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ETAG 015

GUIDELINE FOR
EUROPEAN TECHNICAL APPROVAL

of

THREE-DIMENSIONAL NAILING PLATES

Edition November 2012

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

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

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

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

This edition replaces edition September 2002 of ETAG 015

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1 SCOPE OF THE ETAG

1.1 Definition of the construction product

This Guideline covers preformed three-dimensional metal nailing plates made of steel or aluminium with specified fasteners.

The specified fasteners include for example nails, screws, bolts, pins and dowels.

This ETAG is intended to cover all types of three-dimensional nailing plates, a non-exhaustive list of examples of which are given in Figure 1 and possible configurations are given in Figure 2. If, however, a particular nailing plate cannot be adequately covered by the provisions of this ETAG, the consensus procedure described in section 1.5 may be followed.

This ETAG only covers products with a surface or coating covered by EC Decision 96/603/EC, amended by EC Decision 2000/605/EC (reaction to fire class A1 without testing).

The ETAG does not cover:

- products covered by Mandate M112 to CEN for 'Structural timber products and ancillaries',
- joist hangers covered by Mandate M116 to CEN for 'Masonry and related products' (as 'ancillary components'),
- use of three-dimensional nailing plates in pile foundations. Such use is defined in the Mandate addressed to EOTA, but there is no history of use of these products for this purpose.

The ETAs issued may cover either:

- the three-dimensional nailing plate and the fasteners. Both the three-dimensional nailing plates and the fasteners are marketed and supplied by the ETA holder who takes full responsibility for the products,

or

- the three-dimensional nailing plate only, but giving a specification for the fasteners by trade name, performance criteria, dimensional criteria or reference to a technical specification.

Note: If a three-dimensional nailing plate is supplied with fasteners, this should be classified as a kit. However, this document will only refer to the product.

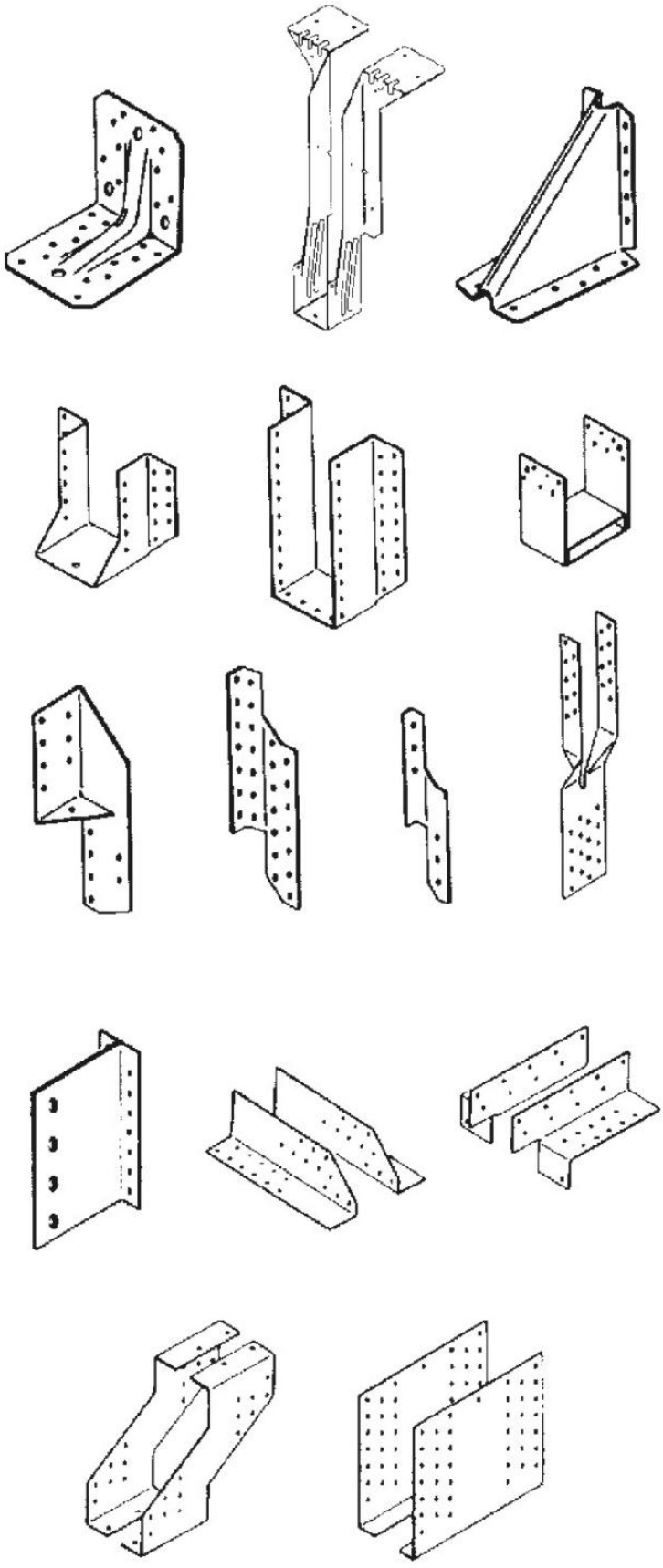
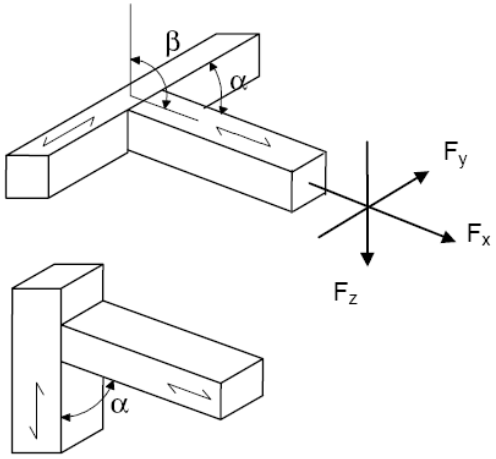
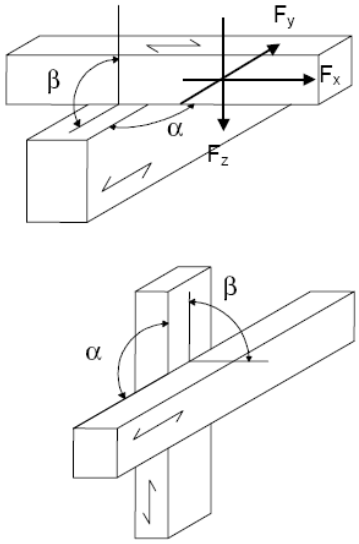


Figure 1 – Examples of three-dimensional nailing plates



Arrangement and loading of timber members with end-grain to side-grain



Arrangement and loading of timber members with side-grain to side-grain

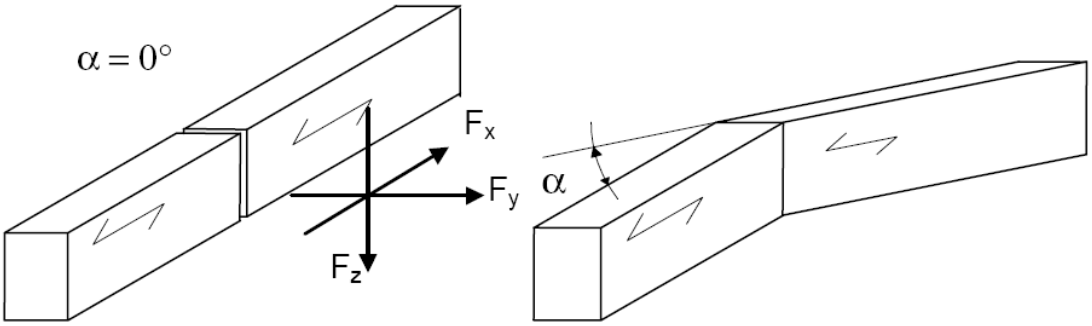


Figure 2 – Possible configurations of timber members

1.2 Intended use of the construction product

This ETAG covers three-dimensional metal nailing plates with specified fasteners for use as connections in loadbearing timber structures and their supports, for which a load-carrying capacity and, where appropriate, a stiffness will be declared.

1.3 Assumed working life of the construction product

The provisions and the verification and assessment methods included or referred to in this ETAG have been written based upon the assumed working life of the three-dimensional nailing plate for the intended use of 50 years when installed in the works, provided that the three-dimensional nailing plate is subject to appropriate installation, use and maintenance (see section 4.4). These provisions are based upon the current state of the art and the available knowledge and experience.

"Assumed working life" means that, when an assessment following the ETAG provisions is made, and when this working life has elapsed, the real working life, in normal use conditions, may be considerably longer without major degradation affecting the Essential Requirements.[1]

The indications given of parameters (materials and/or coating or service class(es)) related to the working life of the construction product cannot be interpreted as a guarantee given by the product manufacturer or his representative or the Approval Body issuing the ETA, but are regarded only as a means for choosing the appropriate products in relation to the expected economically reasonable working life of the works (see section 5.2.2 of the Interpretative Documents).

The assessment of durability of the three-dimensional nailing plate shall be based on the materials specification[2] given in the ETA and the recommendations of EN 1995-1-1.

1.4 Terminology

1.4.1 Common terms relating to the Construction Products Directive

For the meaning of these terms see EOTA document *Common terms used in Guidelines for European Technical Approval* published on the EOTA website.

1.4.2 Specific terms used in this ETAG

1.4.2.1 Unless otherwise stated, the terminology used in EN 1995-1-1 applies.

1.4.2.2 The modified characteristic load-carrying capacity $X_{k,mod}$ is the 5% fractile in the distribution of the load-carrying capacity for the stated relevant load duration and service class. It is equal to $k_{mod}X_k$ as given in EN 1995-1-1.

1.4.2.3 Wane – original rounded sapwood surface of a log, without bark, on any face or edge of sawn timber.

1.4.2.4 Square-edged timber – sawn timber of rectangular cross-section, with wane, if permitted, not exceeding a specified amount.

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1 The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject and the particular conditions of the design, execution, use and maintenance of that works may be outside the scope of this ETAG. Therefore, it cannot be excluded that, in these cases, the real working life of the product may also be shorter than the assumed working life.

2 The three-dimensional nailing plate material shall be specified in accordance with the definitions given in EN 1995-1-1.

1.4.2.5 Connection – joint

Note: The Mandate and EN 1995-1-1 make reference to 'joints', accordingly, this Guideline uses 'joints' rather than the equivalent term 'connections'.

1.5 Procedure in the case of a significant deviation from the ETAG

The provisions of this ETAG apply to the preparation and issue of European Technical Approvals in accordance with Art. 9.1 of the Construction Products Directive (CPD) and section 3.1 of the Common Procedural Rules.

In cases in which a certain provision of this ETAG is not or not fully applicable or a particular aspect of a product and/or intended use to be assessed is not or not sufficiently covered by the methods and criteria of the ETAG, the procedure of Art. 9.2 of the CPD and section 3.2 of the Common Procedural Rules may apply with regard to the deviation or aspect concerned.

2 ASSESSMENT OF FITNESS FOR USE

2.1 Meaning of "fitness for use"

"Fitness for (the intended) use" of a construction product means that the product has such characteristics that the ***works*** in which it is to be incorporated ***can***, if properly designed and built:

1. ***satisfy*** the Essential Requirements when and where such works are subject to regulations containing such requirements (CPD Art. 2.1), and
2. ***be fit*** for their intended use, account being taken of economy, ***and*** in this connection ***satisfy*** the Essential Requirements for an economically reasonable working life, if normally maintained (see CPD Annex I, sentences 1 and 2).

Where the connector is fastened with fasteners in a long alignment perpendicular to the grain of wood members with the grain running essentially in one direction such as solid wood members, glued laminated timber, glued solid timber moisture, induced deformations, such as shrinkage and swelling, will result in an uneven distribution of slip over the fasteners in the connection resulting in a risk of a zipper like failure. The assessment of this effect shall be done considering the expected moisture variations of the construction and the ductility of the fastener connection.

2.2 Elements of the assessment of fitness for use

The assessment of the fitness of a construction product for its intended use includes:

- the identification of the characteristics of the product which are relevant to its fitness for use (in the following referred to as "regulatory characteristics"),
- the establishment of methods for the verification and assessment of the regulatory product characteristics and the expression of the respective product performances,
- the identification of such regulatory characteristics to which the option "No Performance Determined" applies for the reason that, in one or more Member States, they are not relevant for the fulfilment of the requirements applicable to the works,
- the identification of such regulatory characteristics for which limit values (threshold values) have to be respected for technical reasons.

The load-carrying capacity and the stiffness of the connections shall be determined considering the diameter of the holes in the connector and the diameter or side length of the fasteners.

2.3 Relationship of requirements to the product characteristics and methods of verification and assessment

The product characteristics, methods of verification and assessment criteria which are relevant for the fitness of the three-dimensional nailing plate for the intended use referred to in section 1.2 are given in Table 1.

Table 1 – Product characteristics and methods of verification and assessment

No	Product characteristic	Option "No Performance Determined"	Method of verification and assessment	Expression of product performance
Essential Requirement 1 Mechanical resistance and stability				
1	Joint strength	No	See sections 2.4.1.1 and 2.4.1.2	Numeric value(s)
	Joint stiffness	Yes		Numeric value(s) or NPD
	Joint ductility	Yes		Numeric value(s) or NPD
Essential Requirement 2 Safety in case of fire				
2	Reaction to fire	No	See section 2.4.2.1	Class A1 according to EC Decision 96/603/EC, amended by EC Decision 2000/605/EC
3	Resistance to fire	Yes	See section 2.4.2.2	Classification according to EN 13501-2 or NPD
Essential Requirement 3 Hygiene, health and environment				
4	Release of dangerous substances	Yes	See section 2.4.3	(*)
Essential Requirement 4 Safety in use				
Not relevant				
Essential Requirement 5 Protection against noise				
Not relevant				
Essential Requirement 6 Energy economy and heat retention				
Not relevant				
General aspects relating to fitness for use(**)				
5	Resistance to corrosion and deterioration	No	See section 2.4.	Service class and admissible corrosivity category or type and thickness of coating or steel grade in the case of stainless steel
6	Dimensional stability	No	See section 2.4.	

(*) NPD option regarding ER3: For the meaning of the npd option regarding ER3, see EOTA TR 034 "General Checklist for ETAGs/CUAPs/ETAs - Content and/or release of dangerous substances in products/kits"

(**) Aspects of durability and economy of the works (see CPD, Annex 1, sentences 1 and 2) which are not dealt with under Essential Requirements 1 to 3. Such aspects are also referred to as "serviceability".

2.4 Product characteristics which are relevant for the fitness for use

ESSENTIAL REQUIREMENT 1: MECHANICAL RESISTANCE AND STABILITY

2.4.1 Joint strength, joint stiffness and joint ductility

2.4.1.1.0 Method of verification

Three-dimensional nailing plate joints may be designed to resist forces with specified positions and/or moments in several directions.

The mechanical resistance and stability of three-dimensional nailing plates can be verified using:

- calculation,
- calculation assisted by testing,
- testing.

The force and moment capacity shall be determined for deformations of the timber members similar to those of the structures in which they are intended for use.

The manufacturers shall specify either the strength class according to EN 338 or the species, grade and surface finish of the timber or structural timber composite.

The possible existence of wane shall be considered. If wane is allowed, the maximum extent of wane allowed in the specification shall be used in the calculations or testing.

The support and restraint conditions shall be those specified by the manufacturer.

The support and restraint conditions for the members are critical to the performance and hence the characteristic loads of the three-dimensional nailing plate, and shall reflect the declared intended use.

The manufacturer shall specify any assumptions regarding preparation of timber members, e.g. pre-drilled holes, tolerance on hole diameter and any special installation/maintenance provisions, e.g. retightening of bolts.

The mechanical resistance and stability shall be determined taking into consideration the gaps between the timber members that can occur in practice. For side-grain to side-grain connections it can normally be assumed that the timber members are brought close together without any gap. For end-grain to end-grain and for end-grain to side-grain connections the maximum permitted size of the gap shall be considered and, in no case, shall be smaller than 3 mm between mating faces (timber-timber or timber-three-dimensional nailing plate). To avoid the possibility of failure by a zipper effect, failure of the fasteners shall not take place by head tear-off.

In seismic zones, a dissipative structural behaviour may be assumed if an appropriate low-cycle fatigue behaviour of the joints is verified by cyclic testing in accordance with EN 12512, as required by EN 1998-1:2004.

2.4.1.1.1 Calculation

2.4.1.1.1.1 General

Calculations can be used as the means of assessment if the three-dimensional nail plate is of a ductile material and if either of the following conditions is fulfilled:

- the static behaviour of the joint is ductile and if the components of the joint have a ductile force-deformation behaviour,

- if the static behaviour of the mechanical fasteners (nails or screws) is brittle, e.g. pull-out, then the force distribution over these shall be determined statically or based on a conservative assumption.

Note: Three-dimensional nailing plates of steel in accordance with EN 10088-2:2005 or EN 10346:2009, with a 0,2 % proof strength ≤ 350 N·mm^{-2} may be regarded as ductile.

The calculations shall be carried out in accordance with the relevant parts of EN 1993, EN 1995, EN 1998 and EN 1999 as applicable.

The calculations shall be based on the characteristic material properties for the appropriate load duration and service class, calculated in accordance with EN 1995-1-1 using the factor k_{mod}.

Where relevant, the deformations of the connection shall be calculated as described in EN 1995-1-1 and in accordance with load levels given in EN 26891:1991.

The values of the instantaneous slip modulus K_{ser} given in EN 1995-1-1 may be used in the calculations.

Examples of methods which may be used for calculations are given in EOTA Technical Report TR015 *Principles for the static calculation of connections made with three-dimensional nailing plates, with examples*. A worked example is given in EOTA Technical Report TR017 *Worked example calculation of characteristic load-carrying capacities of 90° angle bracket with a rib*.

2.4.1.1.1.2 Properties of materials and components

The properties of the materials and the components of the three-dimensional nailing plate joints shall be specified preferably by reference to the relevant ENs.

For the steel or aluminium parts, the specified yield stresses and the ultimate stresses shall be documented.

If the static model provides for withdrawal of the nails or screws from the wood, tensile failure in the steel or aluminium cross-section shall not occur (head tear-off or tear-off in the area of thread). It shall be documented by testing (see section 2.4.1.1.3.2.4) that this requirement is satisfied.

For the nails, screws, dowels, bolts, pins or other fasteners subjected to lateral load or to axial load the load-carrying capacities and the stiffness shall be determined either from the methods given in EN 1995-1-1 or from tests (see section 2.4.1.1.3.1.3).

2.4.1.1.1.3 Static models

2.4.1.1.1.3.1 The calculation of the nailing plate joints shall take into account the internal forces and the deformations of the timber members, which come from the global analysis of the structure. The deformation of the connected timber members and the components in the three-dimensional nailing plate connection shall be assumed compatible with those from the global analysis of the structure.

The analysis of a three-dimensional nailing plate joint shall take into account the static behaviour of all parts, which constitute the joint.

2.4.1.1.1.3.2 Equilibrium shall be fulfilled in any part of the joint. If used, the finite element analysis shall comprise the three-dimensional nailing plate, the fasteners, the connected members and the supports, if any. All eccentricities shall be considered.

2.4.1.1.1.3.3 It shall be documented that the internal forces in the three-dimensional nailing plate joints are less than or equal to the capacities.

2.4.1.1.1.3.4 The limited deformation capacity of the components in the three-dimensional nailing plate joints shall be considered.

For threaded nails and screws subjected to a lateral force and having a penetration depth $l > 9d$, where d is the diameter of the nail or screw as defined in EN 1995-1-1; an elastic-plastic behaviour may be assumed.

For threaded nails and screws subjected to an axial force, a brittle failure shall be assumed.

Axially loaded nails or screws, with even a small difference in the axial deformation, shall be assumed to have dissimilar axial forces.

2.4.1.1.2 Calculation assisted by testing

2.4.1.1.2.1 General

The principles described in section 2.4.1.1.1 apply.

Calculation assisted by testing comprises:

- verification of the static model,
- determination of properties of the component by test or by declared and documented values as input data for the static model, e.g. the yielding moment of an embossed nailing plate section

2.4.1.1.2.2 Scope of testing and calculations

2.4.1.1.2.2.1 The scope of the testing is to verify or calibrate a theoretical static model of the three-dimensional nailing plate connections and to derive properties where calculation is not practical or possible for particular properties.

The model shall reflect the actual static behaviour.

It can be assumed that the verification has been carried out if the theoretical static model – possibly with some efficiency factors – can describe the static behaviour of the three-dimensional nailing plate connections.

A static model for the ultimate load-carrying capacity of the joint can only be assumed to be verified, if the model for the load-carrying capacities of the connection components can predict the load-carrying capacity of the connection.

2.4.1.1.2.2.2 The static model shall be verified for the type of forces in the joint and for the range of their position.

The model shall be verified for the range of eccentricities to be used in the calculations.

The verification shall give special consideration to the case of axial loaded nails or screws. From the verification tests, it shall be possible to establish either the effective number of nails or screws or the effectiveness of the nails or screws.

2.4.1.1.2.2.3 For three-dimensional nailing plates with special cross-sections or varying cross-sections, e.g. pressed or deformed cross-sections, the bending capacity of the three-dimensional nailing plate cross-sections can be determined by testing (see section 2.4.1.1.2.3.4).

2.4.1.1.2.2.4 For three-dimensional nailing plates incorporating screws parallel to grain into end–grain, the following shall be considered:

- the effects of splitting due to variations in moisture content,
- the number of fasteners,
- length and diameter of fasteners,
- the need to validate the model by tests of the whole joint.

The load-carrying capacity of the joint shall not be sensitive to cracking in the timber.

These conditions will be satisfied if:

- the use is limited to service class 1 for screws without pre-drilled holes and service class 1 and 2 for screws with pre-drilled holes,
- a minimum of six screws into end grain are used when the holes are not pre-drilled or minimum three screws when the holes are predrilled,
- the minimum length of fastener is 50 mm,
- the minimum diameter of fastener is 4 mm and maximum 8 mm, however maximum 10 mm when the holes are pre-drilled,
- confirmatory testing on the joint is carried out,
- the moisture content at fabrication is below 18 %.

2.4.1.1.2.3 Testing of properties

2.4.1.1.2.3.1 The requirements of section 2.4.1.1.3 apply.

2.4.1.1.2.3.2 Tests to determine the moisture content and density of the timber shall be carried out in accordance with the relevant test standards referenced in EN 1995-1-1 or the relevant materials standards.

2.4.1.1.2.3.3 Tests to determine the relevant properties related to the metal components shall be carried out in accordance with the relevant test standards referenced in EN 1993-1-1 or EN 1999-1-1 or in their supporting standards.

2.4.1.1.2.3.4 Testing of the bending capacity of three-dimensional nailing plates with profiled cross-sections shall be carried out in a way that the bending of the three-dimensional nailing plate corresponds to the actual moment distribution of the three-dimensional nailing plate in the connection.

Note: The three-dimensional nailing plate may be clamped by bolts in the nail holes, and subjected to the force causing bending by a tension rod through a hole in the three-dimensional nailing plate, as shown in Figure 3.

By applying the force in the downward or upward direction, a bending moment can be applied to the three-dimensional nailing plate with tension or compression stresses in the deformed part of the cross-section as would occur in the actual connection.

By applying the force with one or a few eccentricities, a curve of the bending capacity of the flange of the three-dimensional nailing plate can be determined. The plot of the bending capacity will consist of several straight lines determined from the tests with different eccentricity.

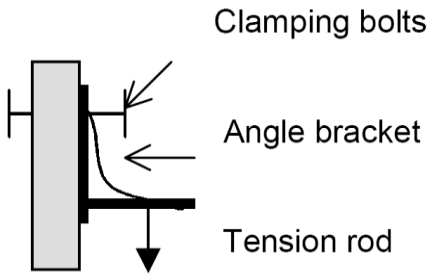

Figure 3 – Example of test assembly

2.4.1.1.3 Testing

2.4.1.1.3.1 General

Testing for joint strength and stiffness shall be in accordance with EN 26891:1991 and testing for joint ductility in cyclic conditions shall be in accordance with EN 12512.

The tests shall simulate the behaviour of the joint under practical conditions, and the loading, support and constraint conditions used in the test shall model those that apply in practice. As EN 26891:1991 is a general document, and due to the large variation in product types covered in this Guideline, it is not possible to set rules for each type. The general principles, which shall be adopted for the tests, are given below. Examples are given in EOTA Technical Report TR016 *Method of Testing Three-Dimensional Nailing Plates, with examples*. Further examples will be added as the need arises. These recommendations are based on the work of RILEM TC169-MTE who are continuing to develop test methods for three-dimensional nailing plates:

(1) Determine cross-sections of primary and secondary members according to intended purpose and function and use these members in full scale during the tests.

(2) Choose the test configuration to avoid failure due to effects outside the scope, e.g. failure due to tension perpendicular to the grain in the timber, bending failure of the secondary member, bearing failure at the loading points shall not be present.

(3) Choose the test configuration of the secondary member such that the deformation of the connection in the test zone reflects the intended use.

(4) Avoid undue influence arising from the method of load application and member support which defines the intended purpose and function, e.g. loading shall only be applied in the connected area if this covers the intended use.

(5) Make sure that the load transmission principles within the arrangement are determinable, e.g. by using additional load cells to determine the exact load transferred by the connection; if relevant, the mass of the test equipment shall be taken into account in the recorded data.

(6) Measure the relative displacements between the members and take into consideration that undesirable influences are avoided by fixing the transducers at points away from the expected failure zone; place the transducers on either side of the specimen and average the results to take into account any distortion of the members.

(7) Take into account that practical tolerances in the fit between the connected members can influence the load-carrying capacity of the connection, e.g. by arranging appropriate gaps between the members.

(8) Assemble the test pieces with the timber at an equilibrium moisture content corresponding to 20 ± 2 °C and 85 ± 5 % relative humidity, condition the assembly to 20 ± 2 °C and 65 ± 5 % relative humidity until just before testing, and measure the moisture content at the time of testing. For engineered wood products conditioning at 20 ± 2 °C and 85 ± 5 % relative humidity before assembly is not necessary. Other conditioning regimes shall be considered on a case-by-case basis and be reported in the ETA.

(9) Determine and record the relevant specifications of the materials, e.g. the quality or grade of the timber, the specifications and dimensions of the metalwork and other fasteners, and mention in the test report that the test results do not necessarily apply to other types of metalwork or timber.

(10) A comprehensive record of load-deformation behaviour shall be made for each variable of interest.

2.4.1.1.3.2 Materials and properties

The extent of testing depends on the type of documentation of load-bearing capacities:

- For calculations, the load-bearing capacities of the ancillary components are needed.
- For calculation assisted by testing, the capacities of the components of the joint are needed to verify the static model.
- For modification of the test results of the particular joint capacities, the load-carrying capacities of the ancillary components and the strength properties of the three-dimensional nailing plate are needed.

2.4.1.1.3.2.1 Timber and wood-based materials

The timber shall be selected in accordance with the method given in EN ISO 8970. The densities for species are taken from EN 338.

Unless otherwise specified by the manufacturer, the tests shall be carried out using European Whitewood (*Picea abies*).

Wood-based materials shall be selected in a similar manner to that for timber.

For a group of similar test pieces, separate planks shall be used for each test piece.

The members shall be free from major defects in the area of the three-dimensional nailing plates. However, where wane is allowed, the test shall be conducted with the maximum extent of wane (artificially produced by cutting if necessary) allowed by the specification, as described in section 2.4.1.1.0.

The moisture content and density of the timber shall be determined as specified in ISO 3130 or EN 13183-2 and ISO 3131 respectively, as appropriate.

2.4.1.1.3.2.2 Three-dimensional nailing plates

The relevant characteristic properties (e.g. ultimate tensile strength, yield stress and elongation) of the metal used to manufacture the three-dimensional nailing plates, taken from the coil or strip used in manufacture, shall be determined using standard test procedures (e.g. EN ISO 6892-1). These data are required to establish the extent to which the properties of the metal used in the fabrication of the samples for test differ from the minimum properties specified.

The test samples shall be representative of production and shall be drawn at random. Prototype samples may be used where it is possible to demonstrate that the characteristics of performance are representative of products from the full production process.

Most three-dimensional nailing plates are produced in a range of sizes; the sizes of three-dimensional nailing plates to be used in the various tests shall be selected in such a way that the strength and stiffness of the complete range may be obtained by interpolation provided the failure mechanism is the same.

2.4.1.1.3.2.3 Associated ancillary components

For the nails or the screws subjected to lateral load or to axial load, the load-carrying capacities and the stiffness shall be determined from the tests described in EN 1380, EN 1382, EN 1383:1999 and EN 26891:1991. The tests shall be conducted with relevant timber species with density according to EN ISO 8970.

The ancillary components used in the tests shall be representative and shall be drawn at random.

2.4.1.1.3.2.4 Tensile capacity of nails or screws

The tensile capacity of the nail or screw (head tear-off or tear-off in the area of thread) shall be determined in conformity with Figure 4 of EN 1383:1999. Instead of the timber or wood-based panel, a steel panel shall be used supplied with a pre-drilled hole for the nail or screw. The diameter of the drill hole in the steel plate shall exceed the external diameter d_1 of the profiled part of the shaft of the nail, or the threaded part of the screw, by approximately 0,1 mm. The area of transition from profiled/threaded part to smooth part of shaft shall be located within the free length of testing and shall have a clear distance from the jaws of the testing equipment of at least $3 \bullet d_1$.

The rate of loading shall be chosen so that failure load (ultimate load) is reached within 10 s ± 5 s.

From the test results, the characteristic tensile capacity of the nail or screw shall be calculated in accordance with the principles given in EN 1995-1-1.

Note: Test methods for connections made with nails and screws are specified in EN 1380, EN 1382 and EN 1383:1999. The tensile capacity (head tear-off and tear-off in the area of thread) of nails and screws is not covered by these standards.

2.4.1.1.3.2.5 The nails, screws, dowels, bolts, pins or other fasteners shall be in accordance with EN 14592+A1:2012 or other relevant specification and shall have the necessary performance values for the proposed end use.

2.4.1.1.3.2.6 Where the ancillary component already carries CE marking and is tested in accordance with the test methods mentioned in section 2.4.1.1.3.2.3, it is not necessary to repeat the tests. However, assessment still has to be carried out according to this Guideline to ensure that the ancillary component is fit for the intended use. Where the ancillary component does not carry CE marking, the tests in accordance with this Guideline shall be carried out.

2.4.1.1.3.3 Test methods for joints

2.4.1.1.3.3.1 General

Generally, three-dimensional nailing plates are available in a range of sizes; some can also be used with a range of timber sizes and a range of fasteners/fastener sizes. In producing a test specification, consideration shall be given to the three-dimensional nailing plate sizes, the fasteners and timber member combinations. For specified fasteners, testing the largest and smallest three-dimensional nailing plates and only one or more of the intermediate sizes may be appropriate. Interpolation for intermediate sizes may be used to determine three-dimensional nailing plate load capacity, where other physical properties remain the same (e.g. material specifications, materials irregularities and material section properties). To confirm the assumed interpolation formula, tests may be necessary. To achieve test results that reflect the load capacity of the three-dimensional nailing plate and not the timber strength, selecting the largest timber size for a range of three-dimensional nailing plate sizes may be appropriate.

The minimum number of specimens to determine the following values is:

- mean value: three specimens,
- characteristic value: five specimens.

It is not permissible to disregard test results when a test series has been planned for the testing. However, it is permissible to disregard a test result where the failure has taken place outside the connection.

The support and restraint conditions shall be those specified by the manufacturer.

2.4.1.1.3.3.2 Conditioning

Before the test pieces are assembled, the timber shall be conditioned to an equilibrium moisture content corresponding to 20 ± 2 °C and 85 ± 5 % relative humidity and after assembly the test pieces shall be conditioned for at least one week at 20 ± 2 °C and 65 ± 5 % relative humidity in accordance with ISO 554. For engineered wood products conditioning at 20 ± 2 °C and 85 ± 5 % relative humidity before assembly is not necessary. Other conditioning regimes shall be considered on a case-by-case basis and be reported in the ETA. The timber material is conditioned when it attains constant mass. The conditioning time depends on the sizes of the timber members. For timber members of a thickness of up to 65 mm a constant mass is considered to be attained when the results of two successive weighings, carried out at an interval of six hours, do not differ by more than 0,1 % of the mass of the timber material. For larger thickness it may be necessary to use longer time between the readings than 6 hours but the same 0,1 % criterion applies. The laboratory shall check that the time between the readings is sufficient to attain constant mass. For certain investigations other moisture conditioning may be appropriate, and shall be reported. For some hardwoods, a much longer conditioning period may be necessary.

2.4.1.1.3.3.3 Assembly of test pieces

The size and geometry of the test pieces will depend upon the type of three-dimensional nailing plates and the property being measured, and shall be representative of the connection under practical conditions. The test pieces shall be assembled using the method(s) specified by the manufacturer with the particular three-dimensional nailing plates.

Timber members for test pieces shall be cut so that the areas to which the three-dimensional nailing plates are fixed are free from knots, local grain disturbance, fissures and wane (except to the extent described in section 2.4.1.1.0). Elsewhere, the members shall be free from characteristics which could lead to premature failure in the timber.

The fabrication of the test pieces shall reflect the gaps which can occur in practice (see section 2.4.1.1.0).

2.4.1.1.3.4 Test procedure

2.4.1.1.3.4.1 Estimation of maximum load

The estimated maximum load $F_{max,est}$ for the type of joint to be tested shall be determined on the basis of experience, or by calculation, or from preliminary tests, and shall be adjusted as required by the loading procedure.

2.4.1.1.3.4.2 Loading procedure

The loading procedure given in section 8 of EN 26891:1991 shall be followed.

2.4.1.1.3.4.3 Maximum load

The load reached before or at a slip of 15 mm shall be recorded as the maximum load for each specimen. The slip shall be measured as the relative movement between the centres of gravity of the timber members of the connection in the direction of the applied load, see 2.4.1.1.3.4.4.

However, if no failure takes place within 15 mm slip the testing shall continue until the maximum load (F_{max}) is achieved or 15 mm slip is reached. For the purposes of determination of adjustment factors based on failure mode, if failure has not occurred at 15 mm slip, testing shall continue until a maximum (F_{max}) load is reached. The maximum load (F_{max}) and load at 15 mm slip (F_{15}) shall be recorded together with the failure mode.

$F_{max,mod}$ shall be taken as F_{max} within maximum 15 mm slip modified by a factor based on the failure mode.

Technical Report 016 gives under certain conditions guidance for how the modification shall be performed when failure does not take place within 15 mm slip without continuing the testing until failure.

The compression capacity shall be taken as the highest load required to close the gap between the timber members.

Note: This will define the load-carrying capacity of the actual three-dimensional nailing plate connection, but not necessarily of the connection as a whole.

2.4.1.1.3.4.4 Deformation

Deformations shall be taken as the relative movement between the centres of gravity of the timber members being joined in the direction of the applied load (δ_m).

2.4.1.1.3.4.5 Test report

The test report shall include:

- the timber species and grade, and the surface finish, density and moisture content of the timber,
- method for selecting timber density, by reference to EN ISO 8970,
- dimensions of the joints, size of the three-dimensional nailing plates, details of gaps between the members,
- specification of any fasteners used, e.g. nails, screws, by reference to an appropriate standard or other relevant specification,
- conditioning of the timber and test pieces before and after fabrication,
- the loading procedure used, and a statement of any deviations from these procedures,
- product specification, including the dimensions, coating thickness, if appropriate, and specified mechanical properties (e.g. tensile strength, yield stress and elongation) of the metal used to manufacture the product,
- method of installation,
- individual test results of maximum load and any relevant information regarding adjustments, descriptions of the modes of failures, density of timber in which failure took place,
- initial slip and slip modulus according to EN 26891:1991, and load–slip curve.

- low-cycle fatigue joint behaviour in accordance with EN 12512, where appropriate for seismic performance.

2.4.1.2 Determination of strength, stiffness and ductility

Where properties are claimed for more than one direction of loading, each shall be given together with any interaction equation. Consideration shall be given to the duration of load, the effects of reversal of load from long- and medium-term actions and alternating between tension and compression actions in the members.

Note: The value determined by section 2.4.1.2.1 is the highest value the producer may declare as the characteristic value. It may be advisable to declare a lower value to avoid an unreasonable rejection.

2.4.1.2.1 Strength

The characteristic load-carrying capacity X_k or the modified load-carrying capacity $X_{k,mod}$ for a given load duration and service class defined in EN 1995-1-1 shall be given.

For assessment by 'calculation' and 'calculation assisted by testing' this shall be derived in accordance with the requirements of EN 1995-1-1 and for assessment by testing in accordance with EN 14358:2006.

When deriving values from tests, account shall be taken of the density and moisture content of the timber test specimens, and deviations from the minimum specification for material properties of the three-dimensional nailing plate and ancillary components (see EOTA Technical Report TR016 *Method of testing three-dimensional nailing plates with examples*).

2.4.1.2.2 Stiffness

Where an initial slip and slip modulus are to be declared, they shall be determined as described in EN 26891:1991. This relationship shall cover the serviceability limit state covering forces up to 40 % of the ultimate force F_{ult}.

For assessment by tests, these properties shall be determined in accordance with EN 26891:1991, section 8.5:

- initial slip vi,
- slip modulus k_s (K_{ser} in EN 1995-1-1).

It is recommended that bolt holes have a diameter not more than 2 mm larger than the bolt. This shall be considered in the load-slip relation.

2.4.1.2.3 Ductility in cyclic testing

In seismic zones, dissipative structural behaviour may be adopted in design if joints are able to deform plastically for at least three fully reversed cycles in cyclic testing in accordance with EN 12512 at a static ductility ratio of 4 for ductility class M structures and at a static ductility ratio of 6 for ductility class H ones, without more than a 20 % reduction of their resistance, as laid down in section 8.3(3) of EN 1998-1:2004.

Moreover, in order to ensure a stable behaviour under cyclic loading, if the intended use is in dissipative structures in seismic areas, the energy dissipated in the 3rd cycle shall be not less than the 80 % of the energy dissipated in the 1st cycle. In this case this evaluation shall be declared in the ETA. The evaluation of the energy dissipated in the cycle, evaluated as the equivalent damping of the hysteretic energy dissipation, shall be performed according to EN 15129.

ESSENTIAL REQUIREMENT 2: SAFETY IN CASE OF FIRE

2.4.2 Behaviour in fire

2.4.2.1 Reaction to fire

2.4.2.1.1 Method of verification

The three-dimensional nailing plates are considered to satisfy the requirements for performance class A1 of the characteristic reaction to fire, in accordance with the provisions of EC decision 96/603/EC (as amended) without the need for testing on the basis of the listing of their materials in that decision.

2.4.2.1.2 Method of assessing and judging

The product shall be classified according to EC Decision 96/603/EC (as amended).

2.4.2.2 Resistance to fire

2.4.2.2.1 Method of verification

2.4.2.2.1.1 General

The part of the works or assembled system in which the three-dimensional nailing plates are intended to be incorporated or installed shall be tested, using the test method relevant for the corresponding fire resistance class, in order to be classified according to EN 13501-2.

Tests shall be conducted in accordance with the relevant standard(1) together with the provisions of this Guideline to allow a classification according to EN 13501-2.

Note (1): For example EN 1365-2 for loadbearing floors and roofs.

The intended end use conditions, mounting and fixing conditions and associated components in relation to fire resistance performance shall be given in the ETA.

2.4.2.2.1.2 Test configuration

The test configuration shall be determined based on the intended end use conditions for the complete structural element with any associated finishes e.g. plasterboard.

The test shall be carried out by a Notified Test Laboratory using specimens made from timber representative of the strength class with a density which is within ± 5 % of the mean density of the strength class for which the fire resistance shall be applicable. The connection to be tested shall be representative of those for which the fire resistance is intended to be declared. The load applied to the connection shall be based on that which the manufacturer intends to state in the declaration.

2.4.2.2.2 Method of assessing and judging

2.4.2.2.2.1 General

The part of the works or assembled system in which the three-dimensional nailing plates are intended to be incorporated or installed shall be classified according to EN 13501-2.

2.4.2.2.2.2 Failure conditions

Failure shall be considered to occur either when collapse of the connection occurs or when the slip at the connection (the relative movement) between the centres of gravity of the connected members in the direction of the applied force reaches 30 mm.

2.4.2.2.2.3 Field of direct application

The fire resistance achieved from the test is applicable to connections between timber members with a mean density of at least that of the target strength class. Further, it is also applicable to similar nailing plate connectors made from metal with a larger thickness or a thicker zinc coating.

ESSENTIAL REQUIREMENT 3: HYGIENE, HEALTH AND ENVIRONMENT

2.4.3 Content and/or release of dangerous substances

The applicant shall either

- submit the chemical constitution and composition of the materials and components of the product to the Approval Body which will observe strict rules of confidentiality
  or
- submit a written declaration to the Approval Body stating whether or not and in which concentration the materials and components of the product contain substances which have to be classified as dangerous according to Directive 67/548/EEC and Regulation (EC) No 1272/2008 and listed in the "Indicative list on dangerous substances" of the EGDS - taking into account the installation conditions of the construction product and the release scenarios resulting from there.

The use of recycled materials shall always be indicated, because this could lead to the implementation of further assessment and verification methods.

The information concerning the presence of dangerous substances listed in Council Directive 67/548/EEC and Regulation (EC) No 1272/2008 regulated at European level and listed in the "Indicative list on dangerous substances" of the EGDS and/or of other dangerous substances, shall be circulated as part of the evaluation report by the issuing Approval Body to the other Approval Bodies, under strict conditions of confidentiality.

2.4.3.1 Method of verification

Materials and components of the product listed in the EOTA TR 034 "General Checklist for ETAGs/CUAPs/ETAs – Content and/or release of dangerous substances in products/kits", which have to be considered will be verified by the given methods, taking into account the installation conditions of the assembled system/component of the assembled system and the release scenarios resulting from there. Regulations related to placing the product on the market may also need to be taken into account.

Regarding the release scenarios referred to in the EOTA TR 034, the following use categories have to be considered:

Category IA1:	Product with direct contact to indoor air
Category IA2:	Product with no direct contact to (e.g. covered products) but possible impact on indoor air
Category IA3:	Product with no contact to and no impact on indoor air
Category S/W1:	Product with direct contact to soil-, ground- and surface water
Category S/W2:	Product with no direct contact to but possible impact on soil-, ground- and surface water
Category S/W3:	Product with no contact to and no impact on soil-, ground- and surface water

Categories IA1 and S/W1 are applicable for products which are in contact with indoor air, soil or water in a way that dangerous substances could be released directly out of the product.

Category IA2 is applicable for products which are covered with other products but nevertheless could release dangerous substances to indoor air (e.g. products covered with porous/unsealed coverings incapable of avoiding migration).

Category S/W2 is applicable for products which can be leached by rain and could release dangerous substances which can have impact on soil and water.

Categories IA3 and S/W3 are applicable for products which are completely covered with tight products capable of avoiding any kind of migration of dangerous substances to indoor air, soil or water.

Note: Content restrictions have to be considered in all cases.

2.4.3.1.2 Method of assessing and judging

- Materials and components of the product listed in the EOTA TR 034: "General Checklist for ETAGs/CUAPs/ETAs – Content and/or release of dangerous substances in products/kits" (or equivalent EOTA document), and the related dangerous substances which have to be considered, will be assessed by the given methods taking into account the installation conditions of the construction product and the release scenarios resulting from there.

Note (to be implemented in the ETA):

For dangerous substances falling under the scope of the CPD for which
- no assessment and verification methods are given (or cannot be found in TR 034)
  or
- "no performance determined" is declared
  or
- the chosen verification and assessment method does not comply with the regulatory requirement of a particular Member State

there might be the necessity for an additional assessment.

ESSENTIAL REQUIREMENT 4: SAFETY IN USE

2.4.4 Not relevant.

ESSENTIAL REQUIREMENT 5: PROTECTION AGAINST NOISE

2.4.5 Not relevant.

ESSENTIAL REQUIREMENT 6: ENERGY ECONOMY AND HEAT RETENTION

2.4.6 Not relevant.

GENERAL ASPECTS RELATING TO FITNESS FOR USE (DURABILITY AND SERVICEABILITY)

2.4.7 Durability

2.4.7.1 General

The nailing plates and the fasteners shall either be inherently corrosion resistant or protected against corrosion e.g. according to EN 1995-1-1:

- use of the structure,
- required performance criteria,
- expected environmental conditions,
- composition, properties and performance of the materials,
- shape of members and the structural detailing,
- quality of the workmanship and the level of control,
- particular protective measures,
- likely maintenance during the intended life.

The corrosion protection shall be determined in conjunction with the admissible service conditions according to EN 1995-1-1 and the admissible corrosivity category according to EN ISO 12944-2.

2.4.7.2 Resistance to corrosion and deterioration

2.4.7.2.1 Method of verification

The product specification (including associated ancillary components) shall be examined and an assessment or appropriate test and evaluation shall be carried out to determine the thickness of corrosion protection or the material specification.

If a zinc coating is used its thickness shall be determined by:

- hot-dip galvanized coating to EN ISO 1461, using the methods described in the standard, preferably using the non-destructive magnetic method of EN ISO 2178, or using the gravimetric method of EN ISO 1460 as a reference method in case of dispute,

- hot-dip zinc-coated sheet to EN 10346:2009 using the non-destructive magnetic method of EN ISO 2178, or using the methods described in Annex A of the standard in the case of dispute,

- electroplated zinc coating to EN ISO 2081, using the methods described in the standard, or using EN ISO 2177 as a reference method in case of dispute.

If stainless steel is used, it shall be designated in accordance with EN 10088-1.

If aluminium is used, it shall be designated in accordance with an appropriate standard.

2.4.7.2.2 Method of assessing and judging

The materials' specification or minimum corrosion protection for different service classes shall be in accordance with EN 1995-1-1. Alternative materials may be used provided that they have sufficient corrosion protection for the proposed intended use shown by assessment or testing and that they do not change the reaction to fire Class A performance of the nailing plate.

The edges of hot-dip zinc coated-steel sheet to EN 10346:2009, with a minimum coating mass of Z275, are galvanically protected by the zinc present on the faces of the sheet, and are known to have satisfactory long-term service in service class 2 provided the steel thickness is less than or equal to 3,0 mm.

It is noted that standards for galvanized and electroplated coatings express mass/unit area of coatings with respect to the surface area, and standards for hot-dip coated sheet express mass/unit area with respect to the area of the sheet (ie the area of a sheet represents half the area of its surface).

Contact of materials with the three-dimensional nailing plate, including the different materials used in the construction of the joint including the fasteners, shall not result in corrosion occurring in the service classes being considered. Where appropriate, the product specification (including any ancillary components) will be examined to determine whether any risk of bimetallic corrosion exists (with reference to the electrochemical series), and any evidence of monitored atmospheric exposure tests to EN ISO 7441 will be evaluated.

Contact of materials with the three-dimensional nailing plate, including the fasteners, the timber species and preservative treatments proposed for use, shall not result in corrosion occurring in the service classes being considered. An assessment shall be made of the risks of corrosion arising from any proposed preservative treatment for the timbers used with the product, or with any acidic or corrosive timber species, e.g. hardwood, proposed for use.

2.4.8 Dimensional stability

2.4.8.1 Method of verification

Additional tests are not required for this property as it is covered during the assessment for mechanical resistance and stability.

2.4.8.2 Method of assessing and judging

The effects of deformations or deflections of the three-dimensional nailing plate which may affect the appearance or effective use of the structure, or cause damage to finishes or non-structural elements, shall be considered. Guidance can be given in the ETA in the form of an initial slip and a slip modulus (see section 2.4.1.2.2).

The effects of dimensional changes on the structural elements being joined due to varying moisture content shall be considered by the determination of the strength and the stiffness of the joints.

3 EVALUATION AND ATTESTATION OF CONFORMITY AND CE MARKING

3.1 System of attestation of conformity

According to the decision 97/638/EC of the European Commission[3], the system of attestation of conformity given in Table 2 applies.

Table 2 – System of attestation of conformity applicable to the load-carrying capacity of three-dimensional nailing plates

Product(s)	Intended use(s)	Level(s) or class(es)	Attestation of conformity system(s)
Three-dimensional nailing plates (with fasteners specified)	For structural timber products	Reaction to fire class and resistance to fire classes according to EN 13501-2	2+

The system of attestation of conformity referred to above is defined as:

System 2+: Declaration of conformity of the product by the manufacturer on the basis of:

(a) Tasks for the manufacturer:
- (1) initial type-testing of the product;
- (2) factory production control;
- (3) testing of samples taken at the factory in accordance with a prescribed test plan (unless covered by normal FPC).

Note: In the context of this Guideline, initial type-testing may be by testing and/or by calculation.

(b) Tasks for the notified body:
- (4) certification of factory production control on the basis of:
  - initial inspection of factory and of factory production control,
  - continuous surveillance, assessment and approval of factory production control.

[3] Official Journal of the European Communities L 268/36 of 1/10/1997

3.2 Tasks and responsibilities of the manufacturer and notified bodies

3.2.1 Tasks for the manufacturer

The corner stones of the actions to be undertaken by the manufacturer of the three-dimensional nailing plate in the procedure of attestation of conformity are laid down in Table 3 which relates to long-term production of product families.

For the purposes of ITT and FPC, products may be grouped into families where it is considered that the results of testing one or more characteristics of any one product from within the family are representative for the same characteristic(s) of all other products within that family.

Note: Products may be in different families for different characteristics.

Table 3 – Control plan for the manufacturer; corner stones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
(1)	(2)	(3)	(4)	(5)	(6)
Factory production control (FPC) including testing of samples in accordance with a prescribed test plan					
1	Three-dimensional nailing plates				
	Checks on incoming materials	Check supplier's certificate, e.g. mill certificate	Against purchase order	N/A	Each delivery
	Checks on finished products: Corrosion protection	2.4.5.1 using mill certificate	To relevant standard	To relevant standard	To relevant standard
	Dimensions	Using calibrated tools	Dimensional drawings with tolerances	To relevant standard	To relevant standard
	Visual inspection	Visual	e.g. no cracks	To relevant standard	To relevant standard
	Standard of welding (where appropriate)	e.g. to parts of EN ISO 15609	To relevant standard	To relevant standard	To relevant standard
2	Fasteners[(1)]				
	To EN 14592:2008 or other appropriate specification	To EN 14592+A1:2012 or other appropriate specification	To EN 14592+A1:2012 or other appropriate specification	To EN 14592+A1:2012 or other appropriate specification	To EN 14592+A1:2012 or other appropriate specification
3	Coated steel parts[(1)]				
	Cleaning/pre-treatment process data	To relevant standard	To relevant standard	To relevant standard	To relevant standard
	Coating process data	To relevant standard	To relevant standard	To relevant standard	To relevant standard
	Mass and/or thickness of coating	2.4.5.1	To relevant standard	To relevant standard	To relevant standard
Initial type-testing of the product (ITT)					
See section 3.2.1.3					
(1) Where materials are not manufactured and tested by the supplier in accordance with agreed methods, then, where appropriate, they shall be subject to suitable checks/tests by the ETA holder before acceptance. For the purposes of this ETAG, testing is not required where products carry CE marking and have the necessary performance values to show compliance.					

The characteristics to be addressed as described in the amended Mandate are mechanical resistance, release of dangerous substances, reaction to fire and resistance to fire, together with durability.

If the results of the continuous surveillance inspections by the Notified Body are satisfactory, the inspection interval for the Notified Body can be reduced from a normal level of twice per year to once per year.

There is a wide variation in the products and production processes covered by this ETAG. Therefore a precise test plan can only be set up on a case-by-case basis. Normally only properties related to the mechanical resistance and stability and durability of the product have to be tested. In relation to factory production control the term testing shall be taken to apply to both physical testing and visual examination (including for example dimensional checks).

3.2.1.1 Factory production control

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

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

The manufacturer and the Approval Body issuing the ETA shall agree an FPC test plan.

An agreed FPC test plan is necessary as current standards relating to quality management systems (Guidance Paper B, EN ISO 9000 and EN ISO 9001) 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 checks on the final product as detailed in Table 3.

3.2.1.2 Testing of samples taken at the factory – Prescribed Test Plan (unless covered by normal FPC)

The manufacturer and the Approval Body issuing the ETA shall agree a prescribed test plan.

The tests shall only be carried out on the final product or samples representative of the final product.

3.2.1.3 Initial Type-Testing

Approval tests will have been conducted by the Approval Body or under its responsibility (which may include a proportion conducted by a laboratory or by the manufacturer, witnessed by the Approval Body) in accordance with section 2 of this ETAG. The Approval Body will have assessed the results of these tests in accordance with section 2 of this ETAG, as part of the ETA issuing procedure.

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

This work should be taken over by the manufacturer for Declaration of Conformity purposes.

In cases of modification of the product or the method of production (where this may affect the declared properties), ITT shall be performed. Only those characteristics which may be changed by the modification need be subject to this ITT.

Note: In the context of this Guideline, initial type-testing may be by testing and/or by calculation.

3.2.1.4 Declaration of Conformity

When all the criteria of the Conformity Attestation on the basis of the tasks of the manufacturer and the tasks of the notified body (FPC certification) are satisfied, the manufacturer shall make a Declaration of Conformity and affix the CE marking.

3.2.2 Tasks for the notified body

The corner stones of the actions to be undertaken by the notified body in the procedure of attestation of conformity for the three-dimensional nailing plate are laid down in Table 4.

Table 4 – Control plan for the notified body; corner stones

No	Subject/type of control	Test or control method	Minimum frequency of control
Initial inspection of factory and factory production control (FPC)			
1	Inspection of the factory and the factory production control of the manufacturer as described in the control plan	Control of devices and equipments and the documentation of the FPC	When starting the production process or when starting a new production line
Continuous surveillance, judgment and assessment of factory production control (FPC)			
2	Surveillance, assessment and approval of the factory production control of the manufacturer as described in the control plan	Control of the documentation of the FPC	Minimum once per year

3.2.2.1 Assessment of the factory production control system — initial inspection and continuous surveillance

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

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

3.2.2.2 Certification

The notified body shall issue an EC Certificate of Factory Production Control.

3.3 CE marking and accompanying information

According to Council Directive 93/68/EEC[4], the CE marking consists of the letters "CE" in the form laid down in the Directive.

The CE marking of the three-dimensional metal nailing plates shall be accompanied by the following information:

- the name and address of the producer (legal entity responsible for placing the product on the market),
- the last two digits of the year in which the CE marking was affixed,
- identification number of the notified FPC certification body
- the number of the EC certificate for the factory production control,
- the number of the European Technical Approval,
- joint strength, reaction to fire, fire resistance (where appropriate), service class and admissible corrosivity category or type and thickness of coating or steel grade in the case of stainless steel, specification of fixings and installation conditions. In addition any specific information relating to dangerous substances shall be given.

The above information shall be given on a label attached to the product, the packaging or the accompanying technical documents. As an alternative to giving performance information, reference may be made to the ETA, where it has to be given in full.

The marking requirements of other technical specifications shall be fulfilled (see below).

An example of CE marking and accompanying information is given in Figure 4.

CE	Letters "CE"
1234	Identification number of notified FPC certification body
Company name Street name, Town or City name, Country	Name and address of the producer (legal entity responsible for the manufacture)
10	Two last digits of year of affixing CE marking
1234-CPD-0321	Number of EC certificate for the FPC
ETA-YY/WWWW	ETA number
ETAG 015	ETAG number
Declared values and classes e.g. Joint strength Reaction to fire: Class: A1 Resistance to fire: NPD Service classes 1 or 2 Coating type: TTTT Coating thickness: tt No dangerous substances Or For the characteristics see ETA-YY/WWWW	Declared values and/or classes in accordance with sections of the ETA

Figure 4 – An example of CE marking

4 Official Journal of the European Communities L 220 of 30.8.1993

Each three-dimensional nailing plate shall be marked with the CE-marking and the number of the Notified Certification Body, unless its size or surface makes this impractical.

This ETAG covers products which may have more than one intended use and therefore may be subject to other technical specifications. The CE marking shall refer to all technical specifications relating to the product and shall cover all requirements for information accompanying the CE marking from all referenced harmonised technical specifications (ETAs and/or harmonised standard).

It is possible that, for different end uses according to different technical specifications, the system of attestation of conformity may be different (e.g. systems 2+ and 3). Where this is the case, the CE marking may not imply that characteristics declared under system 3 have been controlled under system 2+ so, in this case, the different sets of information have to be presented separately.

There are a number of ways in which the information for different uses can be presented. Some information will be common irrespective of the intended end use:

- the CE marking symbol,
- the description of the product,
- the last two digits of the year of affixing the CE-marking,
- the name and address of the manufacturer.

This information is presented only once. In some cases, other information may be common:

- the number of the certification body (only if the AoC system applies in both cases and only a single body has been used),
- the FPC certificate number (if a single certificate has been issued),
- characteristics where these have been assessed using the same test method and under the same attestation system.

Manufacturers shall consider the implications of declaring performances for one characteristic, using two (or more, if more than two technical specifications apply) different test methods, leading to different performances.

An example of dual CE marking is given in Figure 5 giving information for a product meeting both ETA YY/XXXX (based on ETAG 015) and EN 845-1 provisions. The product would be under AoC system 2+ for ETAG 015 and system 3 for EN 845-1.

<table>
<tr><td colspan="3">CE

Company name
Street name
Town name
Country name
xx

Joist hangers types XX, YY and ZZ</td></tr>
<tr><td>xxxx

xxxx-CPD-xxxx

ETA YY/XXXX</td><td colspan="2">EN 845-1
Specification for ancillary components for masonry

Part 1: Ties, tension straps, hangers and brackets

For supporting joists, beams or rafters on a masonry wall.</td></tr>
<tr><td>ETAG 015
Three-Dimensional Nailing Plates

Declared values and classes eg
Joint strength
Reaction to fire: Class A1
Resistance to fire NPD
Service classes 1 or 2
Coating type: TTTT
Coating thickness: tt
No dangerous substances
Or
For the characteristics see ETA-YY/WWWW</td><td>Durability:

Dangerous substances:

Vertical load capacity:
Deflection under load:</td><td>Material/coating reference XX

X decree YY/nn(yy-mm-dd)

See producer’s literature</td></tr>
</table>

Figure 5 – Example CE marking

4 ASSUMPTIONS UNDER WHICH THE FITNESS FOR THE INTENDED USE IS ASSESSED

4.1 Manufacture of the product

The different components of three-dimensional nailing plates, generally, are manufactured using conventional techniques. Any critical process or treatment of the components which affects the performance shall be highlighted.

Welding shall be considered a critical treatment if the stress in the weld is larger than half the design stress.

4.2 Packaging, transport, storage of the product

For conventional metallic products, it is not necessary to consider special recommendations for packaging, transport and storage. In special cases, it may be necessary for the Approval Body to draw attention to any necessary precaution in the ETA.

4.3 Installation of the product in the works

The ETA is issued under the assumption that the execution of the works shall be in accordance with the manufacturer's technical literature.

The quality and sufficiency of this technical literature shall be assessed against the recommendations given in EN 1995-1-1, in particular concerning the aspects on the following checklist:

- number, location and type of fasteners,
- condition and adequacy of supports and restraints,
- specification of timber members, e.g. strength class, allowance for wane,
- contact with preservative-treated timbers,
- permitted gap-size between members.

In accordance with the recommendations of EN 1995-1-1, bolts and screws shall be re-tightened when the timber has reached equilibrium moisture content if this is necessary to ensure the load-carrying capacity or stiffness of the structure.

It is assumed that the manufacturing dimensions of the product are within such tolerances that the load-carrying capacity and stiffness of the connection can be maintained.

4.4 Use, maintenance, repair

The assessment of the fitness for use is based on the assumption that maintenance is not required during the assumed intended working life. Should repair prove necessary, this is normally achieved by replacement.

With reference to the requirement stated in clause 2.1 it can be assumed that there is a negligible risk of a zipper like failure in long alignments of fasteners perpendicular to the grain of solid wood and similar wood members situated in service class 1 or 2 provided the length of the fastener alignment is less than the following maximum lengths

- Mechanical fasteners such as nail, screws, bolts or dowels loaded laterally:
  Maximum length of alignment: 600 mm
- Axially loaded inclined nails and screws in tension either in side grain or in end grain
  Maximum length of alignment: 250 mm

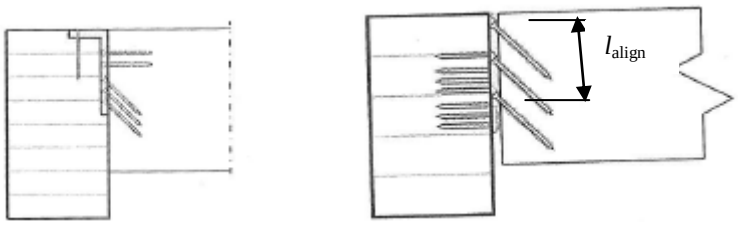

Figure 6 – Examples of end grain connections with an alignment of inclined screws perpendicular to the grain in axial tension in the fasteners to the right. On the figure to the right the length of the fastener alignment is indicated.

5.1 Means of identification

All components of the three-dimensional nailing plate shall be identified, either by reference to:

- Harmonised product standards,
- European Technical Approvals,
- Non-harmonised European product standards,
- Non-harmonised International product standards,
- Descriptive identification, identifying the products by their composing materials and their function.

In any case, dimensions (e.g. length, width, thickness), geometry (e.g. squareness, flatness), significant properties (e.g. mechanical, physical, chemical) and their tolerances shall be given. In those cases where the above listed product specifications do not specify test methods for identification, test methods used shall be based on European standards (CEN), International standards (ISO), EOTA Technical Reports, UEAtc Guidelines or national test methods.

Ultimately, a formulation, the ETA applicant's specific reference or a similar unique specification can also be accepted.

Where the ancillary components are not covered by European Standards, they shall be precisely defined by reference to physical characteristics as indicated in this Guideline.

Methods of verification and criteria for checking the product identity are given in Table 5.

Table 5 – Product characteristics, methods of verification and criteria used for checking the product identity

Number	Product characteristic	Verification method	Criteria for product identity
(1)	(2)	(3)	(4)
1	Mechanical properties for the raw materials, e.g. tensile strength, yield strength and elongation	5.2.1.1	5.2.1.2
2	Dimensional specification of raw materials	5.2.2.1	5.2.2.2
3	Type and thickness of any protective coating*	5.2.3.1	5.2.3.2
4	Chemical composition of raw materials	5.2.4.1	5.2.4.2
5	Mechanical properties of the fasteners	5.2.5.1	5.2.5.2
6	Dimensional specification of the fasteners	5.2.6.1	5.2.6.2
7	Geometry of the three-dimensional nailing plate	5.2.7.1	5.2.7.2
* This characteristic is also relevant to the fitness for use (see section 2.3, Table 1).			

5.2 Product characteristics which are relevant for identification checking

5.2.1 Mechanical properties for the raw materials, e.g. tensile strength, yield strength and elongation

5.2.1.1 Method of verification

In accordance with a relevant standard, e.g. EN 10346:2009.

5.2.1.2 Criteria for product identity

In accordance with a relevant standard, e.g. EN 10346:2009.

5.2.2 Dimensional specification of raw materials

5.2.2.1 Method of verification

In accordance with a relevant standard, e.g. EN 10143.

5.2.2.2 Criteria for product identity

In accordance with a relevant standard, e.g. EN 10143.

5.2.3 Type and thickness of any protective coating

5.2.3.1 Method of verification

See section 2.4.

5.2.3.2 Criteria for product identity

In accordance with a relevant standard.

5.2.4 Chemical composition of raw materials

5.2.4.1 Method of verification

In accordance with a relevant standard, e.g. EN 10346:2009.

5.2.4.2 Criteria for product identity

In accordance with a relevant standard, e.g. EN 10346:2009.

5.2.5 Mechanical properties of the fasteners

5.2.5.1 Method of verification

In accordance with the relevant standard or specification, e.g. EN 1380 or EN 14592 +A1:2012.

5.2.5.2 Criteria for product identity

In accordance with the relevant standard or specification, e.g. EN 1380 or EN 14592 +A1:2012.

5.2.6 Dimensional specification of the fasteners

5.2.6.1 Method of verification

Using calibrated measuring tools.

5.2.6.2 Criteria for product identity

In accordance with product drawings.

5.2.7 Geometry of the three-dimensional nailing plate

5.2.7.1 Method of verification

Using calibrated measuring tools.

5.2.7.2 Criteria for product identity

In accordance with product drawings.

6 MODEL OF ETAS ISSUED ON THE BASIS OF THE ETAG

European Technical Approvals issued on the basis of this ETAG shall be in accordance with the ETA model given in the Addendum to the ETAG.

7 REFERENCE DOCUMENTS

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Construct 99/339-Rev 1 Mandate to EOTA concerning the execution of harmonisation work for an ETA Guideline on three-dimensional nailing plates

Construct 10/884 Amendment to Mandate to cover ER 2 Safety in case of fire (reaction to fire and resistance to fire)

Mandate M112 to CEN/CENELEC concerning the execution of standardisation work for harmonised standards on structural timber products and ancillaries

Mandate M116 to CEN/CENELEC concerning the execution of standardisation work for harmonised standards on masonry and related products

Commission Decision 96/603/EC of 4 October 1996, Official Journal L267, 19.10.96, p 23 amended by Commission Decision 2000/605/EC

Council Directive 89/106/EEC (CPD) of 21 December 1988, on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products. Official Journal L40, 11.2.89, pp 12-26

Council Directive 93/68/EEC. Official Journal of the European Communities L 220, 30.8.1993, p. 1

EOTA Guidance Document No 004
The provision of data for assessment leading to ETA

EN 1995-1-1 *Eurocode 5: Design of timber structures – General – Common rules and rules for building*

EN 338 *Structural timber – Strength classes*

EN 843-1 *Specification for ancillary components for masonry*

EN 10088-1	*Stainless steels – List of stainless steels*
EN 10088-2:2005	*Stainless steels – Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*
EN 10346:2009	*Continuously hot-dip coated steel flat products – Technical delivery conditions*
EN 1993-1-1	*Eurocode 3: Design of steel structures – General rules and rules for buildings*
EN 1993-1-3	*Eurocode 3: Design of steel structures – General rules – Supplementary rules for cold-formed members and sheeting*
EN 1998-1:2004	*Eurocode 8: Design of structures for earthquake resistance – General rules, seismic actions and rules for buildings*
EN 1999-1-1	*Eurocode 9: Design of aluminium structures – General structural rules*
EN 26891:1991	*Timber structures – Joints made with mechanical fasteners – General principles for the determination of strength and deformation characteristics*
EOTA Technical Report TR015	*Principles for the static calculation of connections made with Three-Dimensional Nailing Plates, with examples*
EOTA Technical Report TR016	*Method of Testing Three-Dimensional Nailing Plates, with examples*
EOTA Technical Report TR017	*Worked example calculation of characteristic load-carrying capacities of 90° angle bracket with a rib*
EOTA Technical Report TR034	*General ER 3 Checklist for ETAGs/CUAPs/ETAs- Content and/or release of dangerous substances in products/kits*
EN ISO 8970	*Timber structures – Testing of joints made with mechanical fasteners – Requirements for wood density*
EN ISO 6892-1	*Metallic materials – Tensile testing – Method of test at ambient temperature*
EN 1365-2	*Fire resistance tests for loadbearing elements – Part 2: Floors and roofs*
EN 1380	*Timber structures – Test methods – Loadbearing nailed joints*
EN 1382	*Timber structures – Test methods – Withdrawal capacity of timber fasteners*
EN 1383:1999	*Timber structures – Test methods – Pull-through resistance of timber fasteners*
EN 12512	*Timber structures – Test methods – Cyclic testing of joints made with mechanical fasteners*
EN ISO 15609	*Specification and qualification of welding procedures for metallic materials – Welding procedure specification*
EN 14592+A1:2012	*Timber structures – Dowel-type fasteners – Requirements*
ISO 3130	*Wood – Determination of moisture content for physical and mechanical tests*
ISO 3131	*Wood – Determination of density for physical and mechanical tests*
ISO 554	*Standard atmospheres for conditioning and/or testing – Specifications*

EN ISO 1461	*Hot-dip galvanized coatings on fabricated iron and steel articles – Specification and test methods*
EN ISO 2178	*Non-magnetic coatings on magnetic substances – Measurements of coating thickness – Magnetic method*
EN ISO 1460	*Metallic coatings – Hot-dip galvanized coatings on ferrous materials – Gravimetric determination of the mass per unit area*
EN ISO 2081	*Metallic and other inorganic coatings – Electroplated coatings of zinc with supplementary treatments on iron or steel*
EN ISO 2177	*Metallic coatings – Measurement of coating thickness – Coulometric method by anodic dissolution*
EN 10143	*Continuously hot-dip coated steel sheet and strip – Tolerances on dimensions and shape*
EN 13183-2	*Moisture content of a piece of sawn timber – Part 2: Estimation by electrical resistance method*
EN 13501-1	*Fire classification of construction products and building element – Part 1: Classification using data from reaction to fire tests*
EN 13501-2	*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)*
EN 1179:2003	*Zinc and zinc alloys – Primary zinc*
EN ISO 7441	*Corrosion of metals and alloys – Determination of bimetallic corrosion in outdoor exposure corrosion tests*
Commission Decision 97/638/EC of 19 September 1997 on the procedure for attesting the conformity of construction products pursuant to Article 20(2) of Council Directive 89/106/EEC as regards fasteners for structural timber	
EN ISO 9000	*Quality management systems – Fundamentals and vocabulary*
EN ISO 9001	*Quality management systems – Requirements*
EC Guidance Paper B	*The definition of factory production control in technical specifications for construction products*
EC Guidance Paper D	*CE marking under the Construction Products Directive*
Commission Decision 22 July 1997, Official Journal L 236, 27.8.97	
EN 14358:2006	*Timber structures – Calculation of characteristic 5-percentile values and acceptance criteria for a sample*
EN 15129	*Anti-seismic devices*
EN ISO 12944-2	*Paints and varnishes – Corrosion protection of steel structures by protective paint systems – Classification of environments*
EU database on dangerous substances in construction products: http://ec.europa.eu/enterprise/construction/cpd-ds/index.cfm	

ADDENDUM MODEL FOR ETAS ISSUED ON THE BASIS OF ETAG 015

Cover page of the ETA

according to Document 5.1 (new ETA),Document 5.2 (modified ETA) or Document 5.3 (ETA with extended period of validity), as relevant.

Page 2 of the ETA

with headline Page 2 of ETA-xx/xxxx, issued on dd.mm.yyyy[, validity extended on dd.mm.yyyy]

I LEGAL BASES AND GENERAL CONDITIONS

1 This European Technical Approval is issued by ....*(name of Approval Body)* in accordance with:

- Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products[5], modified by Council Directive 93/68/EEC[6] and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council[7];
- ...*(indicate respective national law transposing the CPD; only if the national law of the Member State of the issuing Approval Body so requires)*;
- Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC[8];
- Guideline for European Technical Approval of Three-Dimensional Nailing Plates.

2 ...*(name of issuing Approval Body)* is authorized to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant(s). Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.

3 This European Technical Approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those /indicated on page 1/ laid down in the context/ of this European technical approval *(delete as appropriate)*.

4 This European Technical Approval may be withdrawn by...*(name of issuing Approval Body)*, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.

5 Reproduction of this European Technical Approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of ...*(name of issuing Approval Body)*. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European Technical Approval.

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5 Official Journal of the European Communities L 40, 11.2.1989, p. 12

6 Official Journal of the European Communities L 220, 30.8.1993, p. 1

7 Official Journal of the European Union L 284, 31.10.2003, p. 25

8 Official Journal of the European Communities L 17, 20.1.1994, p. 34

6 The European Technical Approval is issued by the Approval Body in its official language(s). This (These) version(s) corresponds (correspond) fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product(s) and intended use

1.1 Definition of the construction product

..... *(Specific text)*

1.2 Intended use

..... *(Specific text)*

The provisions made in this European Technical Approval are based on an assumed working life of the ...*(product)* of ... years[, provided that the conditions laid down in section(s) 4.2 / 5.1 / 5.2 for the packaging / transport / storage / installation / use / maintenance / repair are met]. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

2 Characteristics of product(s) and methods of verification

..... *(Specific text)*

Include following text in section of dangerous substances:

According to the chemical constitution and composition of the materials and components of the product / the written declaration on dangerous substances *[whichever applies]* submitted by the ETA-holder to the Approval Body:

(…)[9]

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.

Note: For dangerous substances falling under the scope of the CPD for which

- no assessment and verification methods are given (or cannot be found in TR 034)

or

- "no performance determined" is declared

or

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9 For the expression of the assessment results on dangerous substances in the ETA, the Approval Bodies will follow the provisions given in Annex 1 to the Addendum to EOTA GD 001, March 2012, "Criteria for the ETA content of dangerous substances information"

- the chosen verification and assessment method does not comply with the regulatory requirement of a particular Member State

there might be the necessity for an additional assessment.

3 Evaluation and attestation of conformity and CE marking

3.1 System of attestation of conformity

According to the Decision 97/638/EC of the European Commission[10] system 2+ of the attestation of conformity applies.

This system of attestation of conformity is defined as:

System 2+: Declaration of conformity of the product by the manufacturer on the basis of:

(a) Tasks for the manufacturer:

(1) initial type-testing of the product;

(2) factory production control;

(3) testing of samples taken at the factory in accordance with a prescribed test plan.

(b) Tasks for the approved body:

(4) certification of factory production control on the basis of:

– initial inspection of factory and of factory production control;

– continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

3.2 Responsibilities

3.2.1 Tasks for the manufacturer

3.2.1.1 Factory production control

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

The manufacturer may only use initial / raw / constituent materials *(as relevant)* stated in the technical documentation of this European Technical Approval.

The factory production control shall be in accordance with the "Control plan of ...*(date)* relating to the European Technical Approval ETA -...*(number)* issued on ...*(date)*" which is part of the technical documentation of this European Technical Approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with ...*(name of the Approval Body)*.[11]

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

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[10] Official Journal of the European Communities L 268/36 of 1/10/1997

[11] The control plan is a confidential part of the European Technical Approval and only handed over to the approved body or bodies involved in the procedure of attestation of conformity (see section 3.2.2).

3.2.1.2 Other tasks for the manufacturer

..... *(Specific text, if relevant)*

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of ...*(product)* to undertake the actions laid down in section 3.2.2. For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body or bodies involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of the European Technical Approval ETA...*(number)* issued on ...*(date)*.

3.2.2 Tasks for the approved body

The approved body shall perform the:

- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control,

  in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in (a) written report (reports).

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the factory production control stating the conformity with the provisions of this European Technical Approval.

In cases where the provisions of the European Technical Approval and its "control plan" are no longer fulfilled, the certification body shall withdraw the certificate of conformity and inform...*(name of Approval Body)* without delay.

3.3 CE marking

The CE marking shall be affixed on the...*(product itself - indicate where on the product, if necessary; or the label attached to it; packaging; accompanying commercial document, e.g. the EC declaration of conformity)*. The letters “CE” shall be followed by the identification number of the approved certification body and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacturer),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate for the factory production control,
- the number of the European Technical Approval,
- the number of the guideline for European Technical Approval,
- *... (indicate characteristics, performances, use categories, etc. of the product as listed in accordance with the provisions of the ETAG)*.

4 Assumptions under which the fitness of the product(s) for the intended use was favourably assessed

4.1 Manufacturing

(Specific text, as far as is relevant)

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

4.2 Installation *(if relevant)*

(Specific text, as far as is relevant)

5 Indications to the manufacturer *(if relevant)*

5.1 Packaging, transport and storage *(if relevant)*

(Specific text, as far as is relevant)

5.2 Use, maintenance, repair *(if relevant)*

The resistance to corrosion and deterioration can be given by the following information:

- Corrosive resistant in accordance with EN 1995-1-1
- Corrosive resistant for use in a corrosive category according to EN ISO 12944-2
  (Specific text, as far as is relevant)

ANNEX 1 - DESCRIPTION OF PRODUCT(S)

(Specific text and/or drawings, as far as is relevant)

(Give further annexes as far as is necessary)