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GUIDELINE FOR EUROPEAN TECHNICAL APPROVAL
OF

TIMBER FRAME BUILDING KITS

EOTA, KUNSTLAAN 40 AVENUE DES ARTS, B - 1040 BRUSSELS

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FOREWORD

Background to the subject

This Guideline has been drawn up by EOTA Working Group 02.03/01 – Timber Frame Building Kits.

The Working Group consisted of members from 11 EEC-countries; Austria, Belgium, Finland, France, Germany, Italy, Netherlands, Norway (convenorship), Portugal, Sweden and United Kingdom. In addition Denmark, Iceland and Slovenia have been corresponding members together with members appointed by CEI-Bois.

The guideline sets out the performance requirements for timber frame building kits used in building construction, the verification methods used to examine the performance, the assessment methods used to evaluate the performance for the intended use, and the presumed conditions for the design and installation of the kits in the works.

Timber frame building kits according to this guideline are construction products defined in the Mandate (ref Construct 98/307 Rev 1) as follows:

> This Mandate covers those industrially prepared kits, marketed as a building, that are made of pre-designed and prefabricated components intended for production in series. This Mandate defines minimum requirements on the contents of such a kit. Partial kits falling below these minimum requirements are outside the scope of the Mandate and shall not be CE Marked on the basis of the resulting ETAG. These minimum requirements comprise all of the following: the structural elements of the building, the essential components of the external envelope including all necessary thermal insulation, and the internal linings in so far as they are necessary for the satisfaction of the Essential Requirements applied to the building.
>
> The design process (including the approval of detailed plans, applications for planning permission, building permits, …) must comply with the procedures foreseen in the Member States in which the house is to be built. This Mandate does not amend this process in any way. The completed building (the works) must comply with the building regulations (regulations on works) applicable in the Member States in which the house is to be constructed. The procedures foreseen in that Member State for demonstrating compliance with the building regulations must also be followed by the entity held responsible for this act. This Mandate does not amend this process in any way.
>
> Although some components may be prepared in different factories, only the final kit for delivery, and not the different components, can be CE Marked as a whole, under the responsibility of the seller.

The declared performance of the kit must be compared with the relevant requirements in the building regulations from case to case, taking into account the intended use of the kit in relation to type of building, site, etc. An ETA is a favourable technical assessment of a construction product for an intended use, ie incorporated in the works. The ETA deals only with the product, and states classes or product characteristics to be used by the designer of the works.

Verification and assessment methods of loadbearing performance are based on the provisions in Eurocode 5. The code so far has been published by CEN as European prestandard ENV 1995, and is planned to replace the national structural design codes of timber structures in all the member states. A condition for the application of this guideline to CE marked timber frame building kits is that declared structural performance based on Eurocode 5 is accepted in the member states in relation to their building regulations.

Verification and assessment methods of performance in relation to fire is based on the publication of European standards concerning classification for reaction to fire and resistance to fire. If the publication of these standards should be postponed too long, it may be considered to apply national classifications on a case-by-case basis in a transition period before the relevant European standards are available.

Verification of the performance of timber frame building kits requires an assessment of many construction details, such as the performance of joints between prefabricated elements with respect to air permeability and durability, the strength of lining materials with respect to impact loads and safety in use, watertightness of internal wet areas, etc. Relevant standardised verification methods may not always be available or judged to be necessary since the performance of many construction details has been proven to be acceptable by long-term experience from use in traditional designs. In accordance with the general advice in the Format of Guidelines for ETAs it is recognised in this guideline that some product properties can be assessed by a pass/fail approach on the basis of engineering judgement and experience from the use of well-known materials and designs.

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. When additional parts for this ETAG are written afterwards, they may comprise modifications to the list of reference documents applicable to that part.

Updating conditions

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

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

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

EOTA Comprehension Documents permanently take on board all usefull information on the general understanding of this ETAG as 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 **History File**.

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

SECTION ONE: INTRODUCTION

1 PRELIMINARIES

1.1 LEGAL BASIS (to be finally written by EOTA Secretary general)

This ETA Guideline has been established in compliance with the provisions of the Council Directive 89/106/EC and has been established taking into account the following steps:
- the final mandate issued by the EC : 09/11/98
- the final mandate issued by EFTA : 09/11/98
- adoption of the Guideline by the Executive Commission of EOTA : 18/05/2000
- opinion of the Standing Committee for Construction : 12-13/12/2000
- endorsement by the EC

This document is published by the Member states in their official language or languages according to art. 11/3 of the CPD. No existing ETA guideline 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 (89/106/EEC). This means that Member States shall presume that the approved timber frame building kits are fit for their intended use, i.e. they enable works in which they are employed to satisfy the essential requirements during an economically reasonable working life, provided that:
- the works are properly designed and built;
- the conformity of the products with the ETA has been properly attested.

b. **This ETAG is a basis for ETA's**, i.e. a basis for technical assessment of the fitness for use of a product for an intended use. An ETAG is not itself a technical specification in the sense of the CPD.

This ETAG expresses the common understanding of the approval bodies, acting together within EOTA, as to the provisions of the Construction Products Directive 89/106 and of the Interpretative Documents, in relation to the timber frame building kits and uses concerned, and is written within the framework of a mandate given by the Commission and the EFTA secretariat, after consulting the Standing Committee for Construction.

c. When accepted by the European Commission after consultation with the Standing Committee for Construction this **ETAG is binding** for the issuing of ETA's for timber frame building kits 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 timber frame building kit for the defined use only through an evaluation an approval process and decision, followed by the corresponding attestation of conformity. This distinguishes an ETAG from a harmonised European standard which is the direct basis for attestation of conformity.

Where appropriate, timber frame building kits 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 presumptions 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 requirement.

2 SCOPE

2.1 SCOPE

This guideline covers those industrially prepared timber frame kits, marketed as a building, that are made of pre-designed and prefabricated components intended for production in series.

The components in a kit may be manufactured as pre-cut timber members or prefabricated structural frames supplemented with additional materials on site, as completely prefabricated two-dimensional building elements, or as complete building sections where the floors, walls and roof are connected in the factory. Although some components may be prepared in different factories, only the final kit for delivery, and not the different components, can be CE marked as a whole, under the responsibility of the ETA holder.

The minimum content of the kit to be assessed shall include the following, as far as is necessary for the satisfaction of the Essential Requirements applied to the building:

- All structural elements necessary for the stability of the building including walls, floors, roof structures, their connections, and the connections of the building to the substructure.
- All components of the external envelope, including all necessary thermal insulation, internal linings, fire protection, vapour control provisions and external waterproofing.
- All components of the internal walls including acoustic insulation, internal linings and fire protection.
- Preparatory measures for the installation of plumbing, heating, cooling, ventilation and electrical services.

The kits are assembled according to pre-designed technical solutions for joints and construction details, which are part of the product specification for assessment and are supplied as part of each kit.

Components such as windows, external doors, brick cladding, internal linings and roofing materials, which are essential for the performance of the external envelope, shall always be specified and assessed as a condition for the fitness in use of the kit, but may not necessarily be delivered by the kit supplier. The connections and detailing of the interface between such components and the kit shall always be part of the kit description.

Products such as internal doors, stairs, surface coverings etc may be part of the timber frame kit.

Kits which do not meet all the conditions set out above are outside this scope, and shall not be CE-marked on the basis of an ETA based on this Guideline.

Service installations and complementary structures (including foundation or substructure) are not covered by this Guideline.

Building kits based on log construction are covered by the ETA Guideline for Log Building Kits.

2.2 USE CATEGORIES, PRODUCT FAMILIES, KITS AND SYSTEMS

The product performance of timber frame building kits in relation to the essential requirements will normally have to correspond with national regulatory requirements for the works relevant to the intended use of the kit. These requirements will vary between the member states, and the kit performance shall be expressed in numerical terms. For performance in case of fire standard European fire classification is applied.

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 and products. This ETAG contains assumptions taking account of the state of art and makes provisions for appropriate, additional case by case approaches when examining ETA-applications, within the general framework of the ETAG and under the CPD consensus procedure between EOTA members.

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

3 TERMINOLOGY

3.1 COMMON TERMINOLOGY AND ABBREVIATIONS

See Annex A

3.2 SPECIFIC TERMINOLOGY

Design climatic conditions:
Outdoor and indoor air temperature and moisture levels, snow loads, wind speed levels, etc, which may be stated in national building regulations or in other specifications to be used for design.

Integrated components:
Components such as windows, doors, conduits, etc which are built into the main building parts.

Joint/Connection:
Junction between two materials, components, elements or parts of a building

Main building parts:
Main construction parts of a building like walls, floors and roof.

National Application Document:
Supplementary document to a structural Eurocode published as European prestandard (ENV), with rules for the national application of the Eurocode. This includes boxed values and references to national standards which may be applied together with the provisions in the Eurocode.

Pre-designed:
Pre-determined technical solutions.

Production in series:
Production of building kits for a series of buildings on the basis of the same materials, structural design and construction details. The buildings and components do not have to be exactly of the same size or shape.

Production unit:
Production line or facility where the timber frame kit is manufactured and/or processed.

Separating walls and floors:
Walls and floors where national regulations can require sound insulation, fire resistance performance, etc.

Supporting documents:
Documents included in the formal part of the approval, but where the content is not included in the ETA-document itself. The valid version of a supporting document is the last updated version filed by the approval body.

Suspended floors:
Floor structures with a free span between supports.

Timber frame building:
Construction where the main structural members are studs, joists and rafters made of solid wood or wood-based materials.

Two-stage principle:

Design principle for claddings, joints, etc in the exterior envelope. An outer layer serves to protect an inner layer from direct driving rain and sun radiation. The space between the layers is ventilated and drained.

Wet area surface:
Floors and wall areas in bathrooms and other “wet rooms” where the surface may be exposed to water spray from showers, etc, and where the manufacturer declares the surfaces to be watertight.

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 timber frame building kits and their intended uses. It is the manufacturer or producer who defines the family of kits for which he is seeking an ETA and how it is to be used in the works, and consequently the scale of the assessment.

It is therefore possible that for some timber frame building kits, which are fairly conventional, only some of the tests and corresponding criteria are necessary to establish fitness for use. In other cases, e.g. special or innovative kits or materials, or where there is a range of uses, the whole range of tests and assessment may be applicable.

(b) General layout of this section

The assessment of fitness of timber frame building kits 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 timber frame building kits and uses concerned, beginning with the Essential Requirements for works (CPD art. 11.2) and then listing the corresponding relevant characteristics of the timber frame building kits.
- Chapter 5 extends the list in chapter 4 into more precise definitions and the **methods available to verify** product characteristics and to indicate how the requirements and the relevant product characteristics are described. This is done by test procedures, methods of calculation and other appropriate methods.
- Chapter 6 provides guidance on **the assessing and judging methods** to confirm fitness for the intended use of the timber frame building kits.
- Chapter 7, assumptions and recommendations are only relevant in as far as they concern the basis upon which the assessment of the timber frame building kits is made concerning their fitness for the intended use.

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

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

This ETAG indicates however the compulsory way of expressing relevant performance characteristics for timber frame building kits. If, for some uses at least one Member state has no regulations, a manufacturer always has the right to opt out 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 timber frame building kit 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 timber frame building kit for the intended use of 50 years for the loadbearing structure and for non-accessible components and materials, and 25 years for repairable or replaceable components and materials like claddings, roofing materials, exterior trims, and integrated components like windows and doors, provided that the kit is subject to appropriate use and maintenance (cfr. ch. 7). The use of components and materials with shorter intended working life must be clearly stated in the ETA. 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 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 timber frame building kit can not 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 timber frame building kits in relation to the expected, economically reasonable working life of the works (based upon ID. Par. 5.2.2).

(e) Fitness for the intended use

According to the CPD it has to be understood that within the terms of this ETAG, products shall "have such characteristics that the works in which they are to be incorporated, assembled, applied or installed, can, if properly designed and built, satisfy the Essential Requirements" (CPD, art. 2.1).

Hence, the timber frame building kits must be suitable for use in construction works, in which (as a whole and in their separate parts) they are fit for their intended use, account being taken of economy, and in order to satisfy the essential requirements. Such requirements must, subject to normal maintenance, be satisfied for an economically reasonable working life. The requirements generally concern actions which are foreseeable (CPD Annex 1, preamble).

4 REQUIREMENTS

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

- expressing in more detail, within the scope of the ETAG, the relevant Essential Requirements of the CPD in the Interpretative Documents and in the mandate, for works or parts of the works, taking into account the actions to be considered, as well as the expected durability and serviceability of the works.
- applying them to the scope of the ETAG (product and where appropriate its constituents, components and intended uses), and providing a list of relevant product characteristics and other applicable properties.

When a product characteristic or other applicable property is specific to one of the Essential Requirements, it is dealt with in the appropriate place. If, however, the characteristic or property is relevant to more than one Essential Requirement, it is addressed under the most important one with cross reference to the other(s). This is especially important where a manufacturer claims “No performance determined” for a characteristic or property under one Essential Requirement and it is critical for the assessing and judging under another Essential Requirement. Similarly, characteristics or properties which have a bearing on durability assessments may be dealt with under ER 1 to ER 6, with reference under 4.7. Where there is a characteristic which only relates to durability, this is dealt with in 4.7.

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

Table 1 on the next page shows the links between the Essential Requirements (ER) in the EC Construction Products Directive (CPD), the relevant paragraphs of the corresponding Interpretative Documents (ID) to the CPD, and the related requirements and product performances in this ETA Guideline:

Table 1

ER	Corresponding ID paragraph for works	Corresponding ID paragraph for product performance	Product performance characteristics from the Mandate, and ETA-Guideline paragraphs on product performance
1	2.1.3 Collapse 2.1.4 Inadmissible deformation 2.1.5 Damage by an event, disproportionate to the original clause	3.2 (2) Permanent actions Variable actions Accidental actions	4.1 - Mechanical resistance and stability
2	4.2.2 Load bearing capacity of the construction 4.2.3 Limitation of generation and spread of fire and smoke within the construction works 4.2.4 Limitation of spread of fire for neighbouring construction works	4.3.1.1 Products subject to reaction to fire requirements 4.3.1.2 Products for roofs subject to fire requirements 4.3.1.3 Products subject to resistance to fire requirements, load-bearing elements with or without separating function	4.2 - Safety in case of fire Reaction to fire Resistance to fire External fire performance (of the roof covering)
3	3.3.1.1 Air quality 3.3.1.2 Dampness (indirect effect inducing mould-growth and increased deposit of house dust mites)	3.3.1.1.3.2 a Emission and release of radiation and pollutants. Susceptibility to the growth of harmful micro-organisms 3.3.1.2.3.2 e Building products	4.3 - Hygiene, health and environment Vapour permeability and moisture resistance Watertightness Release of dangerous substances
4	3.3.1.2 Nature of surfaces 3.3.2.2 Behaviour on impact	4.2 Capability to avoid slippery floors 4.2 Capability to resist horizontal thrust	4.4 - Safety in use Slipperiness of floors Impact resistance
5	2.3.1, 2.3.2, 2.3.2 Protection against air-borne and impact noise between enclosed spaces and from outside of works	4.3.2 Acoustic properties (according to 4.3.3)	4.5 - Protection against noise Airborne sound insulation Impact sound insulation Sound absorption
6	4.2 Energy consumption limitation	Table 4.2 Component characteristics	4.6 - Energy economy and heat retention Thermal resistance Air permeability Thermal inertia

4.1 MECHANICAL RESISTANCE AND STABILITY (ER 1)

The loadbearing structures of the building must have adequate resistance and safety against structural collapse, inadmissible deformations and disproportionate collapse. The relevant actions to be considered comprise normally self-weight and imposed loads, wind loads, snow loads and seismic loads.

4.2 SAFETY IN CASE OF FIRE (ER 2)

4.2.1 Reaction to fire

Materials which are parts of the kit shall have the necessary performance concerning reaction to fire applicable for the intended use of the kit, and may comprise ignitability, rate of heat release, smoke production and flaming droplets/particles.

4.2.2 Resistance to fire

The main building parts shall have the necessary fire resistance applicable for the intended use of the building. The fire resistance shall be determined with respect to the loadbearing criterion (R), the integrity criterion (E), and the thermal insulation criterion (I) according to the definitions in prEN 13501-2.

4.2.3 External fire performance of the roof covering

Roof coverings which are a part of the kit shall have the necessary external fire performance applicable for the intended use of the building.

4.3 HYGIENE, HEALTH AND ENVIRONMENT (ER 3)

4.3.1 Vapour permeability and moisture resistance

The external envelope shall be designed to limit interstitial and surface condensation of moisture which may cause unacceptable growth of micro-organisms or affect the indoor climate.

4.3.2 Watertightness

4.3.2.1 External envelope
The external envelope shall prevent leakage of water from rain and melting snow into the works.

4.3.2.2 Internal surfaces
Internal wall and floor surfaces in bathrooms, toilets, etc claimed to be watertight by the manufacturer, shall be sufficiently tight to avoid water penetration to rooms below (short-term effects) and to avoid moisture levels in materials and components which may lead to unacceptable growth of micro-organisms (long-term effects).

4.3.3 Release of dangerous substances

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

4.4 SAFETY IN USE (ER 4)

4.4.1 Slipperiness of floor finishes

To limit accidental falls in buildings under normal use, finished floor surfaces shall not be unacceptably slippery.

4.4.2 Impact resistance

Walls, floors and roofs shall have sufficient strength to withstand a dynamic load in order to protect persons from injury.

4.5 PROTECTION AGAINST NOISE (ER 5)

4.5.1 Airborne sound insulation

Walls and floors shall provide the necessary airborne sound insulation applicable to the intended use of the building.

The external envelope shall provide the necessary sound insulation applicable to the intended use of the building concerning airborne noise from the outside (ie noise from industry, road and air traffic, etc).

4.5.2 Impact sound insulation

Floors shall provide the necessary impact sound insulation applicable to the intended use of the building.

4.5.3 Sound absorption

The internal surfaces which are part of the kit shall provide the necessary sound absorption applicable to the intended use of the building.

4.6 ENERGY ECONOMY AND HEAT RETENTION (ER 6)

4.6.1 Thermal resistance

The external envelope shall provide the necessary thermal insulation which is applicable to the intended use of the building. Thermal bridges which may cause uncomfortably low temperatures or water vapour condensation affecting hygiene, health and environment related to ER 3 shall be avoided.

4.6.2 Air permeability

The external envelope shall provide adequate airtightness to limit unnecessary energy loss, and to prevent cold draughts which may affect persons health in relation to ER 3.

4.6.3 Thermal inertia

Thermal inertia of the main building parts shall be known, where applicable, to assess the effect on energy and heat retention.

4.7 ASPECTS OF DURABILITY, SERVICEABILITY AND IDENTIFICATION

4.7.1 Aspects of durability

The design of the timber frame building kit shall ensure that deterioration of materials and components during the assumed intended working life does not significantly affect the performance of the kit in relation to fulfilling all the Essential Requirements 1 – 6. Deterioration may be caused by physical, biological and chemical agents.

4.7.2 Aspects of serviceability

Suspended floors shall have sufficient stiffness to avoid unacceptable vibrations from normal use.

4.7.3 Identification

The materials used in the timber frame building kit shall be identifiable in relation to those properties which have an influence on the ability of the kit to fulfil the Essential Requirements.

5 METHODS OF VERIFICATION

This chapter refers to the verification methods used to determine the various aspects of performance of the timber frame kit in relation to the requirements for the works (calculations, tests, engineering knowledge, site experience etc.) as set out in chapter 4.

Verification by testing shall be in accordance with the test methods given in this guideline. 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 harmonised European technical specifications.

It is supposed that the ENVs used as reference documents are replaced by the same Eurocodes when these are published as EN-standards.

When the performance is assessed by reference to traditional methods, general experience, etc the Technical Dossier of the ETA shall as far as possible refer to documents where such methods or experience are described.

Assessment of individual materials and components which are part of the kit shall be carried out on the basis of the relevant product standards or approvals for these products, or as far as possible on the basis of technical specifications for products with the same intended use.

The relationship between the product performance characteristics and the corresponding paragraphs on verification methods are summarised in Table 2.

Table 2

ER	ETAG paragraph on product performance	ETAG paragraph on verification method
1	4.1 Mechanical resistance and stability	5.1 Mechanical resistance and stability
		5.1.1 Verification of structural capacities in general 5.1.2 Verification by calculation 5.1.3 Verification by testing
2	4.2 Safety in case of fire	5.2 Safety in case of fire
	4.2.1 Reaction to fire	5.2.1 Reaction to fire
	4.2.2 Resistance to fire	5.2.2 Resistance to fire
	4.2.3 External fire performance of the roof covering	5.2.3 External fire performance of the roof covering

ER	ETAG paragraph on product performance	ETAG paragraph on verification method
3	4.3 Hygiene, health and environment	5.3 Hygiene, health and environment
	4.3.1 Vapour permeability and moisture resistance	5.3.1 Vapour permeability and moisture resistance 5.6.2 Air permeability
	4.3.2 Watertightness	5.3.2.1 External envelope 5.3.2.2 Internal surfaces
	4.3.3 Release of dangerous substances	5.3.3 Release of dangerous substances
4	4.4 Safety in use	5.4 Safety in use
	4.4.1 Slipperiness of floors	5.4.1 Slipperiness of floors
	4.4.2 Impact resistance	5.4.2 Impact resistance
5	4.5 Protection against noise	5.5 Protection against noise
	4.5.1 Airborne sound insulation	5.5.1 Airborne sound insulation
	4.5.2 Impact sound insulation	5.5.2 Impact sound insulation
	4.5.3 Sound absorption	5.5.3 Sound absorption
6	4.6 Energy economy and heat retention	5.6 Energy economy and heat retention
	4.6.1 Thermal resistance	5.6.1 Thermal resistance
	4.6.2 Air permeability	5.6.2 Air permeability
	4.6.3 Thermal inertia	5.6.3 Thermal inertia

5.1 MECHANICAL RESISTANCE AND STABILITY

5.1.1 Verification of structural capacities in general

The loadbearing capacities of the pre-designed structural parts of the kit, including relevant connections/joints, shall be verified in conformity with the basis of design as given in ENV 1991-1 (Eurocode 1 Part 1), ie according to the limit state design method. The verification can normally be undertaken by structural calculations, supplemented if necessary by testing in special cases, and shall when relevant include resistance against disproportionate collapse.

5.1.2 Verification by calculation

Unless differently provided for in specific national regulations on works, calculations of loadbearing capacities shall be made according to ENV 1995-1-1 Eurocode 5, Part 1-1 General rules and rules for buildings. The boxed values given in the standard shall be used to calculate the declared design values for structural capacity in the ETA. Supplementary information on capacities based on the various boxed values given in National Application Documents may be undertaken as part of the specific structural designs for each individual works.

Supplementary calculations which are relevant for the resistance against seismic actions should be done according to the provisions in ENV 1998-1-3 Eurocode 8, Part 1-3 General rules – Specific rules, for various materials and elements. Other information on capacities against seismic actions based on the various boxed values given in National Application Documents or other national regulations may be undertaken as a basis for the specific structural design for each individual work.

5.1.3 Verification by testing

Loadbearing performance unable to be calculated according to 5.1.2 shall be verified by testing. The test procedures shall in general follow EN 380 and other relevant EN-standards for testing of wood-based components and materials such as EN 594, EN 595 and EN 596 (see Annex B).

Test methods used for the assessment of the loadbearing performance must be specified with complete references to the number and edition of the standard, the conditioning of the specimens and, if relevant, any deviations made from the standard.

5.2 SAFETY IN CASE OF FIRE

The ETAG is based upon the European Commission's decisions, as well as tests and classifications according to EN-standards. If these standards are not available at the time when this ETAG is to be made operational, the verification of reaction to fire and fire resistance may also be considered to be based on national classification standards on a case-by-case basis in a transition period (taking into account the intended use of the kits, and the countries where the kit is put on the market).

5.2.1 Reaction to fire

Reaction to fire of surface materials shall be verified by tests according to the test methods specified in prEN 13501-1.

5.2.2 Resistance to fire

Fire resistance shall be verified by tests according to the test methods specified in prEN 13501-2. Determination of the loadbearing capacity of the structural parts of the kit when exposed to fire may also be undertaken by calculation according to ENV 1995-1-2, Eurocode 5, Part 1-2.

5.2.3 External fire performance of the roof covering

External fire performance of roofing materials shall be verified by tests according to prEN 1187 test 1-3, except for those products deemed to satisfy listed in Commission Decision 2000/553/EC (19/09/2000 O.J. L 235 p 19).

5.3 HYGIENE, HEALTH AND ENVIRONMENT

5.3.1 Vapour permeability and moisture resistance

Assessment shall be undertaken on the basis of calculations according to prEN 13788, taking into account the relevant design climatic conditions.

The assessment of interstitial or internal surface condensation risk to avoid the growth of micro-organisms should be based on the assumption that humidity in the timber frame structures inside the external sheathing or breather membrane only exceeds 80 % RH for limited periods of time at design climatic conditions.

The risk of condensation can normally be verified on the basis of hygrothermal characteristics of the products used in each component and the construction details.
Water vapour resistance of the relevant layers should be based upon:

- Design values given in prEN 12524 or European technical specifications
  or
- Tests according to prEN ISO 12572 or European technical specifications

For verification of condensation risks due to low surface temperatures or air leaks see 5.6.1 and 5.6.2. Moisture resistance of materials in terms of durability is covered under chap. 5.7.1.

5.3.2 Watertightness

5.3.2.1 External envelope
Water leakage resistance of the building envelope, including driving rain on facades and possibly snow penetration, shall primarily be assessed by the approval body on the basis of the standard construction details for the kit, and by using the available technical knowledge and experience from similar well-known technical solutions.

The assessment of resistance against the penetration of driving snow into the external envelope may normally be based upon design or engineering knowledge. The assessment must include the full external envelope, including joints between prefabricated components in the kit and principal solutions for joints between the kit and the substructure.

The external envelope should normally be designed according to the two-stage principle unless other acceptable solutions can be demonstrated.

If the resistance against weather influence cannot be assessed by the use of existing knowledge, eg because of unfamiliar solutions to the relevant construction details, the approval body may find it necessary to require testing of the external envelope performance. Laboratory tests may be carried out according to prEN 1027, prEN 12155, prEN 12865-1 and -2.

5.3.2.2 Internal surfaces
The performance of watertight membranes or surface layers in wet areas of bathrooms, etc may be assessed on the basis of experience/technical knowledge, verified by references to conformity with relevant performance standards for the products which are applied, e.g. product standards for roofing membrane systems, or by verification according to the Nordtest methods NT BUILD 058, 230 and 448 for products with unknown performance.

5.3.3 Release of dangerous substances

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

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

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

5.4 SAFETY IN USE

5.4.1 Slipperiness of floor finishes

Verification of slip resistance of flooring materials shall be undertaken in accordance with the relevant EN-standards for the specified finished flooring products.

5.4.2 Impact resistance

Mechanical resistance against dynamic loads shall primarily be assessed by the approval body on the basis of existing knowledge related to the intended use. Timber frame walls with well-known internal lining materials, such as standard gypsum boards, wood-based panel products and solid timber boards with suitable stud spacing, should generally be accepted to have a satisfactory impact resistance for normal use in residential housing, office buildings, etc.

When the performance of the kit is not known to be acceptable, or a quantified performance is to be declared due to national building regulations in some member states, the impact resistance should be tested. Testing of walls is undertaken according to ISO 7892 and ISO/DIS 7893, and shall follow the detailed test procedures described in the ETA Guideline No 003 for Internal Partition Systems for Use as Non-Loadbearing Walls. Floors and roofs are tested according to EN 1195.

The minimum accepted impact resistance should normally be 100 Nm for soft body impact with the 50 kg bag and 10 Nm for hard body impact with the 1 kg steel ball, when the intended use is kits for residential housing, office buildings, etc. However, national building regulations in some member states require a minimum soft body impact resistance of 900 Nm for external walls.

For wood-based panels used as loadbearing subfloor panels on joists and as roof sheathing the impact resistance should be accepted as adequate when the panels conform to the requirements in prEN 12871.

5.5 PROTECTION AGAINST NOISE

5.5.1 Airborne sound insulation

The airborne sound insulation performance of the main building parts of an assembled kit shall be verified by either laboratory or field tests according to the relevant parts of ISO 140. The rating of airborne sound insulation shall be undertaken according to ISO 717.

Estimated values for airborne sound insulation in completed buildings, based on laboratory tests, can be determined according to prEN ISO 12354, Parts 1 and 2.

The sound insulation performance may also be verified by references to data for common timber frame construction designs given in national standards, textbooks or authoritative guides, provided that such data are based upon tests and classification in accordance with the ISO-standards mentioned above.

5.5.2 Impact sound insulation

The impact sound insulation performance of the floors of an assembled kit shall be verified by either laboratory or field tests according to the relevant parts of ISO 140, and the rating of impact sound insulation shall be done according to ISO 717.

Estimated values for impact noise level in completed buildings, based on laboratory tests, shall be determined according to prEN ISO 12354, Parts 1 and 2.

The sound insulation performance may also be verified by references to data for common timber frame construction designs given in national standards, textbooks or authoritative guides, provided that such data are based upon tests and classification in accordance with the ISO-standards mentioned above.

5.5.3 Sound absorption

Sound absorption is measured according to EN ISO 354.

5.6 ENERGY ECONOMY AND HEAT RETENTION

5.6.1 Thermal resistance

Thermal resistance (R-value) and the corresponding thermal transmittance (U-value) of the main building parts in a kit shall be calculated according to EN ISO 6946, using the design thermal conductivity values for materials according to EN 12524, relevant European product standards, or conductivities determined according to EN ISO 10456. Alternatively the thermal resistance may be verified by testing according to EN ISO 8990.

Verification of thermal transmittance for windows, doors and shutters may be undertaken by calculation according to prEN 10077-1, or by testing according to relevant EN ISO-standards for these products.

If the design has technical solutions with special thermal bridges not covered by the ordinary verification of the thermal resistance as mentioned above, the effect on the overall thermal resistance and the surface temperatures in relation to 4.3.1 shall be verified when the approval body finds this necessary. Eg the effect of moisture due to thermal bridges. Such verification may be undertaken by calculations according to EN ISO 10211-1 and prEN ISO 10211-2, or by testing according to EN ISO 8990 or relevant test standards for specific products.

5.6.2 Air permeability

Assessment of the air permeability of the external envelope is normally undertaken by judgement of the construction details, on the basis of the knowledge and experience from traditional technical solutions. The assessment shall include joints between components in the kit, and if relevant also joints between the kit and other building parts.
For example, joints in timber frame constructions may generally be regarded as sufficiently airtight when the following principles are applied:

- Overlapped joints of plastic films, breather paper or similar roll products continuously clamped by parallel timber members or by panel products

or

- Joints filled with a building sealant or foam protected from direct weathering, and with movements in the joint limited by mechanical fasteners.

When the approval body finds it necessary, eg when non-traditional joints are applied, the air permeability shall be verified by testing. Tests may be carried out by pressurisation of completed buildings according to ISO 9972, or by laboratory testing according to pr EN 1026, prEN 12114 or other relevant test standards. The tests must include long-term performance when relevant.

The assessment of air permeability should be undertaken both with regard to energy economy (unintended ventilation), cold draughts (see 4.6.2) and risks of water vapour condensation inside the construction (see 4.3.1). The assessment must be undertaken on the basis of the intended use of the building kit, taking into account the internal and external design climates (eg geographical areas).

5.6.3 Thermal inertia

Verification of thermal inertia is undertaken on the basis of the following properties of the main building parts: the total mass per unit area, density and specific heat capacity of relevant materials and thermal resistance. Specific heat capacities are tabulated in EN 12524, and material densities are shown in ENV 1991-2-1.

5.7 DURABILITY, SERVICEABILITY AND IDENTIFICATION

5.7.1 Aspects of durability

The estimated working life of the various parts of the kit will normally have to be determined by the approval body, on the basis of experience and general knowledge, and mainly by examining the building details which are part of the kit.
In so doing the approval body must take into account the influence of climatic conditions when assessing the estimated working life of the timber frame building kit. The EC Guidance Paper F on Durability and the Construction Products Directive may be consulted with regard to the use of relevant degradation factors and climatic sub-divisions of Europe.

The most important aspects related to the durability of timber frame building kits are:

- Insects attacking wood materials
- Fungi attacking wood materials with excessive moisture content due to interstitial condensation or driving rain penetrating the external envelope
- Corrosion of metal fasteners in wet climates

The durability of materials and components in the kit shall be assessed for resistance to the major degradient agents such as moisture etc., making reference to the relevant standards for each product (see Annex B).

When assessing the durability of materials and components in the kit it should be borne in mind that durability is normally best ensured by good design measures. Excessive moisture content should primarily be prevented by adequate construction details. The least possible reliance should be placed on chemical treatments for durability in relation to wood-destroying fungi.

Wood and wood-based products

The natural durability of wood-based products should be identified according to EN 350-1 and EN 350-2 and selected according to EN 460 for use in the appropriate hazard class described in EN 335-1, -2 and -3:

Hazard class 1: Structural members and other components situated on the inside of the wall and roof sheathing.
Hazard class 2: Roof sheathing and battens behind ventilated claddings.
Hazard class 3: External wall claddings, trims, etc continually exposed to the weather.

As stated in EN-335-2 and –3, the risk of insect attack of susceptible wood used in construction depends on geographical regions of Europe. So, chemical treatment of wood and wood-based products may be required in some Member States. Such treatment shall be declared in the ETA when the manufacturer opts for it.
If preservative treatment is proposed, the preservative should be specified according to EN 599-1 and EN 599-2, and the treated timber should comply with a specification written according to EN 351-1, or a national classification and labelling corresponding to these standards (see flow chart diagram in EN 351-1, Annex A).

Fasteners

Fasteners should be assigned to one of the service classes given in ENV 1995-1-1. The following classes are normally applicable:

Service class 1: Internal fixings and fasteners inside the external sheathing or the thermal insulation
Service class 2: Fixing of sheathing, battens, etc, and fasteners outside the thermal insulation, not directly exposed to the weather
Service class 3: Fixing of external claddings, trims, etc, and anchors and fasteners directly exposed to the weather.

Examples of fasteners in service class 1 are products made of unprotected steel.
Examples of fasteners in service class 2 are products made of zinc-coated steel in class Z275 according to EN 10147.
Examples of fasteners in service class 3 are products made of zinc-coated steel with a minimum thickness of 50µm zinc, and fasteners manufactured from stainless steel according to prEN 10088-2.

5.7.2 Aspects of serviceability

Deflections related to the structural design of the loadbearing structures shall be determined by calculations or tests as in 5.1.

The stiffness of suspended floor structures shall be calculated in accordance with the provisions in Eurocode 5 concerning vibrations of residential floors in order to check adequate serviceability under normal traffic loads.

5.7.3 Identification

The identification parameters shall be chosen appropriately, so that they give a clear understanding of the properties of the product.
The specifications of materials and components should as far as possible provide maximum flexibility to choose alternative products for a kit, without affecting the declared performances or the fitness for the intended use. Hence the specifications should as far as possible refer either to:

- a product standard
  or
- an ETA
  or
- material properties or performance specifications given directly in the ETA for the kit.

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

6 ASSESSING AND JUDGING THE FITNESS FOR USE

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

The type and options of product performance to be declared are summarised in Table 3.

Table 3

ER	ETAG paragraph on product performance	Type of performance declaration in ETAs	NPD*
1	6.1.2.1 External walls	- Vertical load capacity - Horizontal load capacity - Combined vertical/hor. load capacity - Racking load capacity - Anchorage load capacity	No No No No Yes
	6.1.2.2 Internal load-bearing walls	- Vertical load capacity - Racking load capacity	No Yes
	6.1.2.3 Suspended floors	- Imposed load capacity - Horizontal diaphragm shear load capacity	No Yes
	6.1.2.4 Roof structures	- Snow and/or wind load capacity - Concentrated imposed load capacity - Horizontal diaphragm shear load capacity	No Yes Yes
2	6.2.1 Reaction to fire	- Classification according to Euroclasses in prEN 13501-1	No
	6.2.2 Resistance to fire	- Classification according to prEN 13501-2	Yes
	6.2.3 External fire performance of roof covering	- Classification according to prEN 13501-5	Yes
3	6.3.1 Vapour permeability and moisture resistance	- Assessed to be acceptable in relation to the intended use of the building and any limitations regarding climatic zones	Yes
	6.3.2 Watertightness 6.3.2.1 External envelope 6.3.2.2 Internal surfaces	 - Assessed to be acceptable in relation to any limitations regarding climatic zones - Assessed to be acceptable	 No Yes
	6.3.3 Release of dangerous substances	- Declaration of dangerous substances defined in Council Directive 76/769/EEC, and possible measures to be taken	No
4	6.4.1 Slipperiness of floors	- Assessed to be acceptable or - Slip resistance of flooring	Yes
	6.4.2 Impact resistance	- Assessed to be acceptable by judgement or - measured horizontal soft and hard body impact resistance of walls - measured vertical impact load resistance of floors and roof	Yes Yes Yes

* No performance determined being an option

ER	ETAG paragraph on product performance	Type of performance declaration in ETAs	NPD*
5	6.5.1 Airborne sound insulation	- Weighted apparent sound reduction index for separating walls and floors - Weighted apparent sound reduction index for all other walls and floors - Weighted apparent sound reduction index for external walls and roof	No Yes Yes
	6.5.2 Impact sound insulation	- Weighted normalised impact sound pressure level for separating floors - Weighted normalised impact sound pressure level for all other floors	No Yes
	6.5.3 Sound absorption	- Sound absorption coefficient of internal surfaces	Yes
6	6.6.1 Thermal resistance	- Total thermal resistance R_t and corrected thermal transmittance U_c for: Exterior walls Windows and external doors Floors Internal walls Roof	 Yes Yes Yes Yes Yes
	6.6.2 Air permeability	- Measured air leakage of type tested buildings and/or components or - Assessed to be acceptable in relation to energy loss, cold draughts (ER3), interstitial or surface condensation (ER3), and intended use	Yes Yes
	6.6.3 Thermal inertia	- Information on relevant data	Yes
	6.7.1 Aspects of durability	- Assessed to be acceptable in relation to intended use and the effect on performance related to ER1 – ER6 - Possible conditions regarding maintenance	No Yes
	6.7.2 Aspects of serviceability	- Maximum deflections at serviceability limit state related to the loadbearing capacities declared under ER1 - Stiffness against floor vibrations	No Yes
	6.7.3 Identification	- Values of appropriate identification parameters	Yes

* No performance determined being an option

6.1 MECHANICAL RESISTANCE AND STABILITY

6.1.1 Declaration of mechanical resistance in general

The loadbearing capacity of the main building parts, taking into account the relevant connections, should normally be stated in the ETA as design resistance at ultimate limit state. Unless differently provided for in specific national regulations on works, the design resistance is calculated according to EN 1995-1-1. Before EN 1995-1-1 is published the calculations should be undertaken on the basis of ENV 1995-1-1, using the modification factors specified in the standard.

The partial coefficient for material properties at ultimate limit state shall be $\gamma_M = 1.3$ for timber, wood-based materials and joints. Other values for γ_M may also be used for the calculation of mechanical resistance, if the manufacturer wants to include declared values based on a different partial coefficient value laid down in specific national regulations, or alternatively declare characteristic capacities instead of design values.

The loadbearing capacities to be declared are specified in 6.1.2, and may preferably be given in the form of a table in the ETA.

The load-carrying capacity of walls shall be given for specified wall heights as vertical resistance and racking strength per unit length of the walls, and as horizontal resistance perpendicular to the wall per unit area.

The load-carrying capacity of suspended floors and of roof structures with specified maximum spans may be given as net design imposed load resistances, and net design snow load and/or wind load resistance as defined in ENV 1991-2-3 and ENV 1991-2-4. (The effect of the self-weight of the floor and roof structure shall be taken into account in order to declare the net load capacity).

6.1.2 Structural capacities to be declared

6.1.2.1 External walls
The following design resistances for external walls shall normally be declared:

1. Vertical resistance in kN/m for medium-term and short-term loads , without combination with loads perpendicular to the wall.
2. Vertical resistance in kN/m for the short-term load duration class, in combination with a specified instantaneous load perpendicular to the wall.
   (The load perpendicular to the wall must be determined by the manufacturer in order to cover the wind loads which are relevant for the intended use of the kit (geographical areas))
3. Horizontal resistance in kN/m² perpendicular to the wall surface for instantaneous load , without combination with vertical loads
4. Racking resistance in kN/m for instantaneous load , assuming that the frame is vertically anchored
5. Anchorage resistance of standard wall fixings to the substructure for instantaneous load , when such fixings are part of the kit

6.1.2.2 Internal load-bearing walls
The following design resistances for internal walls shall normally be declared:

1. Vertical resistance in kN/m for the medium-term and the long-term loads.
2. Racking resistance in kN/m for instantaneous loads , assuming that studs are effectively anchored to the substructure

6.1.2.3 Suspended floors
The following design resistances for suspended floors shall normally be declared:

1. Net vertical uniformly distributed medium-term imposed floor load resistance in kN/m² as defined in ENV 1991-2-1
2. Vertical local concentrated medium-term imposed floor load resistance in kN as defined in ENV 1991-2-1

3. Horizontal diaphragm shear resistance in kN/m at ultimate limit state for instantaneous load

6.1.2.4 Roof structures
The following design resistances for roof structures shall normally be declared:

1. Maximum uniformly distributed vertical medium-term, short-term and instantaneous load resistance in kN/m²
2. Vertical local concentrated short-term imposed roof load resistance in kN as defined in ENV 1991-2-1
3. Horizontal diaphragm shear resistance in kN/m at ultimate limit state for instantaneous load
4. Vertical and horizontal anchorage resistances of standard roof structure fixings at ultimate limit state for instantaneous loads, when such fixings are part of the kit

Note:

- Loadbearing capacities at instantaneous loads mentioned above shall be replaced by short term load capacities when the declared values are calculated on the basis of ENV 1995-1-1, because wind loads are classified as short-term loads in this standard.

- Vertical load-carrying resistances for wall structures may include openings for windows and doors when the kit has standard openings with specified dimensions, and standard load-carrying components around the openings.

- Racking load resistances are normally declared only for wall sections without openings. The racking load should normally also be declared on the basis that vertical uplift of walls are prevented by separate anchors designed for each individual works.

- Resistances against instantaneous and short-term loads for roofs shall normally be declared separately. On request from the ETA holder, specified combinations (with a specified wind load action) may also be declared.

- Densities and total mass necessary for the calculation of seismic forces should also be declared when relevant for the intended use (geographical zones). Assessment of the seismic resistance of buildings is otherwise assumed to be possible to be undertaken on the basis of the declared racking resistance and diaphragm shear capacities for the kit, and also the anchorage capacities of fixings when relevant.

6.1.3 Resistance against seismic actions

Load-bearing capacities of the main building parts and anchorage which is part of the kit, including racking resistance and horizontal diaphragm shear load capacity, is covered by 6.1.2. If a kit is to be put on the market in areas with seismic zones the masses of the building parts shall also be declared, as well as the specific characteristics of connections and factors for energy dissipation according to the methods of calculation given in 5.1.2.

6.1.4 Structural analysis

The detailed structural analysis to verify the declared capacities mentioned in 6.1.2 and 6.1.3 shall always be available to the approval body as a part of the technical file for the ETA.

6.2 SAFETY IN CASE OF FIRE

6.2.1 Reaction to fire

Reaction to fire of materials shall be declared in accordance with Euroclasses A1 – F or $A1_{FL}$ – F_{FL} in prEN 13501-1.

6.2.2 Resistance to fire

The following range of classifications in accordance with prEN 13501-2 is normally applicable:
- REI 15, REI 30, REI 60, REI 90 and REI 120 (RE 20 – RE 120) for loadbearing parts with fire separating function
- R 15, R 30, R 60, R 90 and R 120 for loadbearing parts without fire separating function
- EI 15, EI 30, EI 60, EI 90 and EI 120 (E 20 – E 120) for non-loadbearing parts with fire separating function
- No performance determined

For loadbearing building components with a classified fire resistance, the characteristic load capacities, which include the effect of fire exposure in accordance with ENV 1991-2-2, shall be specified in addition to the capacities mentioned in 6.1.2.

6.2.3 External fire performance of the roof covering

Classification of external fire performance for roofing materials shall be made according to prEN 13501-5.

6.3 HYGIENE, HEALTH AND ENVIRONMENT

6.3.1 Vapour permeability and moisture resistance

The assessment is undertaken with respect to both interstitial and internal surface condensation.

The performance of the kit is stated in the form of acceptable intended uses relevant to the design climatic conditions, eg types of buildings and geographical zones.

6.3.2 Watertightness

6.3.2.1 External envelope
The performance of the kit will normally have to be declared in qualitative terms in relation to the intended use like potential climatic zones, and with respect to durability aspects (see EC Guidance Paper F on Durability and the Construction Products Directive), as well as to the requirements mentioned in 4.3.2. When a kit is assessed to be inadequate in certain regions (for example in areas with exceptional amounts of driving rain or potential snow penetration), the limitations on the intended use must be clearly stated in the ETA.

6.3.2.2 Internal surfaces
It shall be clearly indicated in the ETA which parts of the kit are classified as watertight surface areas.

6.3.3 Release of dangerous substances

The product/kit shall comply with all relevant European and national provisions applicable for the uses for which it is brought to the market. The attention of the applicant should be drawn 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 product but not covered by the ETA, the NPD option (no performance determined) is applicable.

6.4 SAFETY IN USE

6.4.1 Slipperiness of floor finishes

When this performance is determined the slip resistance of finished floorings shall be declared according to the relevant standard for the specified flooring product.

6.4.2 Impact resistance

Impact resistance can normally be declared as acceptable under defined conditions and not be quantified. Any limitations on intended use must be stated in the ETA.

When wall structures have been tested according to ISO 7892, and/or floors and roof according to EN 1195, the determined impact resistance shall be declared in the ETA.

6.5 PROTECTION AGAINST NOISE

Sound insulation performance of building elements shall be declared in the ETA as estimated values for airborne sound insulation and impact noise level to be expected in completed buildings. The performance shall be specified with designations according to ISO 717, and should preferably be specified as given below. Other designations for the sound insulation performance mentioned in ISO 717 may be added in the approval, to agree with the verification methods according to national building regulations based on such designations.

6.5.1 Airborne sound insulation

Airborne sound insulation between rooms and of facades shall be given as:
Weighted apparent sound reduction index R'_w

6.5.2 Impact sound insulation

Impact noise level shall be given as:
Weighted normalised impact sound pressure level $L'_{n\,w}$ (Band width 1/3 octave)

6.5.3 Sound absorption

The sound absorption coefficient of internal surfaces is declared.

6.6 ENERGY ECONOMY AND HEAT RETENTION

6.6.1 Thermal resistance

Thermal resistance values for the main building parts in the kit shall be declared as the total thermal resistance R_t in m²K/W, including the surface resistances. The thermal resistance shall be an average value for the main building parts , including the effect of studs, joists, plates, etc based on an average length in relation to one m² of the building part. Thermal resistance of windows and doors in the external envelope which are included in the kit shall be declared separately, also in the term m²K/W.

The corresponding thermal transmittance shall be specified as the corrected thermal transmittance $U_c = 1/R_t + \Delta U$, where the correction term ΔU is calculated according to EN ISO 6946.

When specific thermal bridges are present, the thermal transmittance, in addition to the normal thermal transmittance U_c, shall be declared in units of W/mK. If relevant, the potential surface condensation risk due to these thermal bridges shall be stated in the ETA (see 4.3.1).

6.6.2 Air permeability

Quantified national building regulations concerning air permeability are related to energy economy in the member states, although there may be no quantified requirements related to

health and the effect on the indoor climate. Requirements on the overall air permeability are related to the completed building (works), and not to separate building parts.

Declaration of the degree of air permeability will normally have to be in qualitative terms, ie that a building based on the the kit will result in adequate airtightness in relation to the intended use, incl. climatic zones, taking into account energy economy and heat retention, risk of cold draughts as mentioned in 4.6.2, and risk of condensation within the construction as mentioned in 4.3.2. When a kit is assessed to be inadequate in certain regions, the limitations on the intended use must be clearly stated in the ETA.

6.6.3 Thermal inertia

The information on total mass per unit area of the main building parts, and on density, specific heat capacity and thermal resistance of relevant materials, shall be declared as a means for the designer to calculate the thermal inertia of the building.

6.7 DURABILITY, SERVICEABILITY AND IDENTIFICATION

6.7.1 Aspects of durability

Possible geographical limitations or climatic zones for the intended use shall be declared in the ETA if the evaluation of durability makes this relevant.

Wood and wood-based products
The adequacy of the hazard classes given in EN 335 (see cl. 5.7.1) shall be declared in the ETA.

Fasteners
The adequacy of the service classes given in ENV 1995-1-1 (see cl. 5.7.2) shall be declared in the ETA.

6.7.2 Aspects of serviceability

Suspended floors shall be calculated to have a minimum stiffness against vibration under traffic loads as specified in Eurocode 5 for residential floors, using the same boxed values for the structural stiffness design as shown in the code.

Maximum deflections at serviceability limit states, applied in the verification of structural capacities related to ER 1, shall be declared in the ETA, when this is relevant for the serviceability or to meet possible national regulations. The deflections shall be given according to the rules in Eurocode 5, cl. 4.3.

6.7.3 Identification

The appropriate identification parameters shall be given in the ETA. See also 9.1.

7 ASSUMPTIONS AND RECOMMENDATIONS UNDER WHICH THE FITNESS FOR USE OF THE TIMBER FRAME BUILDING KIT IS ASSESSED

7.0 GENERAL

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 THE WORKS

7.1.1 Local building regulations

Normally a specification of relevant requirements concerning fire resistance and reaction to fire, sound insulation performance, thermal insulation performance and ventilation provisions shall be elaborated for each delivery as a basis for the production of a kit.

The design process (including the approval of detailed plans, applications for planning permissions, building permits, etc.) must comply with the procedures foreseen in the Member States in which the building is to be built. An ETA for a timber frame building kit does not amend this process in any way.

7.1.2 Structural design

Manufacture of a kit for a particular application shall be made on the basis of a specific structural design for the building (the works) where the kit is to be used. The structural design shall confirm that the actions on the main building parts according to the structural requirements for the works do not exceed the loadbearing capacities of the kit. The structural design shall include specifications of any wind load anchors and other supplementary structural works when these are not a part of the kit, but are essential for the fitness in use of the kit in the works.

7.1.3 Substructure

The maximum required tolerances of the substructure dimensions and levelling should be assessed for the timber frame building kit, and be specified in the ETA.
Requirements concerning damp-proof membranes or other protection against moisture from the substructure shall be specified.

7.1.4 Ventilation

Buildings shall be assumed to be designed to have adequate ventilation rates in relation to the intended use.

7.2 TRANSPORT, STORAGE

A manual for the packaging, transport and storage of the building kit shall be available from the manufacturer, and assessed by the approval body. The manual must in particular cover requirements concerning handling equipment and transportation systems, and means and requirements for protecting the kit from weather exposure and mechanical damage during transportation. Reference to the manual shall be made in the ETA.

7.3 EXECUTION OF WORKS

A general manual for the installation of the kit in the works shall be available from the manufacturer, and shall be assessed by the approval body. The manual shall cover all important aspects related to the site work, such as:

- erection techniques and necessary equipment
- temporary bracing and weather protection
- completion of joints between kit components (structural fixing, weather sealing etc.)
- fixing of wind and any seismic anchorage to the substructure and between building parts
- additional materials and components applied on the site, and which are a precondition for the fitness in use of the kit

As a supplement to the general manual a specific manual which contain special aspects related to each individual building project (e.g. special crane requirements, hoisting strap positions, etc) should normally be required. Reference to the general manual for installation of the kit shall be made in the ETA.

The completed building (the works) must comply with the building regulations (regulations on the works) applicable in the Member States in which the building is to be constructed. The procedures foreseen in the Member State for demonstrating compliance with the building regulations must also be followed by the entity held responsible for this act. An ETA for a timber frame building kit does not amend this process in any way.

7.4 MAINTENANCE AND REPAIR

It is normally assumed that regular maintenance will be required to retain performance and to obtain the estimated working life of the building. The type and frequency of such maintenance shall be specified, and shall be part of the assessment of the kit.

SECTION THREE: ATTESTATION AND EVALUATION OF CONFORMITY (AC)

8 ATTESTATION AND EVALUATION OF CONFORMITY

8.1 EC DECISION

The system of attestation of conformity specified by the Commission decision 1999/455/EC is system 1 described in Council Directive (89/106/EEC) Annex 3 and is detailed as follows:

(a) Tasks for the manufacturer
- Production control
- Audit testing according to prescribed test plan

(b) Tasks for the approved body
- Initial type testing
- Initial inspection of factory and production control
- Surveillance of factory production control
- Product certificate

8.2RESPONSIBILITIES

8.2.1 Tasks for the manufacturer

8.2.1.1 Factory production control (FPC)
All technical information concerning components delivered by other manufacturers, e.q. specifications of components, installation procedures, etc. have to be formally confirmed by the ETA holder. The ETA holder shall keep available an updated list of the manufacturers of such components which contribute to the fulfillment of essential requirements. Copies of this list shall be submitted to the Approved Body and the Approval Body.

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

The production control system for timber frame building kits shall include the following:
- relevant design specifications mentioned in 7.1, including adequate drawings and written instructions
- type, quality and dimensions of all materials and components incorporated in the kit
- positions of structural members in prefabricated elements as being those specified in the ETA
- positions and installation of structural fasteners
- overall dimensions of prefabricated elements, incl. declared tolerances
- installation of thermal and acoustic insulation material
- installation of sheathings, claddings, linings and air- and vapour-control layers
- surface treatments and coverings
- markings for correct position and installation in the works, and special handling devices like hoisting straps for prefabricated elements when relevant
- packaging and transport protection
- installation of windows and door assemblies in external wall panels
- installation of external roof coverings

The production control system shall specify how the control measures are carried out, and at which frequencies.

Manufacturers having an FPC system which complies with EN ISO 9001/2, and which addresses the requirements of the ETA, are recognised as satisfying the FPC requirements of the Directive.

The characteristics of incoming material and components which comply with a harmonised European technical specification, having met the corresponding AC- procedures shall be considered satisfactory and need, except in justified doubt, no further checking.

8.2.1.2 Testing of samples taken at the factory
Testing of samples by the manufacturer is normally not required for timber frame building kits other than visual controls and controls of dimensions etc. mentioned in 8.2.1.1. However, if glued joints are used in structural applications the control system shall include adequate control of a glue laboratory, climatic conditions applicable to the types of glue that are used, and a test plan for such joints.

Tests shall only be carried out on the final product or samples which are representative of the final product.

8.2.1.3 Declaration of conformity
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

Initial Type Testing
If approval tests have been required the tests will be conducted by the approval body or under its responsibility (which may include a proportion conducted by an independent laboratory or by the manufacturer, witnessed by the approval body) in accordance with chapter 5 of this ETAG. The approval body will have assessed the results of these tests in accordance with clause 6 of this ETAG, as part of the ETA issuing procedure.

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

This work shall be validated by the approved body for Certificate of Conformity purposes.

8.2.3 Tasks for the approved body

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, taking into account all the relevant provisions mentioned in 8.2.1.1. The relevant production units shall be specified in the ETA.

The factory production control shall include checks that the relevant design specifications for the production do exist, e.g. structural designs, construction details and manuals for installation as mentioned in chap. 7.

Subsequently continuous surveillance of factory production control is necessary to ensure continuing conformity with the ETA. It is recommended that surveillance inspections are conducted at least twice a year, although this may be reduced to once a year in special cases, e.g. if the manufacturer has proven good product quality over a long period of time.

8.2.3.2 Certification
The approved body shall issue Certification of Conformity of 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 generally form the basis on which the factory production control (FPC) is assessed.

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

(1) The ETA
See section 4 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 factory production control methods. Items listed in cl. 8.2.1.1 should normally be included.

(3) Product and materials specifications
- Structural design criteria
- Construction details (including manufacturing tolerances and drawings of standard construction details according to the supporting document specified in clause 10).
- Specifications and declarations of incoming materials and components
- References to national, European and/or international standards or appropriate specifications
- Manufacturer's datasheets

(4) Test plan
In most cases it will not be necessary to conduct tests on timber frame building kits as part of FPC.

When special tests are required by the approval body (e.g. on glued joints), the manufacturer and the approval body issuing the ETA shall agree an FPC test plan. An agreed test plan is necessary as current standards relating to quality management systems (Guidance Paper B, EN 29002, etc), do not ensure that the product specification remains unchanged, and they cannot address the technical validity of the type 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.

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
The manufacturer and the approval body issuing the ETA shall agree a prescribed test plan in cases where special tests are relevant.

8.4 CE MARKING AND INFORMATION

The ETA shall indicate the information to accompany the CE-marking. According to the EC Guidance Paper D on CE-marking 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 kit
- Indication to clarify the intended use
- Date of the marking
- Number of the EC Certificate of Conformity (A/C-system 1)
- Number of ETA
- Dangerous substances (see clause 5.3.3 of this ETAG)

SECTION FOUR: ETA CONTENT

9 THE ETA CONTENT

9.1 THE ETA CONTENT

The ETA Format (EC Official Journal L.236 of 27.08.1997) states the content in general. The following should be observed in addition:

9.1.1 Specification of materials

The materials and components which constitute the timber frame building kit must be adequately identified, see 5.7.3.

The following table shows some examples of material specifications:

Material/Component	Reference to product specifications such as:
Structural timber	Solid wood, strength classes: EN 338 Glued lam. timber, strength classes: EN 1194 Laminated veneer lumber (LVL): Brand name with national approval
Prefabricated structural timber components	Trussed rafters: EN 1059
Cladding and lining	Relevant product standards
Plasterboards	PrEN 520 or relevant product standards
Wood-based panels	Particleboards: EN 312-1 to 7 - cement bonded: EN 634-1 and 2 Fibreboards: EN 622-1 to 6 Plywood: EN 636-1 to 3 OSB panels: EN 300 or relevant product standards
Thermal insulation	Mineral wool: EN 13163 Type and brand name, and/or relevant standards
Water vapour and wind barriers	Type and brand name, and/or relevant product standards
Roofing materials	Type and brand name, and/or relevant product standards
Roof sarking	Type and brand name, and/or relevant product standards
Mechanical fasteners	Timber connectors: EN 912 Punched metal plates: Relevant approvals Metal ties etc.: EN 10147
Structural glues	Type and brand name, and/or relevant approvals

9.1.2 Drawings

The ETA document shall include section drawings of the building parts. The purpose of the drawings is to illustrate the general build-up of the kit, ie structural system and loadbearing components, insulation layers, claddings etc. Material specifications may also be shown directly in these drawings of the kit.

In addition, the kit shall also be described by a set of construction details as specified in 9.1.7. These drawings shall be a formal part of the approval, but are presented in a supporting document and not in the ETA itself.

If required by the manufacturer it should be allowed to keep some design details 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 kit and the evaluation of conformity performed by the approved body.

9.1.3 Product characteristics

The performances of the timber frame building kit related to the requirements and methods of verification and assessment mentioned in chapters 4, 5 and 6 shall be clearly stated. When a kit includes optional designs like a set of standard dimensions (thermal insulation thicknesses, loadbearing members etc.) it may be convenient to express the characteristics in table form.

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

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

9.1.4 Packaging, storage and transport

Special provisions concerning packaging, storage and transport which are essential for the use of the kit shall be given in the ETA.

9.1.5 Erection details

The ETA shall include particular preconditions linked to the erection details of the timber frame system, which the approval body finds to be of special importance. This may be requirements related to the substructure, completion of element joints on site, wind load anchors, roof bracings etc (see also 7.3).
Reference to the manufacturer’s general erection manual shall be made.

9.1.6 Estimated working life

The minimum estimated working life of the structural frame and the parts of the exterior envelope shall be stated.

9.1.7 Maintenance

Basic maintenance of the exterior envelope necessary to obtain the minimum estimated working life of the cladding and the roofing, shall be specified (see also 7.4).

9.1.8 Supporting documents

A set of drawings showing the essential construction details of the kit shall form a supporting document as a formal part of the ETA. The purpose of this document is to provide the necessary detailed description of the timber frame building kit, including the assembly details on site and the conditions for the installation of the kit in the works. The current version of this document shall at all times be kept by the approval body and the approved inspection body.

The set of construction details shall describe the general design of the building kit, including joints between main building parts and joints related to integrated components. The detail drawings shall form the necessary documentation for assessing all the performance requirements specified in chapter 4, including weather resistance and air permeability.

Only the most essential construction details, which are directly related to the main building parts, and which are the pre-designed standard details for the kit, shall be included. Annex C shows a checklist of the details normally required.

9.2 ADDITIONAL INFORMATION

It shall be stated in the ETA whether or not any additional (possibly confidential) information shall be supplied to the approved body for the attestation of conformity.

ANNEX A

COMMON TERMINOLOGY AND ABBREVIATIONS

1. Works and products

1.1 ***Construction works (and parts of works)*** (often simply referred to as “works”) (ID1.3.1)
Everything that is constructed or results from construction operations and is fixed to the ground. (This covers both building and civil engineering works, and both structural and non-structural elements).

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 and components of prefabricated systems or installations.)

1.3 ***Incorporation*** (of products in works) (ID 1.3.1)
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 fulfilment 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 ***Kit*** (EC Guidance Paper C)
Construction product consisting of at least two separate components that need to be put together to be installed permanently in the works (Further clarified for the purpose of this ETAG in the Scope, chap. 2, and in the boxed wording from the Mandate reproduced in the Foreword).

2 Performance

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-magnetic) 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 fulfilment 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 fulfilment 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 fFee Trade Association
EN:	European Standard
FPC:	Factory production control
ID:	Interpretative documents of the CPD
ISO:	International Standardisation Organisation
SCC:	Standing Committee for Cconstruction of the EC.

Concerning approval:

EOTA:	European Organisation for Technical Approval
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

Verification of loadbearing capacity

EN 380:1993 *Timber structures - Test methods - General principles for static load testing*
EN 594:1995 *Timber structures - Test methods - Racking strength and stiffness of timber frame wall panels*
EN 595:1995 *Timber structures - Test methods - Test of trusses for the determination of strength and deformation behaviour*
EN 596:1995 *Timber structures - Test methods - Soft body impact test of timber framed walls*
EN 1059:1999 *Timber structures - Product requirements for fabricated trusses, using punched metal plate fasteners*
EN 1195:1997 *Timber structures - Test methods - Performance of structural floor decking*
prEN 12871:2000 *Wood-based panels –Performance specifications and requirements for load bearing boards in floors, walls and roofs*
ENV 1991-1:1994 *Eurocode 1: Basis of design and actions on structures - Part 1: Basis of design*
ENV 1991-2-1:1995 *Eurocode 1: Basis of design and actions on structures - Part 2-1: Actions on structures - Densities, self-weight and imposed loads*
ENV 1991-2-3:1995 *Eurocode 1: Basis of design and actions on structures - Part 2-3: Actions on structures - Snow loads*
ENV 1991-2-4:1995 *Eurocode 1: Basis of design and actions on structures - Part 2-4: Actions on structures - Wind actions*
ENV 1995 1-1:1993 *Eurocode 5: Design of timber structures - Part 1-1: General rules and rules for buildings*
ENV 1998-1-3:1995 *Eurocode 8: Design provisions for earthquake resistance of structures - Part 1-3 General rules – Specific rules for various materials and elements*

Verification of fire resistance and reaction to fire

ENV 1991-2-2:1995 *Eurocode 1: Basis of design and actions on structures - Part 2-2: Actions on structures - Actions on structures exposed to fire*
ENV 1995-1-2:1994 *Eurocode 5: Design of timber structures - Part 1-2: General rules - Structural fire design*
prEN 1187:2001 *External fire exposure of roofs*
prEN 13501-1:2000 *Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests*
prEN 13501-2:2000 *Fire classification of construction products and building elements – Part 2: Classification using data from resistance to fire tests (excluding products for use in ventilation systems)*

Verification of water vapour permeability and moisture resistance

prEN 12572:2000 *Hygrothermal performance of building maetrials and products - Determination of Water Vapour Transmission Properties (ISO/FDIS 12572:2000)*
prEN 13788:1997 *Hygrothermal performance of building components and building elements – Estimation of internal surface temperatures to avoid critical surface humidity and calculation of interstitial condensation (ISO/DIS 13788:1997)*

Verification of watertightness

EN 1027:2000 *Windows and doors - Water tightness - Test method*
EN 12155:2000 *Curtain walling - Water tightness - Laboratory test under static pressure*
prEN 12865-1 *Hygrothermal performance of buildings – Determination of resistance to driving rain under pulsating air pressure – Part 1: External wall systems*
NT BUILD 058 *Walls in bathrooms: Watertightness and resistance to water and moisture. Edition 3 1998*
NT BUILD 230 *Bathroom floors: Watertightness. Edition 2 1995*
NT BUILD 448 *Wall coverings and bushings for water pipes and taps in bathrooms: Watertightness. Edition 1 1996*

Verification of release of dangerous substances

EN 120:1992 *Wood based panels - Determination of formaldehyde content - Extraction method called the perforator method.*

Verification of safety in use

ISO 7892:1988 *Vertical Building Components - Impact Resistance - Impact Bodies and general Test Procedures*
ISO/DIS 7893:1990 *Performance Standards in Building - Partitions made from Components - Impact Resistance Tests*

Verification of sound insulation performance

ISO 140-4:1999 *Acoustics - Measurement of sound insulation in buildings and of building elements – Part 4: Field measurements of airborne sound insulation between rooms*
ISO 140-5:1999 *Acoustics - Measurement of sound insulation in buildings and of building elements – Part 5: Field measurements of airborne sound insulation of facade elements and facades*
ISO 140-7:1999 *Acoustics - Measurement of sound insulation in buildings and of building elements – Part 7: Field measurements of impact sound insulation of floors*
ISO 354:1985 *Acoustics – Measurement of sound absorption in reverberation room*
ISO 717-1:1996 *Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation*
ISO 717-2:1996 *Acoustics - Rating of sound insulation in buildings and of building elements - Part 2: Impact sound insulation*
prEN 12354-1:1999 *Building acoustics - Estimation of acoustic performance of buildings from the performance of elements – Part 1: Airborne sound insulation between rooms*
prEN 12354-2:1999 *Building acoustics - Estimation of acoustic performance of buildings from the performance of elements – Part 2: Impact sound insulation between rooms*
prEN 12354-3:1999 *Building acoustics - Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound*

Verification of thermal insulation

EN ISO 6946:1996 *Building components and building elements - Thermal resistance and thermal transmittance- Calculation method (ISO 6946:1996)*
EN ISO 8990:1996 *Thermal insulation – Determination of steady-state thermal transmission – Calibrated and guarded hot box (ISO 8990:1994)*
EN ISO 10077-1 *Thermal performance of windows, doors and shutters – Calculation of thermal transmittance – Part 1: Simplified method*
EN ISO 10211-1:1995 *Thermal bridges in building construction - Heat flows and surface temperatures –Part 1: General calculation methods (ISO 10211-1:1995)*
prEN ISO 10211-2:1999 *Thermal bridges in building construction - Heat flows and surface temperatures –Part 2: Calculation of linear thermal bridges (ISO/FDIS 10211-2:1999)*
EN ISO 10456:1999 *Thermal insulation - Building materials and components - Determination of declared values and design thermal values*
EN 12524:2000 *Building materials and products – Hygrothermal properties – Tabulated design values*

Verification of air permeability

ISO 9972:1996 *Thermal insulation - Determination of building airtightness - Fan pressurization method*
EN 1026:2000 *Windows and doors - Air permeability - Test method*
EN 12114:2000 *Thermal performance of buildings - Air permeabilityof building components and building elements – Laboratory test method*

Verification of durability of wood products

EN 335-1:1992 *Durability of wood and wood based products - Definition of hazard classes of biological attack – Part 1: General*
EN 335-2:1992 *Durability of wood and wood based products - Definition of hazard classes of biological attack – Part 2: Application to solid wood*
EN 335-3:1995 *Durability of wood and wood based products - Definition of hazard classes of biological attack – Part 3: Application to wood-based panels*

EN 351-1:1995 *Durability of wood and wood based products - Preservative-treated solid wood - Part 1: Classification of preservative penetration and retention*
EN 350-2:1994 *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 in Europe*
EN 460:1994 *Durability of wood and wood based products - Natural durability of solid wood - Guide to the durability requirements for wood to be used in hazard classes*
EN 599-1:1996 *Durability of wood and wood based products - Performance of preventive wood preservatives as determined by biological tests - Part 1: Specification according to hazard class*
EN 599-2:1995 *Durability of wood and wood based products - Performance of preventive wood preservatives as determined by biological tests - Part 2: Classification and labelling*
EN 10088-2:1995 *Stainless steels – Part 2: Technical conditions for sheet/plate and strips for general purposes*
EN 10147:2000 *Continously hot-dip Zinc coated structural steels strip and sheet – Technical delivery conditions*

ANNEX C

CHECKLIST FOR PRINCIPAL CONSTRUCTION DETAILS

General

1. Global structural system

External walls

1. Vertical cross section of the walls with all layers
2. Horizontal cross section of the walls with all layers
3. Typical view of structural frame with positions of studs, plates, lintels, incl. openings
4. Horizontal racking resistance system
5. System for wall ties and uplift anchors
6. Horizontal cross section of joints between prefabricated elements, including corner joints
7. Vertical cross section of joint between exterior wall and foundation/ground floor
8. Vertical cross section of joints between exterior wall and suspended floors
9. Vertical cross section of joints between ext. wall and roof, both at gables and facades
10. Basic design of joints between wall and windows/doors
11. Fire stops

Internal walls

1. Horizontal cross section of the walls with all layers
2. Typical view of structural frame with positions of studs, plates, lintels, incl. openings
3. Horizontal racking resistance system
4. Vertical cross section of joint between wall and foundation/ground floor
5. Vertical cross section of joints between wall and suspended floors

Separating walls between house units

1. Horizontal cross section of the walls with all layers
2. Typical view of the structural frame with positions of studs and plates
3. Horizontal racking resistance system
4. Horizontal cross section of joints between prefabricated elements
5. Vertical cross section of joint between wall and foundation/ground floor
6. Vertical cross section of joints between wall and suspended floors
7. Vertical cross section of joints between wall and roof structure
8. Position of fire stops in voids between double wall leafs

Suspended floors

1. Vertical cross section of the floors with all layers
2. Horizontal plan of structural system with positions of joists, blockings, etc.
3. Structural system for floor openings
4. Detail of possible structural joist splices
5. Vertical cross section of element joints
6. Vertical cross section of support details on foundations and walls

Roofs

1. Vertical cross section of complete roof structure with all layers
2. Plan of structural system with positions of rafters and possible intermediate supports
3. Structural system for openings to attics
4. Basic design of joints around ducts, pipes, chimneys, etc penetrating the roof
5. Vertical cross section of support details at exterior walls and intermediate supports
6. Vertical cross section of element joints
7. Basic design of joints between roof and roof windows