensions, the *fx* values shall be determined in accordance with clause 5.6.1.3.

6.6.2 Compression characteristics

See clause 6.7.1.2.

6.7 Aspects of durability, serviceability and identification

6.7.1 Aspects of durability

6.7.1.1 General

6.7.1.2 Compression characteristics

6.7.1.2.1 Compressive strength/stress of the thermal insulation

Classification in accordance with the provisions given in clause 6.7.1.2.1 of ETAG 031 - Part 1.

6.7.1.2.2 Compressive strength of protective finish

Compressive strength of the protective finishing determined in accordance with clause 5.7.1.2.2 shall be declared in the ETA.

6.7.1.2.3 Compressive creep of the thermal insulation

Classification in accordance with the provisions given in clause 6.7.1.2.2 of ETAG 031 - Part 1.

6.7.1.2.4 Deformation under specified compressive load and temperature (DLT) of the thermal insulation

Classification in accordance with the provisions given in clause 6.7.1.2.3 of ETAG 031 - Part 1.

6.7.1.3 Heat

6.7.1.3.1 Dimensional stability

Classification in accordance with the provisions given in clause 6.7.1.3.1 of ETAG 031 - Part 1 for the insulation with protective finish.

6.7.1.3.2 Ageing of insulation with protective finishing

Following the rain/heat cycle the water absorption by capillarity shall be determined in accordance with clause 5.7.1.3.2 and declared.

6.7.1.4 Water absorption

6.7.1.4.1 Long term water absorption by diffusion (WD(V))

Classification of the thermal insulation shall be in accordance with the provisions given in clause 6.7.1.4.1 of ETAG 031 - Part 1. The long term water absorption by diffusion of the protective finishing layer shall be determined in accordance with clause 5.7.1.4.1 and declared. Results for the thermal insulation and the protective finish shall be expressed separately.

6.7.1.4.2 Long term water absorption by immersion (WL(T))

Classification of the thermal insulation shall be in accordance with the provisions given in clause 6.7.1.4.2 of ETAG 031 - Part 1. The long term water absorption by immersion of the protective finishing layer shall be determined in accordance with clause 5.7.1.4.2 and declared. Results for the thermal insulation and the protective finish shall be expressed separately.

6.7.1.5 Freeze-thaw (FT)

6.7.1.5.1 Freeze-thaw – thermal insulation

Classification in accordance with the provisions given in clause 6.7.1.5 of ETAG 031 - Part 1.

6.7.1.5.2 Freeze-thaw – insulation with protective finishing

After the freeze-thaw cycling in accordance with clause 5.7.1.5.2, the tensile bond strength shall be greater than 80kPa with a recommended maximum decrease change of -20% on the original value. The failure mode shall also be recorded.

6.7.1.6 Mechanical damage

6.7.1.6.1 Hard body impact resistance

Hard body impact resistance determined in accordance with clause 5.7.1.6.1, and any damage to the protective finishing recorded (e.g. cracking, indentation, flaking and/or delamination from the thermal insulation). Recommended areas of usage according to result are given in table 6.1.

Table 6.1 Hard body impact resistance

Result	Recommended area of usage
No performance determined	Non trafficked areas
Major cracking and/or delamination	Non trafficked areas
Minor cracking, indentation and/or flaking	Low maintenance traffic
No damage to protective finish	Pedestrian areas and frequent maintenance traffic

6.7.1.6.2 Tensile bond strength

The tensile bond strength determined in accordance with clause 5.7.1.6.2 shall meet the minimum value of 80kPa. The failure mode shall also be recorded.

6.7.1.6.3 Static indentation (Point loading)

The resistance to static indentation (point loading) shall be expressed as the load which has not damaged the protective finishing layer (i.e. penetrated, indented and/or cracked) in three out of three parallel tests when tested in accordance with clause 5.7.1.6.3. Recommended areas of usage according to result are given in table 6.2.

Table 6.2 Static indentation (point loading)

Result	User load	Recommended area of usage
L1 (70 N)	Low	Non-accessible
L2 (150 N)	Moderate	Accessible for roof maintenance
L3 (200 N)	Normal	Accessible for plant/equipment maintenance and pedestrian
L4 (250 N)	High	High usage pedestrian areas

6.1.7.1.6.4 Wear resistance

Following conditioning in accordance with 5.7.1.6.4, the slip resistance shall be determined in accordance with clause 5.4.2 and shall be greater than a reading of 35.

6.7.1.7 Chemical resistance

6.7.1.7.1 Insulation with protective finishing

The evidence assessed shall show the insulation will retain its functionality following exposure to defined chemicals and list any chemicals or chemical families the insulation shall not come into contact with.

6.7.1.7.2 Separation layer

The evidence assessed shall show the separation layer will retain its functionality following exposure to defined chemicals.

6.7.1.8 Compatibility of kit components with the other components of the assembled system

The ETA Applicant shall declare the compatibility of the kit components with the other components of the kit and the assembled system.

6.7.2 Aspects of serviceability

No additional requirements with regard to Part 1.

6.7.3 Aspects of Identification

6.7.3.1 Composite component as place on the market

6.7.3.1.1 Mass per unit area

Mass per unit area determined in accordance with clause 5.7.3.1.1 shall be within the manufacturer's declared tolerances.

6.7.3.2 Protective Finishing

6.7.3.2.1 Type

The declaration shall state the base material type.

6.7.3.2.2 Thickness

The thickness shall be determined in accordance with clause 5.7.3.2.2 and shall be within the manufacturer's declared tolerances.

6.7.3.2.3 Density (non-ceramic only)

The density for non-ceramic materials shall be determined in accordance with clause 5.7.3.2.3 and shall be within the manufacturer's declared tolerances.

6.7.3.2.4 Flexural strength (non-ceramic)

Flexural strength of the protective finishing shall be determined in accordance with clause 5.7.3.2.4 and declared in the ETA.

6.7.3.2.5 Modulus of rupture and breaking strength (ceramic only)

Modulus of rupture and breaking strength shall be determined in accordance with clause 5.7.3.2.5 and declared in the ETA.

6.7.3.3 XPS

No additional requirements.

6.7.3.4 Adhesive

6.7.3.4.1 Type

The declaration shall state the base material type.

6.7.3.4.2 Coating weight

The manufacturer's declared value for the coating weight with tolerances shall be stated.

6.7.3.5 Separation layer

6.7.3.5.1 Type

The declaration shall state the polymer type and component structure of the separation layer.

6.7.3.5.2 Mass per unit area

The mass per unit area shall be determined in accordance with 5.7.3.5.2 shall be within the declared tolerance of the manufacturer's declared value.

6.7.3.5.3 Tensile properties

The tensile strength and elongation at break shall be determined in accordance with 5.7.3.5.3 shall be within the declared tolerance of the manufacturer's declared value.

7 ASSUMPTIONS AND RECOMMENDATIONS UNDER WHICH THE FITNESS FOR USE OF THE KIT 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 kits).

7.1 Design of works

There are no specific requirements for this family of kits see Clause 7.1 of ETAG 031 - Part 1.

7.2 Packaging, transport and storage

The packaging shall protect the components from damage during normal handling and transportation.

The insulation with protective finish component shall be protected from prolonged exposure to sunlight by either storage under cover, or covering with a suitable material.

Care shall be taken to prevent contact between the insulation with protective finish component and non-compatible materials as per the manufacturer's list.

Storage of the insulation with protective finish component in the vicinity of low flash point materials shall be avoided

7.3 Execution of works (installation, assembling, incorporation, etc., including, if necessary, test methods for verifications on site)

There are no specific requirements for this family of kits see Clause 7.3 of ETAG 031 - Part 1.

Care shall be taken in handling the boards to avoid damage to the protective finish and loss of adhesion between the protective finish and the insulation.

7.4 Maintenance and repair

7.4.1 General maintenance

The owner of the building should check drainage outlets at least once a year and clear any blockages. Any roofs adjacent to trees should be inspected twice a year (i.e. Autumn and Spring).

7.4.2 Additional ballast

In areas of high wind uplift forces it recommends additional ballast be applied dependant on the weight of the boards.

7.4.3 Uncontrolled vegetation

Any unwanted for example lichen, moss, algae growing on the protective finishing should be removed during maintenance checks to reduce the risk of slip for foot traffic.

Use of chemicals (e.g. fungicides) should be checked for compatibility with the ETA Applicant and waterproofing manufacturer.

Section three: ATTESTATION AND EVALUATION OF CONFORMITY

8 ATTESTATION AND EVALUATION OF CONFORMITY

8.1 System of attestation of conformity

The decision is as given in Clause 8.1 of ETAG 031 - Part 1.

8.2 Tasks and responsibilities of the manufacturer and notified bodies

This Complementary Part (ETAG 031 - Part 2) has no procedures contrary to those stated in Clauses 8.1 and 8.2 of ETAG 031 - Part 1 for the thermal insulation. There are additional requirements for factory production control (FPC) for the composite component as placed on the market and the protective finish. The FPC requirements for the thermal insulation are given in Part 1 of this ETAG.

8.2.1 Tasks of the manufacturer

The corner stones of the actions to be undertaken by the manufacturer of the insulation with protective finishing in the procedure of attestation of conformity of the whole board and protective finish are laid down in Table 1.

For the purposes of CE marking the testing for the ETA assessment is considered to be the Initial Type Testing.

Table 1 Control plan for the manufacturer

Nr	Subject/type of control *(kit component, raw/constituent material, component - indicating characteristic concerned)*	Test or control method *(refer to 3.2.3, 2.4 or 5.2)*	Criteria, if any	Minimum number of samples	Minimum frequency of control
(1)	(2)	(3)	(4)	(5)	(6)
Factory production control (FPC) including testing of samples in accordance with a prescribed test plan					
insulation with protective finishing					
1	Reaction to fire	5.2.1	6.2.1		As per EN 13164 : 2008
2	Length and width	EN 822	EN 13164 : 2008		
3	Squareness	EN 824			
4	Flatness	EN 825			
5	Thickness	EN 823			
6	Mass per unit area	Direct	6.7.3.1.1		Once per day
7	Bond strength(1(	5.7.1.6.2	6.7.1.6.2		Once a week
8	Freeze-thaw	5.7.1.5.2	6.7.1.5.2		Once every two years
Protective finishing					
9	Thickness of protective finishing	5.7.3.2.2	6.7.3.2.2		Once per shift
10	Density (non-ceramic only)	EN 1015-10 : 1999	6.7.3.2.3		Once per day
11	Flexural strength (non-ceramic only)	EN 1015-11 : 1999	6.7.3.2.4		Once per 40 shifts
12	Modulus of rupture and breaking strength (ceramic only)	EN ISO 10545-4 :1998	6.7.3.2.5		

(1) Adhesives supplied as raw materials shall be supplied with a Certificate of Conformity for every delivery as specified in the relevant hEN or TS.

8.2.2 Tasks of notified bodies

This Complementary Part (ETAG 031 - Part 2) has no procedures contrary to those stated in Clause 8.2.2 of ETAG 031 - Part 1.

8.2.3 Special methods of control and testing used for the evaluation

Not applicable

8.3 CE marking and information

This Complementary Part of the ETAG gives no additional or different information and/or requirements for CE-marking as detailed in Clause 8.3 of ETAG 031 - Part 1.

Section four: ETA CONTENT

9 THE ETA CONTENT

9.1 The ETA-content

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

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 kits 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.

The ETA will contain the generic specification of the other components of the assembled system, which are not part of the kit.

Information on the performance of the whole board:

- Use category
- Indication of the assumed working life
- Reaction to fire
- Classification of the insulation with protective finishing with respect to external fire performance
- Statement on the presence or otherwise of dangerous substances including concentration
- Dimensions
- Mass per unit area for the composite component as placed on the market
- Joint geometry
- Slip resistance
- Dimensional stability under specified temperature and humidity conditions
- Hard body impact resistance
- Tensile bond strength
- Tensile bond strength after combined heat-rain ageing and freeze-thaw
- Static indentation (point loading)
- Wear resistance
- Correction value for thermal transmittance of the insulation with protective finishing
- Minimum roof slope upon which the insulation with protective finishing can be used

Thermal Insulation

- Type of thermal insulation
- Thermal resistance/thermal conductivity (declared and corrected)
- Compressive strength/stress
- Compressive creep
- Deformation under specified compressive load and temperature conditions
- Dimensional stability under specified temperature and humidity conditions
- Long term water absorption by diffusion
- Long term water absorption by immersion
- Freeze-thaw resistance
- Water vapour transmission (if declared)

Protective finish layer

- Type of protective finish layer
- Thickness
- Density (non-ceramic only)
- sd value
- Compressive strength of protective finish (excluding ceramic finishes)
- Long term water absorption by diffusion
- Long term water absorption by immersion
- Capillarity after heat-rain ageing
- Visual damage after freeze-thaw
- Flexural strength (non-ceramic)
- Modulus of rupture and breaking strength (ceramic only)
- Water vapour transmission

Adhesive

- Type

Separation layer

- Type
- Mass per unit area
- Chemical resistance
- Reaction to fire

Terminology and Assumptions

All necessary definitions (see Chapter 3) and assumptions (see Chapter 7) shall be stated in the ETA.

9.2 Additional information

It shall be stated in the ETA whether or not any additional (possibly confidential) information shall be supplied to the Notified Body for the evaluation of conformity purposes**.**

Annex A
REFERENCE DOCUMENTS

EN 822 Thermal insulating products for building applications – Determination of length and width

EN 823 Thermal insulating products for building applications – Determination of thickness

EN 824 Thermal insulating products for building applications – Determination of squareness

EN 825 Thermal insulating products for building applications – Determination of flatness

EN 1015-10: 1999 – Methods of test for mortar for masonry – Determination of dry bulk density of hardened mortar

EN 1015-11: 1999 – Methods of test for mortar for masonry – Determination of flexural and compressive strength of hardened mortar

EN 1015-19: 1999 – Methods of test for mortar for masonry – Determination of water vapour permeability of hardened and plastering mortars

ENV 1187– Test methods for external fire exposure to roofs

EN 1607: 1997 – Thermal insulating products for building applications – Determination of

EN 1991-1-4 – Eurocode – General actions – Wind actions

EN 12086: 1997 – Thermal insulating products for building applications – Determination of water vapour transmission properties

EN 29073-1: 1992 – Textiles – Test methods for nonwovens – Determination of mass per unit area

EN 29073-3: 1992 – Textiles – Test methods for nonwovens – Determination of tensile strength and elongation

DD ENV 12633: 2003 – Method of determination of unpolished and polished slip/skid resistance value

EN 13036-4: 2003 – Road and airfield characteristics – Test methods – Method for measurement of slip/skid resistance of a surface – The pendulum test

EN 13164: 2008 – Thermal insulation products for buildings – Factory made products of extruded polystyrene foam (XPS) - Specification

EN 13501-1 – Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire test

EN 13501-5 – Classification of construction products and building elements – Part 5: Classification using test data from external fire exposure roof test

EN ISO 6946 *Incorporating amendment No.1* – Building components and building elements – Thermal resistance and thermal transmittance – Calculation method

EN ISO 10545-4: 1998 – Ceramic tiles. Determination of resistance to surface abrasion for glazed tiles

EN ISO 12572: 2001 – Hygrothermal performance of building materials and products – Determination of water vapour transmission properties

ETAG 004 – Edition March 2000 – Guideline for the European Technical Approval of External Thermal Insulation Composite Systems with Rendering

ETAG 031 – Part 1 – Insulation Products for Inverted Roofs – Part 1: General

EOTA Technical Report TR 001: Edition February 2003 – Determination of impact resistance of panels and panel assemblies

EOTA Technical Report TR 007: Edition May 2004 – Determination of resistance to static indentation