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GUIDELINE FOR EUROPEAN TECHNICAL APPROVAL

of

SELF-SUPPORTING COMPOSITE LIGHTWEIGHT PANELS

(Part one : G E N E R A L)

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FOREWORD

- Background of the subject

- **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 useful information on the general understanding of this ETAG as developed 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.
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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:

- the final mandate issued by the EC : 13 July 1999
- the final mandate issued by the EFTA : 13 July 1999
- adoption of the Guideline by the Executive Commission of EOTA : 27 February 2003
- opinion of the Standing Committee for Construction : 14-15 May 2003
- endorsement by the EC : (indicate date)

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 the 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 self-supporting composite lightweight panels 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 ETAs**, i.e. a basis for technical assessment of the fitness for use of a self-supporting composite lightweight panel 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 self-supporting composite lightweight panels 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 ETAs for the self-supporting composite lightweight panels 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 self-supporting composite lightweight panel 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, self-supporting composite lightweight panels 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.

This guideline indicates alternative possibilities for the demonstration of the satisfaction of the requirements.

2. SCOPE

2.1 Scope

This guideline covers self-supporting composite lightweight panels[1] with one or both skins made of various organic, mineral or metallic materials assembled, with or without an internal frame and a core which is thermally insulating or not, bonded to at least one of the skins.
The prefabricated panels do not contribute to the loadbearing capacity of the works[2]. They are used for roofs, external walls, internal walls and ceilings, or claddings of walls, either within a building or as part of a building envelope.
Double metal-skin sandwich panels, covered by prEN 14509, glazing products covered by CEN/TC 129, thermally insulating products covered by CEN/TC 88, masonry products covered by CEN/TC 125, gypsum composite panels covered by prEN 13950**,** products which impair safe breakage (e.g. glass), and heavy products (e.g. concrete, stone block, masonry), are excluded from the scope of this Guideline".
The ETAG is divided into parts: the first part of ETAG deals with general aspects; the other parts deal with specific aspects relating to a different field of application.
Part 1: General
Part 2: Self-supporting composite lightweight panels for use in roofs
Part 3: Self-supporting composite lightweight panels for use in external walls and claddings
Part 4: Self-supporting composite lightweight panels for use in internal walls and ceilings

This general part 1 shall be used in conjunction with the relevant specific part(s) relating to the specific intended use(s).

In case the ETA-applicant claims that the composite panel is intended to improve the mechanical resistance or stability of the works, because it supports other structural elements of the works, or because it has a significant positive influence on the racking resistance of the works (horizontally and/or vertically), the product is not covered by this ETA-Guideline.
In that case, and if the composite panel is wood-based, the ETA-Guideline "Stressed-skin load-bearing wood-based panels" shall be used.

2.2 Use categories

See the specific ETAG Parts

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 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.

[1] The materials can be as follows:
Skins materials: wood-based sheet, paper, metal foils and sheets (with or without coating), synthetic coatings, gypsum-based sheet, bituminous membranes, fibre-cement sheets; etc.
Core materials: thermally insulating materials, honeycomb materials, glass-fibre tissues, etc.
[2] The contribution of these elements to the stiffening of the structure is not considered in this ETAG.

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 EOTA 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.
The ETA-applicant has the following possibilities regarding the incorporation of auxiliary products in the ETA (see also chapter 7):

- the incorporation of **specific fixings and/or jointing products**

In this case, for all the tests where auxiliary products are part of the assembled system, those auxiliary products will be used as specified by the manufacturer. The manufacturer will take full responsibility for those auxiliary products and these products will also be produced under the same attestation of conformity system as indicated in chapter 8 of this ETA-Guideline.

- the reference to **generic fixings and/or jointing products**

In this case, for all the tests where auxiliary products are part of the assembled system, the auxiliary products used in the tests will be those that conform to the minimum specifications of the manufacturer. These minimum specifications will also be given in the ETA. The ETA will specify clearly that CE marked products should be used, if possible. Where auxiliary products without CE marking are used, the designer should verify the conformity of the auxiliary products with the specifications in the ETA.

3. TERMINOLOGY

3.1. Common terminology and abbreviations (see Annex A)

3.2. Terminology and abbreviations specific to this ETAG

Core
Material positioned between two skins. This material can also be a composite material.

Self-supporting composite lightweight panel
a prefabricated non-loadbearing panel that, by virtue of its material and shape, will support all applied loadings and transmit these loadings to structural supports.

Joint
Construction formed by the adjacent parts of two or more self-supporting lightweight composite panels, components or building elements. Open joints would render the assembly unable to fulfil some or all the requirements as specified in chapter 4.

Joint product
Building product used to obtain the desired performance of a joint.

Skin
covering made of flat, lightly corrugated or corrugated coating, foil or sheet. A skin may be a composite as well.

Auxiliary products
In the framework of this ETA-Guideline, fixings and jointing materials (sealant and gaskets) are regarded as auxiliary products.

Gasket
Flexible material or product, in a pre-formed state, that when applied to a joint, seals it by adhering to one of the surfaces, enabling the joint to prevent or limit the passage of dust, moisture and gasses.

Fixing (fastener)
A component intended to be used to fasten self-supporting lightweight composite panels to the substrate, support or supporting frame mechanically and is usually made of a (metal) screw, possibly with a plastic or metal washer, etc.

Sealant

Material in an unformed state, that when applied to a joint, seals it by adhering to the surface enabling the joint to prevent the passage of dust, moisture and gasses.

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 a family of self-supporting composite lightweight panels and their intended uses. It is the manufacturer or producer who defines the self-supporting composite lightweight panels for which he is seeking ETA and how it is to be used in the works, and consequently the scale of the assessment.

In particular a manufacturer needs more than one ETA if :

- the family of skin materials is different (metal, polymer, wood-based…), but different materials of the same family are allowed
- the family of the core is different (insulating foam, mineral wool, honeycomb …), but different densities and thickness are allowed

Only in the case of the same panel with different end uses a manufacturer will need one ETA which will be split in different chapters, after a common description of the product.
It is therefore possible that for some self-supporting composite lightweight panels, 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 self-supporting composite lightweight panels or materials, or where there is a range of uses, the whole package of tests and assessment may be applicable.

(b) General layout of this section

The assessment of the fitness of self-supporting composite lightweight panels 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 self-supporting composite lightweight panels and uses concerned, beginning with the Essential Requirements for works (CPD art. 11.2) and then listing the corresponding relevant characteristics of self-supporting composite lightweight panels.
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 carried out 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 self-supporting composite lightweight panels.
Chapter 7, **assumptions and recommendations** are only relevant in as far as they concern the basis upon which the assessment of the self-supporting composite lightweight panels is made concerning their fitness for the intended use.

(c) Levels or classes 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 self-supporting composite lightweight panels. 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 self-supporting composite lightweight panel does not any longer fall under the scope of the ETAG; such cases shall be indicated 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 self-supporting composite lightweight panels for the intended use of 10 years for the easily replaceable ones, 25 years for others, provided that the self-supporting composite lightweight panel is subject to appropriate use and maintenance (cfr. ch. 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 a self-supporting composite lightweight panel 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 self-supporting composite lightweight panels in relation to the expected, economically reasonable working life of the works (based upon ID. par. 5.2.2).
Specific information on durability aspects will be given in the specific ETAG parts.

(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 self-supporting composite lightweight panels 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, 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 characteristics of self-supporting composite lightweight panels

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 characteristics of self-supporting composite lightweight panels 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 self-supporting composite lightweight panels. (cfr ETA-format par. II.2).

Content:

Table 4.0 Linking the Essential Requirements to the performance of self-supporting composite lightweight panels

ER	ID #	ID clause for the works	Element involved*	Performance of the element (with reference to the ID)	Characteristics specified in the mandate
1					Not relevant
2	§4.2.3 §4.2.3.3. 2a and b and § 4.2.4.2a	Limitation of generation and spread of fire and smoke without or beyond room of origin	All All Roofs	§ 4.3.1.1 Products subject to reaction to fire requirements § 4.3.1.3 Products subject to resistance to fire requirements § 4.3.1.2 Products for roofs subject to fire requirements	Reaction to fire Resistance to fire External fire performance
3	§ 3.3.1.1 § 3.3.1.2 § 3.3.5	Air quality Dampness: Outdoor environment	All	§ 3.3.1.1.3.2a (building materials) emission of volatile organic compounds and release of other pollutants, § 3.3.1.2.3.2e.1 & e.3 Dampness control: walls, walling materials, roofs § 3.3.5.3 Release of pollutants to the air	Release of dangerous substances Water permeability Vapour permeability Dimensional variations Release of dangerous substances
4	§ 3.3.2.2	mechanical resistance and stability Direct impacts – Behaviour on impact	All	§3.3.2.3 mechanical resistance and stability	Mechanical resistance Impact resistance Resistance to fixings
5	§ 2.3.1 § 2.3.2	Protection against airborne noise from outside of the works Protection against airborne noise between enclosed spaces	All	§ 4.3.2 The acoustic properties: (according to 4.3.3)	Direct airborne sound insulation
6	§ 4.2	Energy consumption limitation	All	§ 4.3.2.2 Fabric components Table 4.2 Characteristics	Thermal properties Air permeability

4.1 Mechanical resistance and stability

4.1.1 Mechanical resistance

As the panels are non-loadbearing parts of the work, mechanical resistance is considered under ER4 Safety in use. See §4.4.1.

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 the panel:

4.2.1 Reaction to fire
The reaction to fire performance of the panel and its components shall be in accordance with laws, regulations and administrative provisions applicable to the panel 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.

4.2.2 Fire resistance
The resistance to fire performance of the panel assembly shall be in accordance with laws, regulations and administrative provisions applicable to the panel 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

4.2.3 External fire performance
The external fire performance of the panel shall be in accordance with laws, regulations and administrative provisions applicable to the panel 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 Water permeability
Panels shall be designed to resist the passage of water so as to prevent harmful effects on the building or on the health of the occupants unless otherwise protected.

4.3.2 Vapour permeability
The panel, including joints, shall be designed to minimize the risk of harmful levels of interstitial and surface condensation due to vapour permeability of materials.
Thermal bridges which may cause water vapour condensation affecting hygiene, health and environment shall be avoided.

4.3.3 Release of dangerous substances
The panel 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).

4.3.4 Dimensional variation (related to water penetration)
The panels should have adequate resistance against inadmissible deformations, e.g. bowing, shrinkage, gaps forming, due to thermal effects and moisture, to prevent water penetration.

4.4 Safety in use
4.4.1 Mechanical resistance
The self-supporting composite lightweight panels shall have adequate resistance to static and dynamic loads, and shall be in accordance with the safety requirements for works specified in relevant national building regulations.
The relevant actions to be considered comprise normally self-weight loads, wind loads, snow loads, temperature gradients.

4.4.2 Impact resistance
Panels shall have sufficient strength to withstand dynamic loads from objects or persons who accidentally fall upon or against them.

4.4.3 Resistance to fixings
4.4.3.1 Resistance of the panels at fixing devices and joints
The self-supporting composite lightweight panels shall have adequate resistance to static and dynamic loads, at the points of fixing devices and joints.
The relevant actions to be considered comprise normally self-weight loads, wind loads, snow loads, temperature gradients.

4.4.3.2 Resistance to eccentric loads due to objects fixed to the panel

The panel shall have sufficient mechanical resistance and stability to withstand eccentric loads, from the action of attached heavy objects, such as furniture, without endangering the safety of the occupants.

4.4.4 Walkability
Panels for roofs or ceilings shall have adequate resistance to support occasional foot traffic for access or maintenance, without permanent deformations. (if relevant)

4.5 Protection against noise
4.5.1 Direct airborne sound insulation
The panel, including joints, shall provide the necessary sound insulation applicable to the intended use of the building (i.e. noise from industry, road and air traffic, etc).

4.5.2 Sound absorption
The internal surfaces of panels when declared shall provide the necessary sound absorption performance. (if relevant)

4.6 Energy economy and heat retention
4.6.1 Thermal insulation properties
The panels used in the external envelope or in internal walls, separating environments at different temperatures, shall provide the necessary thermal insulation to satisfy relevant national building regulations; relevant product characteristics to be considered are the thermal transmittance or thermal resistance.
Thermal bridges which may cause relevant energy losses or uncomfortably low temperatures shall be avoided.

4.6.2 Air permeability
The air infiltration between outdoor and indoor environment or between environments at different temperatures and pressure due to the panel, comprising joints, shall be limited, to satisfy relevant national building regulations.
This characteristic is also related to ER3.

4.7 Aspects of durability, serviceability and identification of the products
As far as is necessary for the satisfaction of the CPD not covered by the § 4.1 to 4.6

4.7.1 Durability
Self-supporting composite lightweight panels shall ensure that deterioration of materials and components does not affect the performance of the panel in relation to the Essential Requirements during the assumed intended working life.
The materials constituting the panel shall be chemically and physically compatible.

4.7.2 Serviceability
Panels shall have sufficient stiffness to avoid unacceptable deflections, vibrations and deformation from normal use, and meet the performance requirements of national building regulations.

4.7.2.1 Resistance to eccentric loads due to lightweight objects fixed to the panel
The panel shall have sufficient mechanical resistance and stability to withstand eccentric loads, from the action of attached lightweight objects, such as pictures, lamps or small pieces of furniture.

4.7.3 Identification of materials and products
The materials constituting the panels shall be identified by specific characteristics.

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 No 004 on "The provision of data for assessment leading to ETA".

When EUROCODES are quoted in this ETAG as the methods for the verification of certain product characteristics, their application in this ETAG, as well as in the subsequent ETAs issued according to this ETAG, shall be in accordance with the principles laid down in the EC Guidance Paper on the use of EUROCODES in harmonized European technical specifications.

Table 5.0. Verification methods as applied to table 4.0.

ER	ID #	ID clause for the works	Element involved*	Performance of the element (with reference to the ID)	Characteristics specified in the mandate	Relevant paragraphs
1					Not relevant	
2	§4.2.3 §4.2.3.3. 2a and b and § 4.2.4.2a	Limitation of generation and spread of fire and smoke without or beyond room of origin	All All Roofs	§ 4.3.1.1 Products subject to reaction to fire requirements § 4.3.1.3 Products subject to resistance to fire requirements § 4.3.1.2 Products for roofs subject to fire requirements	Reaction to fire Resistance to fire External fire performance	5.2.1 5.2.2 5.2.3
3	§ 3.3.1.1 § 3.3.1.2 § 3.3.5	Air quality Dampness: Outdoor environment	All	§ 3.3.1.1.3.2a (building materials) emission of volatile organic compounds and release of other pollutants, § 3.3.1.2.3.2e.1 & e.3 Dampness control: walls, walling materials, roofs § 3.3.5.3 Release of pollutants to the air	Release of dangerous substances Water permeability Vapour permeability Dimensional variations Release of dangerous substances	5.3.3 5.3.1 5.3.2 5.3.4 5.3.3
4	§ 3.3.2.2	mechanical resistance and stability Direct impacts – Behaviour on impact	All	§3.3.2.3 mechanical resistance and stability	Mechanical resistance Impact resistance Resistance to fixings	5.4.1 5.4.2 5.4.3
5	§ 2.3.1 § 2.3.2	Protection against airborne noise from outside of the works Protection against airborne noise between enclosed spaces	All	§ 4.3.2 The acoustic properties: (according to 4.3.3)	Direct airborne sound insulation	5.5.1
6	§ 4.2	Energy consumption limitation	All	§ 4.3.2.2 Fabric components Table 4.2 Characteristics	Thermal properties Air permeability	5.6.1 5.6.2

5.1 Mechanical resistance and stability

5.1.1 Mechanical resistance

As the panels are non-loadbearing parts of the work, mechanical resistance is considered under ER4 Safety in use. See §5.4.1.

5.2 Safety in case of fire

5.2.1 Reaction to fire

Generally one of the following options shall apply:

Option 1: the panel shall be tested, using the test method(s) relevant for the corresponding reaction to fire class, in order to be classified according to EN 13501-1.

Option 2: the panel is considered to satisfy the requirements for performance Class A1 of the characteristic reaction to fire, in accordance with the provisions of EC Decision 96/603/EC (as amended) without the need for testing on the basis of its listing in that Decision.

5.2.2 Fire resistance

The panel assemblies shall be tested, using the test method relevant for the corresponding fire resistance class, in order to be classified according to the appropriate Part of EN 13501.

5.2.3 External fire performance

Generally one of the following options shall apply:

Option 1: the panel assemblies shall be tested using the test method relevant for the corresponding external fire performance roof class, in order to be classified according to EN 13501-5.

Option 2: the panel assemblies is considered "deemed to satisfy" all the provisions for external fire performance of all national regulations of the Member States without the need for testing on the basis that it is included within the definitions given in Commission Decision 2000/553/EC and provided that any national provisions on the design and execution of works are fulfilled.

See the specific part of the ETAG for the specific intended use (roofs).

5.3 Hygiene, health and environment

5.3.1 Water permeability

The watertightness of the panels, including joints between the panels, shall be assessed on the most onerous composition by testing; specific information on the test method are given in the specific part of the ETAG.

5.3.2 Vapour permeability

The risk of interstitial or internal surface condensation, including joints between the panels, shall be assessed by calculation on the basis of the water vapour resistance and thermal conductivity of the materials composing the panel, according to EN ISO 13788.

Water vapour resistance of the relevant layers shall be determined by reference to EN 12524, or by test reports. Testing of water vapour resistance for all materials shall be carried out according to EN ISO 12572.

For determination of airtightness and thermal properties, see 5.6.1 and 5.6.2.

5.3.3 Release of dangerous substances

5.3.3.1. – Presence of dangerous substances in the panel

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

5.3.3.2 – Compliance with the applicable regulations

If the panel 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).

5.3.3.3 – 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 panel, regarding this substance, could be established on request of a manufacturer with the participation of the Approval Body which raised the issue.

5.3.4 Dimensional variation (related to water penetration)
The watertightness of the panels, including joints between the panels, shall be assessed by testing, after a test causing the dimensional variation specified in the specific part of the ETAG.

5.4 Safety in use
5.4.1 Mechanical resistance
Mechanical resistance performance shall be verified either by testing or by calculation according to European standard methods.
The test procedures in general shall follow relevant EN-standards for testing of specific types of panels.

The tests shall embrace the extreme values of all parameters.
It is permissible to use quadratic interpolation between test results.
The parameters to be considered are:

- static configuration: one and two spans, or particular configuration defined by the producer
- direction of load: positive or negative
- thickness and material properties of faces
- thickness and material properties of core
- type and frequency of fixings.

5.4.1.1 Test to determine the mechanical strength of a simply supported panel subject to positive load. See Annex C.

5.4.1.2 Test to determine the mechanical strength of a fixed panel subject to negative load.
See Annex C.

5.4.1.3 Test to determine the temperature effect on the panel
Specific information on the test method are given in the specific part of the ETAG.

5.4.2 Impact resistance
Specific information on the test method are given in the specific part of the ETAG.

5.4.3 Resistance to fixings
5.4.3.1 Resistance of the panels at fixing devices and joints
The panel shall be tested according to the method developed in the UEAtc technical report for the assessment of installation using sandwich panels with a CFC-free polyurethane foam core.

5.4.3.2 Resistance to eccentric loads due to objects fixed to the panel.
Specific information on the test method are given in the specific part of the ETAG.

5.4.4 Walkability
Specific information on the test method are given in the specific part of the ETAG.

5.5 Protection against noise
5.5.1 Direct airborne sound insulation
The airborne sound insulation performance of the panel shall be verified on the most onerous composition according to the relevant parts of EN ISO 140-3.

5.5.2 Sound absorption
The sound absorption performance of panels when declared shall be verified on the most onerous composition by laboratory tests according to EN ISO 354.
The performances should preferably be specified by giving the equivalent sound absorption per area.

5.6 Energy economy and heat retention

5.6.1 Thermal insulation properties

Thermal resistance and the corresponding thermal transmittance (U-value) of the panels shall be calculated according to EN ISO 6946, including the effect of thermal bridges.

Thermal conductivity for insulating or new products shall be determined using laboratory test methods such as EN 12939, EN 12667, EN 12664. Declared thermal conductivity should be determined according to EN ISO 10456.

The most significant thermal bridges shall be evaluated using calculation methods in EN ISO 10211-1 and EN ISO 10211-2.

Alternatively the thermal resistance may be verified by testing according to EN ISO 8990.

5.6.2 Air permeability

Assessment of the airtightness of the panels, including joints between the panels, shall be assessed on the most onerous composition according to in EN 12114.

Joints between the panel and other building parts, may usually be assessed by evaluating the construction details.

5.7 Aspects of durability, serviceability and identification of the products

5.7.1 Aspects of durability

The durability of the panel shall be assessed as decay of performance characteristics after ageing tests, with reference to ISO 15686, Part 1 and Part 2.

Details on the specific methods will be given in the specific parts of the ETAG.

The durability of the materials in the panel shall be assessed in accordance with the relevant standards for each product and material.

The relevant agents to be considered are

mechanical agents (e.g. gravity, vibrations, ...)

electromagnetic agents (e.g. radiation, electricity, ...)

thermal agents (freeze/thaw, thermal shock on one or both sides of the panels, ...)

chemical agents (e.g. solvents, acids, salts, bases, ...)

biological agents (animal, vegetable, micro-organisms, fungi, ...)

The table in Annex C5 gives a reference framework for the testing methods which can be used by the Approval Body for the evaluation of durability for “self-supporting composite lightweight panels” for each intended use.

5.7.2 Serviceability
Specific information on the test method are given in the specific part of the ETAG.
5.7.3 Aspects of identification of materials and products

All components of the panel shall be identified clearly. Where possible, reference to harmonized European Standards or European Technical Approvals shall be made.
Where components are not covered by harmonized 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 or accepted international (such as UEAtc, RILEM) test methods as far as they exist**.**

5.7.3.1 Nature of the materials or components
The nature of the materials shall be in conformity with European product standards or ETAs.
The chemical composition through spectral analysis shall be verified, if European technical specifications are not available and where relevant. Surface colors shall be determined for identification only.

5.7.3.2 Geometry
The following dimensional properties for complete panels, including tolerances, shall be considered:

- Thickness of faces
- Depth of profile
- Thickness of panel
- Depth of stiffeners
- Length
- Design (cover) width
- squareness
- straightness
- Bowing
- Flatness
- Pitch
- Width of crown and valley
- Deviation of side laps.

5.7.3.3 Density
The density of core materials shall be verified in accordance with European product standards or ETAs.

5.7.3.4 Mechanical characteristics
The mechanical characteristics of the materials shall be determined, to derive the following characteristics:
- Young's modulus E
  Shear strength of the core (according to EN 12090)
- Shear modulus of the core[3] (according to EN 12090)
- Compressive strength of the core (see Annex C)
- Compressive modulus of the core[3] (see Annex C)
- Tensile strength of the core and its bond with the faces, whichever is the smallest (see Annex C)
- Tensile modulus of the core[3] (see Annex C)

5.7.3.5 Hygroscopic humidity content
The hygroscopic properties shall be determined, where relevant, in accordance with
EN ISO 12571.

[3] Only for deformable insulating materials

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

This chapter details the performance requirements to be met by the panel (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 their 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 in terms of classes, use categories or numerical values. In general, the ETA shall either indicate the result 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 panel performs badly, but merely that this specific performance property has not been tested and assessed.
The possible ways of expressing the results of the assessment of the mandatory performance requirements are given in Table 6.

Table 6.0 Linking the Essential Requirements to product requirements.

ER	ID #	ID clause for the works	Element involved *	Performance of the element (with reference to the ID)	Characteristics specified in the mandate	Relevant paragraph	"No performance determined option" allowed
1					Not relevant		
2	§4.2.3 §4.2.3.3. 2a and b and § 4.2.4.2a	Limitation of generation and spread of fire and smoke without or beyond room of origin	All All Roofs	§ 4.3.1.1 Products subject to reaction to fire requirements § 4.3.1.3 Products subject to resistance to fire requirements § 4.3.1.2 Products for roofs subject to fire requirements	Reaction to fire Resistance to fire External fire performance	6.2.1 6.2.2 6.2.3	YES YES YES
3	§ 3.3.1.1 § 3.3.1.2 § 3.3.5	Air quality Dampness: Outdoor environment	All	§ 3.3.1.1.3.2a (building materials) emission of volatile organic compounds and release of other pollutants § 3.3.1.2.3.2e.1 & e.3 Dampness control: walls, walling materials, roofs § 3.3.5.3 Release of pollutants to the air	Release of dangerous substances Water permeability Vapour permeability Dimensional variations Release of dangerous substances	6.3.3 6.3.1 6.3.2 6.3.3	YES YES YES YES
4	§ 3.3.2.2	mechanical resistance and stability Direct impacts – Behaviour on impact	All	§3.3.2.3 mechanical resistance and stability	Mechanical resistance Impact resistance Resistance to fixings	5.4.1 5.4.2 5.4.3	NO See specific Part YES
5	§ 2.3.1 § 2.3.2	Protection against airborne noise from outside of the works Protection against airborne noise between enclosed spaces	All	§ 4.3.2 The acoustic properties: (according to 4.3.3)	Direct airborne sound insulation	6.5.1	YES
6	§ 4.2	Energy consumption limitation	All	§ 4.3.2.2 Fabric components Table 4.2 Characteristics	Thermal properties Air permeability	6.6.1 6.6.2	YES YES

6.1 Mechanical resistance and stability

6.1.1 Mechanical resistance

As the panels are non-loadbearing parts of the work, mechanical resistance is considered under ER4 Safety in use. See §6.4.1.

6.2 Safety in case of fire

6.2.1 Reaction to fire

The panels shall be classified according to EN 13501-1.

6.2.2 Fire resistance

The panel assembly shall be classified, according to the appropriate part of EN 13501.

6.2.3 External fire performance

The panels assemblies shall be classified according to EN 13501-5.

6.3 Hygiene, health and the environment

6.3.1 Water permeability

The ETA shall indicate the results of watertightness testing.

It shall be established that water infiltration in and through the panel will not occur or will occur only to an extent where damage is not caused.

6.3.2 Vapour permeability

It shall be indicated if interstitial or internal surface condensation of the panel or at relevant thermal bridges as a result of water vapour diffusion will not occur or will occur only to an extent where damage is not caused during the condensation period and the panel will dry out again during the evaporation period.

The moisture permeance Wp with regard to partial vapour pressure (kg/m^2 s Pa) of the whole panel or the μ value for each material, shall be declared in the ETA.

6.3.3 Release of dangerous substances:

The panel 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 on 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 panel but not covered by the ETA, the NPD option (no performance determined) is applicable.

6.3.4 Dimensional variations

In the results of the test they shall be declared.

6.4 Safety in use

6.4.1 Mechanical resistance:

It shall be declared in the results of the tests.

6.4.2 Impact resistance

It shall be declared in the results of the test relating to the specific intended use.

6.4.3 Resistance to fixings

6.4.3.1 Resistance of the panels at fixing devices and joints

It shall be declared in the results of the tests.

Pull through of fixing to panel should not cause sheet penetration causing moisture ingress.

6.4.3.2 Resistance to eccentric loads due to objects fixed to the panel

It shall be declared in the results of the test.

6.4.4 Walkability

Details on walkability are given in the specific parts of the ETAG.

6.5 Protection against noise

6.5.1 Direct airborne sound insulation

The measured airborne sound insulation shall be expressed as a single number rating, R_w, in accordance with EN ISO 717- 1.

6.5.2 Sound absorption
Sound absorption is considered only where panels (factory finishing) contribute to the sound absorption, according to the producer declaration.
The measured acoustic absorption shall be expressed as a single number rating in accordance with EN ISO 11654.

6.6 Energy economy and heat retention
6.6.1 Thermal insulation properties
The thermal transmittance (U-value) of the panel shall be declared.

6.6.2 Air permeability
Test results according to EN 12114 shall be declared.

6.7 Aspects of durability, serviceability and identification of the products
6.7.1 Aspects of durability
The deterioration of performance characteristics after ageing tests shall be declared.
Assessing and judging criteria will be defined in the specific parts of the ETAG.

6.7.2 Aspects of serviceability
Assessing and judging criteria will be defined in the specific parts.
The verification of the serviceability limit state shall be sufficient to ensure the proper functioning of the panels under the serviceability loads. The serviceability limit state shall be characterised by one of the following:

- yielding of a face of the panel without consequential failure
- wrinkling (local buckling) of a face of the panel without consequential failure.

6.7.3 Aspects of identification of materials and products
The results of identification tests shall be declared.

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

7.1 Design of works

7.1.1 General assumptions

The design of a self-supporting lightweight composite panel, in many important respects, will be specific to the works in which it is to be used.

The following is a brief list of aspects, which need to be taken into account when designing the works, with respect to the self-supporting lightweight composite panel; the list is not exhaustive:

- Permissible deflections under various loads, e.g. wind, snow load
- Permissible deflection limits for the panels and of the adjacent structural parts
- Where and how the self-supporting lightweight composite panel is fixed to the rigid support(s)
- Fire protection
- Assessment of condensation risk
- Sound insulation
- Provisions of vapour control and thermal insulation
- Thermal inertia
- Attachments, fixtures and penetrations
- Means of access for inspection and maintenance.

The ETA will indicate the conditions for design of the particular self-supporting lightweight composite panel into the works. It is for the designer to ensure that the self-supporting composite lightweight panel as installed in the works will provide the required performance on the basis of the information given in the ETA. It has to be taken into account that the determination of mechanical resistance is based on single test measurements, therefore the designer may apply the relevant safety factors according to national practice and for particular use.

When appropriate, special fixings for seismic conditions need to be foreseen. In dynamic actions, such as those occurring in an earthquake, the designer shall take account of the possible contribution of the self-supporting lightweight composite panel in accordance with national or local regulations.

7.1.2 Assumptions regarding the substrate, support or supporting frame

The assessment of the self-supporting lightweight composite panels shall be carried out under the presumption that the substrate, support or the supporting frame will not jeopardise any of the ERs in an assembled system.

7.1.3 Assumptions regarding auxiliary products

7.1.3.1 General

Auxiliary products need to fulfil specifications for the panel, used in an assembly, to meet the performance characteristics as specified in the ETA-Guideline.

For **generic auxiliary products**, the ETA-applicant needs to specify minimum criteria, which the generic auxiliary product should fulfil.

If the ETA-applicant chooses to specify **specific auxiliary products**, those products should be clearly identified and tested and the test results specified in the ETA.

7.1.3.2 Verification methods for fixings

The performance characteristics for fixings should be verified in accordance with European technical specifications for the fixings under consideration:

- harmonised European product standards as published by CEN, or
- European Technical Approvals as published by EOTA-member bodies.

If such technical specifications are not available, the specifications referred to in this paragraph shall be used for verification purposes.

7.1.3.2.1 Reaction to fire

The fixings shall be tested as a part of the panel assembly (see §5.2.1).

7.1.3.2.2 Release of dangerous substances
See § 5.3.3

7.1.3.2.3 Mechanical resistance and stability (of fixings)
This test method establishes the pull-out resistance of a fixing. This test will be conducted on each substrate for which the panels are intended to be used.

The test is carried out on five sample substrates, each measuring at least 300mm ± 20mm.
The apparatus consists of:

- a dynamometer,
- a support as shown in Figure 1.

The substrates and fixings are conditioned for at least 2h at 23 ± 2°C before the test.
The fixings are installed in accordance with the manufacturer's specifications.

The test will be carried out at 23 ± 2°C. The tensile strength for pulling out the fixing shall be measured with a dynamometer. The tensioning speed is 20 mm/min.
The pull-out resistance of each test is expressed in N. The test results and mean value is recorded in the test report, the ETA will specify the mean value of the five results.

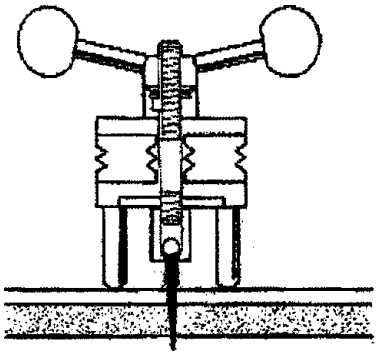

Figure 1: pull-out resistance test

7.1.3.2.4 Durability requirements
The behaviour of fixings can be influenced by corrosion and the degradation of the coating. Therefore, the following shall be considered:

7.1.3.2.4.1 Corrosion
If the fixing is to be used in particularly aggressive conditions, such as chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution, special considerations including testing are necessary, taking into account the environmental conditions and the available experience.

7.1.3.2.4.2 Coating
The durability of the coating that ensures the suitability and the bearing behaviour of the fixing shall be shown.
Special test conditions cannot be given in this ETA-guideline for checking the durability of a coating because they vary depending on the type of coating. Appropriate tests should be decided on by the responsible approval body.
The following environmental conditions should be taken into account in assessing the durability of coatings:

Dry internal conditions

- high alkalinity (pH $\geq$ 13.2)
- temperature in range of - 5°C to + 40°C.

Other environmental conditions

- high alkalinity (pH $\geq$ 13.2)

- temperature in range of - 40°C to + 80°C
- condensed water
- chlorides
- sulphur dioxide
- nitrogen oxide
- ammonia.

Zinc coatings (electroplated or hot-dip galvanised) need not be subjected to testing if used under dry internal conditions.

7.1.3.2.5 Identification
During tests on the fixings, the following properties shall be determined: tensile strength, elastic limit, elongation at rupture and hardness. The measured values shall be compared with minimum values or strength classes indicated in European or ISO standards.
For the testing of carbon steel screws, bolts, nuts and threaded cones, reference can be made to ISO 898, Parts 1 and 2.
For the testing of stainless steel screws reference can be made to ISO 3506. For quenched components, the surface hardness and case depth are to be determined. Hardness testing shall be carried out by either the Brinell or Vickers method. Wherever possible, the material declaration, according to the relevant material standard, should be provided.

If appropriate, surface condition, e.g. surface roughness and the type and thickness of any protective coating, shall be measured.

The results obtained shall be assessed to ensure that they are within the manufacturer's specification.

7.1.3.3 Verification methods for jointing materials (sealants and gaskets)
The performance characteristics for jointing materials should be verified in accordance with European technical specifications for the jointing materials under consideration:
- harmonised European product standards as published by CEN, or
- European Technical Approvals as published by EOTA-member bodies.

If such technical specifications are not available, the specifications referred to in this paragraph shall be used for verification purposes.

7.1.3.3.1 Reaction to fire
See § 5.2.1.

7.1.3.3.2 Release of dangerous substances
See § 5.3.3.

7.1.3.3.3 Mechanical resistance and stability (of jointing materials)
7.1.3.3.3.1 Sealants
7.1.3.3.3.1.1 Tensile strength
The jointing material shall be tested in accordance with ISO 8339, at 23°C and -20°C. If claimed, the test can also be performed at -40°C.

7.1.3.3.3.1.2 Adhesion/cohesion at variable temperatures
The jointing material shall be tested in accordance with ISO 9047.

7.1.3.3.3.1.3 Adhesion/cohesion after water immersion
The jointing material shall be tested in accordance with ISO 10590.

7.1.3.3.3.1.4 Durability requirements
The jointing material shall be tested in accordance with ISO 11431.

7.1.3.3.3.1.5 Identification
The jointing material will be classified in accordance with ISO 11600

7.1.3.3.3.2 Gaskets
7.1.3.3.3.2.1 Durability requirements
The assessment of durability is already performed in § 5.3.4.
7.1.3.3.3.2.2 Identification

The jointing material will be classified in accordance with prEN 12365-1.

7.2 Packaging, transport and storage
The self-supporting lightweight composite panels shall be protected from damage and excessive exposure to moisture during transportation and storage (including short-term storage).
Damaged panels should not be used.

The self-supporting lightweight composite panels shall be handled and stored with care and be protected from accidental damage.

7.3 Execution of works
The conditions for design and execution of the panels into the works shall be taken from the manufacturer's installation guide.

The ETA holder is responsible for delivering the installation guide to the purchaser. The ETA shall copy the essential parts of the installation guide.

The execution of the works must be practicable under normal site conditions and shall be performed by trained installers.

7.4 Maintenance and repair
The assessment of the fitness for use is based on the assumption that normal maintenance of the self-supporting lightweight composite panels is performed.

This maintenance shall include:

- Cleaning, as necessary, carried out with normal cleaning products compatible with self-supporting lightweight composite panels and the joint material kit followed by rinsing with water.
- Early repair of damaged areas or parts.

When replacing sealants and other auxiliary components, the materials used shall be approved by the ETA holder and covered by the ETA.

Section three :

ATTESTATION AND EVALUATION OF CONFORMITY (AC)

8. ATTESTATION AND EVALUATION OF CONFORMITY

8.1 **EC decision**

The systems of attestation of conformity specified by the European Commission in mandate Construct 97/354 Rev.1, Annex 3, (amended with the EC Decision 2000/447/EC *)* are as follows:

System 1 for panels

- for uses subject to reaction to fire regulations with Euroclasses A1[*],A2[*], B[*], C[*]

System 3 for panels

- for uses subject to reaction to fire regulations with Euroclasses A1[**], A2[**], B[**], C[**], D, E
- for uses subject to resistance to fire regulations
- for uses subject to regulations on dangerous substances
- for uses subject to external fire performance regulations, requiring testing.

System 4 for uses other than those specified above.

for uses subject to reaction to fire regulations with Euroclasses (A1 – E)[***] , F

The systems are described in Council Directive (89/106/EEC) Annex III, 2(i), 2(ii) Second possibility and 2(ii) Third possibility, respectively, and are detailed as follows:

System 1

(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

(a) **Tasks for the manufacturer**

[*] products/materials for which a clearly identified stage in the production, results in an improvement of the reaction to fire classification; (e.g. an addition of fire retardants or a limiting of organic material).
**Products/materials not included in note (*)
*** products/materials that do not require to be tested for reaction to fire
(e.g.products/materials of class A1 that according to Decision 96/603/EC, amended)

– factory production control
– initial type testing of the product by an approved laboratory.

System 4

(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 (FPC)

The personnel involved in the production process shall be identified, sufficiently qualified and trained to operate and maintain the production equipment. Machinery equipment shall be regularly maintained and this shall be documented. All processes and procedures of production shall be recorded at regular intervals.

The manufacturer shall maintain a traceable documentation of the production process from purchasing or delivery of raw or basic raw materials up to the storage and delivery of finished products.

Products that do not comply with requirements as specified in the ETA shall be separated from the conforming products and marked as such. The manufacturer shall register non-compliant production and action(-s) taken to prevent further non-conformities. External complaints shall also be documented, as well as actions taken.

8.2.1.2 Testing of samples taken at the factory

When and if testing is performed, then the manufacturer shall maintain and calibrate the testing equipment regularly to ensure constant accuracy of test results.

8.2.1.3 Declaration of Conformity (System 3, 4)

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

8.2.2 Tasks for 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 a 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 shall be used for the purposes of initial type testing.

System 1: this work shall be validated by the approved body for Certificate of Conformity purposes.

System 3: this work shall be validated by an approved laboratory for Declaration of Conformity purposes by the manufacturer.

System 4: this work should be taken over by the manufacturer for Declaration of Conformity purposes.

8.2.3 Tasks for the approved body (System 1)

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

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

An assessment must 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.

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

It is recommended that surveillance inspections be conducted at least twice per year.

8.2.3.2 Certification of Conformity (System 1)
The approved body shall issue the Certification of Conformity for the product.

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:

System 1: generally form the basis on which the factory production control (FPC) is assessed by the approved body

System 3 and

System 4: generally form the basis of the factory production control (FPC).

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.

Any critical process or treatment of the components affecting performance shall be highlighted.

(3) Product and materials specifications

These may include:
detailed drawings (including manufacturing tolerances);
incoming (raw) materials specifications and declarations;
references to European technical specifications and/or international standards or appropriate specifications;
manufacturer's data sheets.

(4) Test plan

The manufacturer and the approval body issuing the ETA shall agree an FPC test plan.

An agreed FPC test plan is necessary as current standards relating to quality management systems, do not ensure that the product specification remains unchanged and they cannot address the technical validity of the type or 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 for checks on the final product. These will normally include:

material properties

dimensions of component parts.

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

(5) Prescribed test plan (**System 1**)

The manufacturer and the approval body issuing the ETA shall agree a prescribed test plan.
the characteristic to be addressed as described in the mandate is Reaction to fire. This will be controlled at least twice per year by analysis/measurement of the relevant characteristics for the components of the panel from the following list:

composition;
dimensions;
physical properties;
construction.

8.4 CE marking and information

8.4.1 General
The ETA shall indicate the information to accompany the CE-marking.
In accordance with EC Guidance Paper D, the required information to accompany the symbol "CE" is:

- Identification number of the notified body (A/C-system 1)
- Name / address of the manufacturer of the panel
- Indication to clarify the intended use
- Last two digits of the year when the marking was affixed
- Number of the EC Certificate of Conformity (A/C-system 1)
- Number of ETA
- Relevant performance characteristics, as far as they are not specified in the ETA.
- Reference to this ETA Guideline

8.4.2 Example

CE Xxxx	"CE"-symbol Number of Notified Body
Any Company Rue du Producteur, 50 Country xx xxxx-CPD-xxxx	Name and address of the manufacturer or his representative established in the EEA and of the plant where the product was manufactured Two last digits of year of affixing CE Marking Number of EC certificate of conformity (where relevant)
ETA N° XX/XXXX ETAG XXX, Parts 1 and 2 Self-supporting lightweight composite panel for use in roofs x x	ETA Number ETAG Reference and date of publication Relevant performance characteristics and/or designation code

8.4.3 Location of CE-Marking
The CE-Marking will be affixed on the packaging of the self-supporting composite lightweight panels (each packaging to be marked). Panels should not be put on the market without packaging.

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.
In section II.2 “characteristics of products and methods of verification “ the ETA shall include the following notes:
“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.”

“It has to be taken into account that the determination of mechanical resistance is the result of single test measurements, therefore the designer may apply the relevant safety factors according to national practice and for particular use.”

“The ETA is issued for the product/kit on the basis of agreed data/information, deposited with {the Approval Body name}, which identifies the product/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 {the Approval Body name} before the changes are introduced. The {Approval body name} 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.”

9.1.2 Checklist for the issuing body
The ETA Format states the content in general. The following should be observed in addition:

9.1.2.1 Scope
Scope of the ETA, composition of the panels (skin(s), core material) and intended use(s)

9.1.2.2 Working life
Indication of the assumed working life

9.1.2.3 Identification of materials
The ETA shall contain information and/or references allowing for, where there is a need e.g. 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.

This 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.

If this is not possible, the materials shall be specified by their brand name and type, class etc., identifying the manufacturer.

9.1.2.4 Performance

The technical part of the ETA shall contain information on the following items, in the order and with reference to the relevant Essential Requirements. For each of the listed items, the ETA shall either give the mentioned indication / classification / statement / description or state that the verification / assessment of this item has not been carried out.

The items are given here with reference to the relevant clause of this guideline:

Classification with respect to reaction to fire, including test method used	Clause 6.2.1
Classification with respect to resistance to fire, including test method used	Clause 6.2.2
Classification with respect to external fire performance, including test method used, for roof panels only	Clause 6.2.3
Statement on water infiltration and declared value on the water permeability, including verification method used	Clause 6.3.1
Statement on condensation and declared value on the water vapour permeability, including verification method used	Clause 6.3.2
Statement on the presence and concentration / emission rate / etc. of dangerous substances or statement of the absence of dangerous materials	Clause 6.3.3
Declared value on the dimensional variation, including verification method used	Clause 6.3.4
Declared value of the mechanical resistance, including verification method used	Clause 6.4.1
Statement and declared value on the impact resistance, including verification method used	Clause 6.4.2
Declared value on the resistance to fixings, including verification method used	Clause 6.4.3
Declared value of the walkability, including verification method used (if relevant)	Clause 6.4.4
Declared value of the airborne sound insulation, including verification method used	Clause 6.5.1
Declared value on the sound absorption, including verification method used (if relevant)	Clause 6.5.2
Indication of calculated or measured thermal resistance, including the calculation or test method used	Clause 6.6.1
Declared value on the air permeability, including verification method used	Clause 6.6.2
Declared value about durability, including verification method used	Clause 6.7.1
Declared value about the serviceability, including verification method used	Clause 6.7.2
Complete identification of the product, including its components	Clause 6.7.3

9.1.2.5 Drawings

The ETA shall include section drawings of the self-supporting lightweight composite panels.
The purpose of the drawings is to illustrate the general build-up of the panel; i.e. skins, coatings, insulation layers, dimensions, tolerances, etc.
Material specifications may also be shown directly in these drawings of the panel.
If required by the manufacturer some design details may be kept confidential by using neutral parts in the drawings, provided that the approval body does not find this in contradiction to necessary information related to the correct application of the panel and the evaluation of conformity performed by the approved body.

9.1.2.6 Installation

The ETA shall also contain any details of the installation which the approval body considers worthy of note, as described in Chapter 7 of this Guideline, details of the maximum acceptable deflection in the supporting structure and details of any particular risks identified during the assessment.
These may be requirements related to the substructure, mounting of the elements, joints on site, including fixing to the substructure, anchoring, roof bracing, etc., see also clause 7.3. The latter could include such aspects as the need to avoid contact with other materials.

9.1.2.7 Maintenance and repair

Basic maintenance and repair of the self-supporting lightweight composite panels which is necessary to obtain the minimum estimated working life of self-supporting panels shall be specified, see also clause 7.4.

9.2 Additional information

The ETA shall state whether the manufacturer's installation guide forms part of the ETA. See clause 7.3 of this ETA-Guideline.

Similarly, it shall be stated in the ETA whether or not any additional (possibly confidential) information shall be supplied to the approved body for the evaluation of conformity, see clause 8.3 of this Guideline.

Annex A
COMMON TERMINOLOGY
(definitions, clarifications, abbreviations)

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This common terminology is intended to be introduced as such and to be used consistently in all ETA-guidelines. It is based upon the EC Construction products directive 89/106 and the Interpretative documents as published in the Official Journal of the EC on 28.2.1994. It is limited to items and aspects which are relevant for approval work. They are partly definitions, partly clarifications.

1. WORKS AND PRODUCTS

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 permanently to the ground.
(This covers both building and civil engineering works, and both structural and non structural elements).

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 and prefabricated systems or installations)

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.

1.4. Intended use (ID 1.3.4)
Role(s) that the product is intended to play in the fulfillment of the essential requirements.
(N.B. This definition covers only the intended use as far as relevant for the CPD)

1.5. Execution (ETAG-format)
Used in this document to cover all types of incorporation techniques such as installation, assembling, incorporation, etc.

1.6. System (EOTA/TB guidance)
Part of the works realized by:
- particular combination of a set of defined products, and
- particular design methods for the system, and/or
- particular execution procedures.

2. PERFORMANCES

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)

2.2. Serviceability (of works)
Ability of the works to fulfil 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).

2.3. Essential requirements (for works): requirements applicable to works, which may influence the technical characteristics of a product, and are set out in objectives in the CPD, Annex I (CPD, art. 3.1).

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.

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".

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.

3. ETAG - FORMAT

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.

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".

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.

4. WORKING LIFE

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 fulfillment of the essential requirements.

4.2. Working life (of products)
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.

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.

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 fulfil all its functions during its working life. These measures include cleaning, servicing, repainting, repairing, replacing parts of the works where needed, etc.

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.

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 fulfillment of the essential requirements by the works.

5. CONFORMITY

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.

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.

6. APPROVAL AND APPROVED BODIES

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.

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

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
ER: Essential Requirement

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 dans la construction / European Union of Agrément

General:
TC: Technical Committee
WG: Working Group

Annex B
LIST OF REFERENCE DOCUMENTS (STANDARDS)

Reference documents used for the ETAG:

R.1 Mechanical resistance and stability (ER 1)
See ER4

R.2 Safety in case of fire (ER 2)
EN ISO 1716: 2002 Determination of the heat of combustion

EN ISO 1182 Non combustibility test
EN 13823: 2002 Building products excluding floorings exposed to the thermal attack by a Single Burning Item
EN ISO 11925-2: 2002 . Ignitability of building products subjected to direct impingement of flame. Single-flame source test
prEN 13501: Fire classification of construction products and building elements
Part 1: 2002 Classification using test data from reaction to fire tests
Part 2: 2002 Classification using test data from resistance to fire tests
Part 5: Classification using test data from external fire performance tests
EN 1363: Fire resistance tests
Part 1: 1999 General requirements
Part 2: 1999 Alternative and additional procedures
EN 1364: 1999 Fire resistance tests for non loadbearing elements
Part1: 1999 Walls

R.3 Hygiene, health and environment (ER 3)
R.3.1 Water permeability
EN 12865: 2001 Hygrothermal performance of building components and building elements- determination of the resistance of external wall system to driving rain under pulsating air pressure.
R.3.2 Vapour permeability
EN ISO 13788 2002:Hygrothermal performance of building components and building elements - Estimation of surface temperature to avoid critical surface humidity and assessment of the risk of interstitial condensation. Calculation method.
EN ISO 12572 2001: Hygrothermal performance of building materials and products. Determination of Water Vapour Transmission Properties.
EN 12524 2000: Building materials and products. Hygrothermal properties. Tabulated design values.

R.3.3 Release of dangerous substances
DD ENV 13419 Building products. Determination of the emission of volatile organic compounds.
Part 1: 1999 Emission test chamber method
Part 2: 1999 Emission test cell method
Part 3: 1999 Procedure for sampling, storage of samples and preparation of test specimens

R.4 Safety in use (ER 4)
4.2 Impact resistance
ISO 7892:1988 Vertical Building Components - Impact Resistance - Impact Bodies and general Test Procedures
ISO/DIS 7893: Performance Standards in Building - Partitions made from Components - Impact Resistance Tests

R.5 Protection against noise
R.5.1 Direct airborne sound insulation
EN ISO 140 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: Acoustics.- Rating of sound insulation in buildings and of building elements.
Part 1: 1997 Airborne sound insulation.
R.5.2 Sound absorption
EN ISO 354:1993 (+ amendment A1/1997) Acoustics. Measurement of sound absorption in a reverberation room.
EN ISO 11654: 1997 Acoustics. Sound absorbers for use in buildings. Rating of sound absorption.

R.6 Energy economy and heat retention (ER 6)

R.6.1 Thermal insulation

EN ISO 8990:1996 Thermal insulation. Determination of steady-state thermal transmission properties. Calibrated and guarded hot box.

ISO 8301: 1991 Thermal insulation. Determination of steady-state thermal resistance related properties - Heat flow meter apparatus.

ISO 8302: 1991 Thermal insulation. Determination of steady-state thermal resistance related properties - Guarded hot plate apparatus.

EN 12664: 2001 Thermal performance of building materials and products -Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Dry and moist products of medium and low thermal resistance.

EN 12667: 2001 Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Products of high and medium thermal resistance.

EN 12939:2001 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 6946:1997 Building components and building elements. Thermal resistance and thermal transmittance. Calculation method.

EN ISO 10456:2000 Building materials and products. Procedures for determining declared and design thermal values.

EN ISO 10211: 1995 Thermal bridges in building construction. Heat flows and surface temperatures.

Part 1: 1996 General calculation methods

Part 2: 2001 Linear thermal bridges.

prEN ISO 14653: Thermal bridges in building construction. Heat flows and surface temperatures – General calculation method

R.6.2 Air permeability

EN 12114: 2000 Thermal performance of buildings. Air permeability of building components and building elements. Laboratory test methods.

R.7 Aspects of durability, serviceability, identification of materials and products

R.7.1 General aspects for durability

ISO 15686: Buildings and constructed assets. Service life planning.

Part 1: 2000 General principles

Part 2 : 2001 Service Life Prediction Procedures

EN 335:1992 Hazard classes of wood and wood-based products against biological attack.

Part 1:Classification of hazard classes.

EN 350:1994 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 to Europe.

EN 29142: 1993 Adhesives. Guide to the selection of standard laboratory ageing conditions for testing bonded joints

EN ISO 4892: 2000 Plastics. Methods of exposure of laboratory light sources.

Part 2: 2000 Fluorescent UV lamps.

ISO 7253: 2000 Methods of test for paint. Durability tests on paint films. Determination of resistance to neutral salt spray (fog)

EN ISO 2812 Paints and varnishes Determination of resistance to liquids.

Part1: 1995 General methods.

ISO 10051 Thermal insulation. Moisture effects on heat transfer. Determination of thermal transmissivity of a moist material.

7.3 Identification

EN ISO12571: 2000 Hygrothermal performance of building materials and products. Determination of hygroscopic properties.

EN 12090 Thermal insulating products for building applications. Determination of shear behaviour.

Relevant reference documents for chapter 7

EN ISO 898: Mechanical properties of fasteners made of carbon steel and alloy steel.

Part 1: 1999 Bolts, screws and studs.

EN ISO 3506:1997 Mechanical properties of corrosion-resistant stainless-steel fasteners.

Part 1: 1998 Bolts, screws and studs.

ISO 8339:1984 Building construction. Jointing products. Sealants. Determination of tensile properties
EN ISO 9047:1998 Building construction. Sealants. Determination of adhesion/cohesion properties at variable temperatures
EN ISO 10590:1998 Building construction. Sealants. Determination of adhesion/cohesion properties at maintained extension after immersion in water
ISO 11431:1993 Building construction. Sealants. Determination of adhesion/cohesion properties after exposure to artificial light through glass
ISO 11600:1993 Building construction. Sealants. Classification and requirements
prEN 12365 Building hardware. Gasket and weather-stripping for doors, windows, shutters and curtain walling.
Part 1: Performance requirements and classification

Other relevant reference documents
prEN 14509 Self Supporting double skin metal faced insulating sandwich panels.
ECCS/CIB Report “European Recommendations for sandwich panels.”
ETAG 003 “Internal Partition kit”
UEAtc Technical Report for the assessment of installation using sandwich panels with a CFC-free polyurethane foam core.
Guidance Paper B: The definition of factory production control in technical specifications for construction products
Guidance Paper F: Durability and the Construction Products Directive

Annex C
TEST METHODS

C1 Test to determine the mechanical strength of a simply supported panel subject to positive load:

The test shall embrace the extreme values of all parameters.
It is permissible to use quadratic interpolation between test results.

The parameters to be considered are:
- static configuration defined by the producer
- thickness and material properties of faces
- material properties of core.

The test spans between supports shall be:
- The shortest span to be used in practice, declared by the producer
- The longest span to be used in practice, declared by the producer
- An intermediate.

The thicknesses of panels to be tested shall be:
- The minimum thickness panel
- The maximum thickness panel
- An intermediate thickness panel.

The test shall be carried out by subjecting a simply supported panel to a uniform load applied by air pressure apparatus.
The panel shall be loaded in at least 10 increments up to failure and the failure load noted.
Where panels are installed on one or more span and as far as the application of the load does not cause a local failure, the point load test may be used (for example with a metal or similarly rigid face). The test should be carried out thus:
the panel shall be subjected to four line loads (as shown in Figure 2) extending across the full width of the panel;
if line loads are applied to a profiled face, they shall be applied through timber or steel transverse loading beams with timber loading platens placed in the troughs of the profile (see Figure 3). A layer of felt, rubber or other similar material may be placed between the loading platens and the panel to reduce the possibility of local damage.
If the trough of the profile includes rolled-in stiffeners, the loading platens may be shaped appropriately (see Figure 4).
The loads shall be maintained perpendicular to the panel throughout the test.

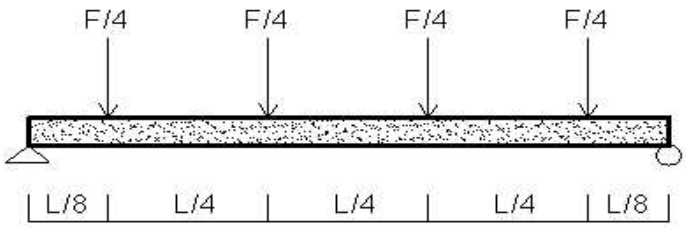

Figure 2 Simply supported panel: 4 line loads

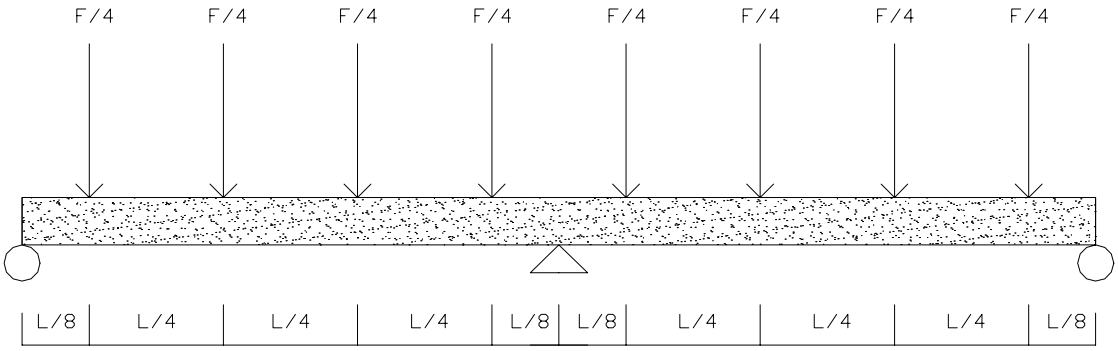

Figure 2a: line loads for simply supported panel on 2 spans

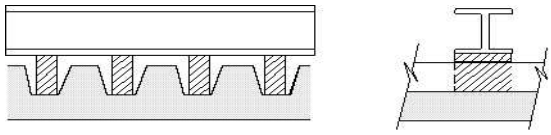

Figure 3 Application of loading platens in the troughs of the profile

Figure 4 Example of shaped loading platens

C.1.1 Support conditions
In general, the support width shall be within the range of 50 to 100 mm. Timber blocks may be used to avoid deformation of a side rib which does not contain foam.

The tested panel may be attached to the supports through either the profile valleys or crests as in practice.

C 1.2 Test control
It is preferable to carry out this test by controlling the deflection rather than the load (i.e. using a constant deflection speed). However, either procedure may be used provided the deflection speed does not exceed 1/50 of the span per minute at any time during the test. The load shall be increased steadily until failure occurs. The failure load and the nature and location of the failure and the relationship between load and deflection shall be recorded.
It is preferable to preface the formal test by a small pre-load.

C.1.3 Results expression
For each test the following data shall be reported:

- The deflection – load graphs and tables
- Interpolation for the linear elastic zone
- Characteristic failure load
- The nature of failure of the panel shall be characterised by the most critical of the following failure modes either individually or in combination:

- yielding of a face of the panel with consequential failure
- wrinkling (local buckling) of a face of the panel with consequential failure
- shear failure of the core
- shear failure of the bond between the face and the core
- shear failure of a profiled face layer
- crushing of the core at a support
- failure of the panels at the points of attachment to the supporting structure.

C 2 Test to determine the mechanical strength of a fixed panel subject to negative load

The mechanical strength of the panel charged with negative load on one span shall be determined by testing considering the minimum fixing configuration defined by the producer.

The parameters to be considered are:
- Minimum thickness and material properties of faces
- material properties of core.

The test spans between supports shall be:
- The shortest span to be used in practice, declared by the producer
- The longest span to be used in practice, declared by the producer
- An intermediate span.

The thicknesses of panels to be tested shall be:
- The minimum thickness panel
- The maximum thickness panel
- An intermediate thickness panel.

In carrying out this test, the arrangements shall be used following the principles described in section C 1.1.
For results expression, see C 1.3.

C.3 Tensile strength test
This test may be performed in one of the two ways:

(a) With the faces of the panel intact to determine the tensile bond strength between the faces and the core or to demonstrate adequate bond (see Figure 5).

(b) Before the faces are attached to determine the tensile strength of the core.

In general, the bond with the faces is of fundamental importance and the test should be carried out with the faces intact and failure should not take place in the bond layer.

Specimens of square cross-section shall be prepared to the dimensions shown and bonded using a suitable adhesive to platens of sufficient stiffness to ensure a uniform tensile stress over the area of the specimen. With lightly profiled faces, special measures may be required to ensure full adhesion between the platens and the faces.

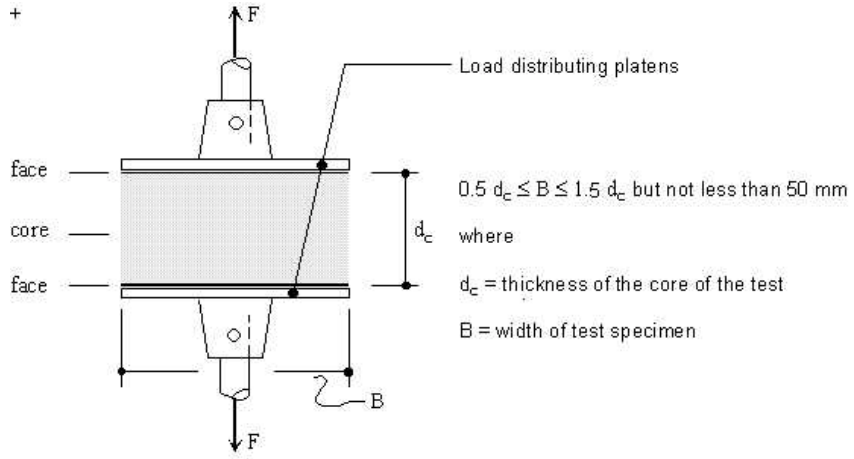

Figure 5: Tensile strength test (a) arrangements

For panels with profiled faces the specimens should be cut from the predominant thickness (see Figure 6)

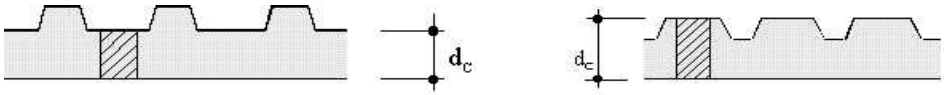

Figure 6: Specimen position for panels with profiled faces

Better results are generally obtained with larger specimens and it is recommended that, where possible, specimens with width B **at** least 100 mm should be used.

The test shall be carried out by loading the specimen in increments in a suitable tensile testing machine. The strain rate shall have a minimum value of 1% per minute and should not exceed 3% per minute. At each increment of load, the extension shall be measured and a load-deflection curve drawn.

The tensile strength f_{Ct} is given by:

$$f_{Ct} = \frac{F_u}{B^2}$$ where F_u= ultimate applied load

The tensile modulus E_{Ct} is given by:

$$E_{Ct} = \frac{F_u \, d_C}{w_u \, B^2}$$

where w_u= deflection at the ultimate applied load, calculated in the linear part of the curve (see Figure 7)

For specimens which do not exhibit a well-defined ultimate load, F_u may alternatively be defined as the load at a specified relative deformation. For polyurethane foams, 10% relative deformation is an appropriate limit. For materials with a more rigid cell structure or of non-cellular structure, a lower value may be used.

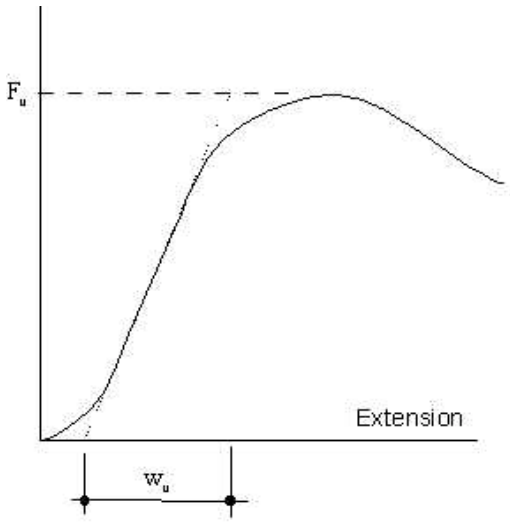

Figure 7: Typical load-deflection curve

The test report shall state whether failure was in adhesive bond or in material strength.

C.4 Compression test on the core material

Specimens of square cross-section shall be prepared to the dimensions shown in Figure 8. Test specimens shall include the facing(s).

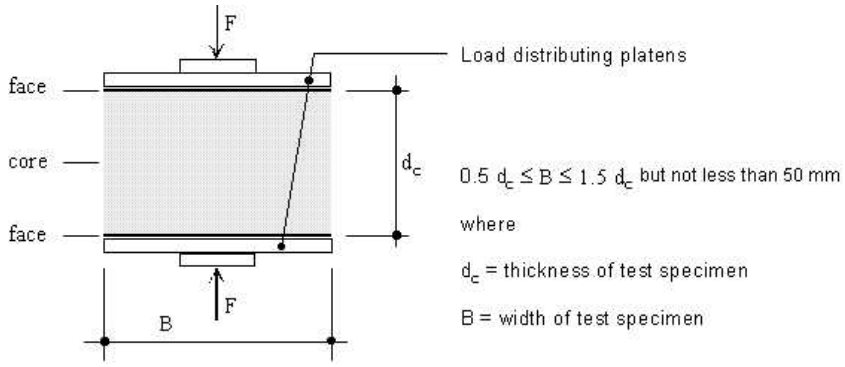

Figure 8: Compression test arrangements

For panels with profiled faces, the specimens shall be cut from the predominant thickness as shown previously for tensile tests on core materials.

Better results are generally obtained with larger specimens and it is recommended that, where possible, specimens with width B at least 100 mm shall be used
Apart from the dimensions of the test specimens and the use of fixed loading platens, this test shall generally be in accordance with EN 826.
The specimen shall be placed between the two parallel stiff loading plates of a suitable compression testing machine and loaded in increments. The strain rate shall have a minimum value of 1% per minute and should not exceed 3% per minute. At each increment of load, the displacement shall be measured and a load-deflection curve drawn.

The compressive strength f_{Cc} of the core material is given by:

$$f_{Cc} = \frac{F_u}{B^2}$$

The compression modulus E_{Cc} of the core material is given by:

$$E_{Cc} = \frac{F_u \, d_C}{w_u \, B^2}$$

For specimens which do not exhibit a well-defined ultimate load, F_u may alternatively be defined as the load at a specified relative deformation. For polyurethane foams, 10% relative deformation is an appropriate limit. For materials with a more rigid cell structure or of non-cellular structure, a lower value may be used.
The characteristic compressive strength shall be declared in N/mm^2.

C 5 Durability reference framework for the testing methods

Ageing agent	Testing method	Performance characteristics decay	Reference	End use
Mechanical agent	Permanent loads: creep	Mechanical resistance	prEN 14509 UEAtc TR	Roofs
	Mechanical dynamic tests	Mechanical resistance	prEN 14509	Accessible roofs and external walls
	High pressure water spray (cleaning in food storage)	Mechanical resistance Water permeability		Internal partition and ceilings
Thermal agent	Thermal cycles	Mechanical resistance	prEN 14509 UEAtc TR	Roofs and external walls
		Water permeability	EN 29142	Any end use of glued composite panels
Electro-magnetic agent	UV rays exposure	Mechanical resistance Water permeability	ISO 4892 ISO 11341	Roofs and external walls
Chemical agent	Salt spray test	Mechanical resistance Water permeability	ISO 7253	Roofs and external walls
	Resistance to humidity	Thermal insulation Mechanical resistance	ISO 10051 prEN 14509	Any end use Any end use
	Acid or basic agent	Water permeability Mechanical resistance	EN ISO 6270 EN 29142	Any end use of glued composite panels
	Resistance to liquids	Mechanical resistance	EN ISO 2812	Any end use
Biological agent	Moulds attack	Mechanical resistance		Any end use
Compatibility between materials	Electro-chemical compatibility	Mechanical resistance		Any end use