



EUROPEAN ASSESSMENT DOCUMENT

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PROFILED ALUMINIUM NAIL FOR USE IN TIMBER STRUCTURES

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This European Assessment Document (EAD) has been developed taking into account up-to-date technical and scientific knowledge at the time of issue and is published in accordance with the relevant provisions of Regulation (EU) No 305/2011 as a basis for the preparation and issuing of European Technical Assessments (ETA).

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1 SCOPE OF THE EAD

1.1 Description of the construction product

The product, "Profiled aluminium nail for use in timber structures", is a specific nail made of aluminium EN AW-5019 according to EN 573-3¹. The minimum tensile strength of the wire is 410 N/mm². The geometry fulfills the requirements of EN 14592, see Figure 1. The fastener is produced in diameters from 2.5 mm to 4.2 mm. The minimum length of the profiled aluminium nails is 45 mm, the maximum length is 70 mm.

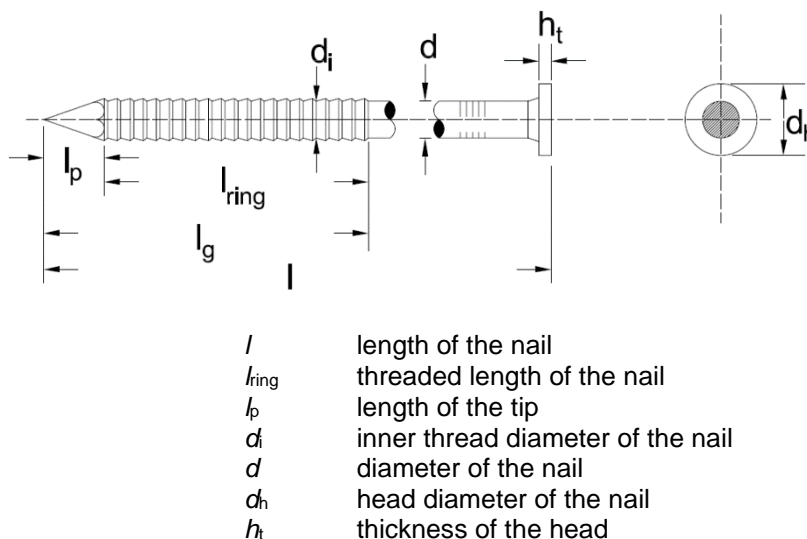


Figure 1: Example for the geometry of a nail

The product is not fully covered by the following harmonised technical specifications:

- hEN 14592 2012-05 due to deviating material

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

It is assumed that the product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant manufacturer's stipulations having influence on the performance of the product covered by this European Assessment Document shall be considered for the determination of the performance and detailed in the ETA.

1.2 Information on the intended use(s) of the construction product

1.2.1 Intended use(s)

The profiled aluminium nail is used for connecting boards made of softwood. Hereby, the fastener is driven into the boards perpendicular to the direction of grain in order to form a single shear connection.

The product is subjected to static and quasi static actions only.

The product is intended to be used in service class 1 and 2 according to EN 1995-1-1. The profiled aluminium nails shall be protected from direct weathering in service.

¹ All undated references to standards or to EAD's in this document are to be understood as references to the dated versions listed in clause 4

1.2.2 Working life/Durability

The assessment methods included or referred to in this EAD have been written based on the manufacturer's request to take into account a working life of the profiled aluminium nail for the intended use of 50 years when installed in the works. These provisions are based upon the current state of the art and the available knowledge and experience.

When assessing the product the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works².

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA when drafting this EAD nor by the Technical Assessment Body issuing an ETA based on this EAD, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

² The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than referred to above.

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 1 shows how the performance of the profiled aluminium nail is assessed in relation to the essential characteristics.

Table 1 Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics

No	Essential characteristic	Method of assessment	Type of expression of product performance
Basic requirements for construction works 1: Mechanical resistance and stability			
1	Dimensions ¹⁾	2.2.1	Description, level
2	Characteristic yield moment ¹⁾	2.2.2	Level
3	Characteristic withdrawal parameter ¹⁾	2.2.3	Level
4	Characteristic head pull-through parameter ¹⁾	2.2.4	Level
5	Characteristic tensile strength ¹⁾	2.2.5	Level
6	Slip modulus of the single shear connection ¹⁾	2.2.6	Level
7	Resistance to corrosion ¹⁾	2.2.7	Description, level
Basic requirements for construction works 2: Safety in case of fire			
8	Reaction to fire	2.2.8	Class
Basic requirements for construction works 4: Safety and accessibility in use			
–	Same as BWR 1		
¹⁾ This characteristic also relates to basic requirements for construction works 4.			

2.2 Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product

This chapter is intended to provide instructions for TABs. Therefore, the use of wordings such as “shall be stated in the ETA” or “it has to be given in the ETA” shall be understood only as such instructions for TABs on how results of assessments shall be presented in the ETA. Such wordings do not impose any obligations for the manufacturer and the TAB shall not carry out the assessment of the performance in relation to a given essential characteristic when the manufacturer does not wish to declare this performance in the Declaration of Performance.

2.2.1 Dimensions

The relevant dimensions of the nails shall be assessed according to EN 14592.

2.2.2 Characteristic yield moment

The characteristic yield moment of the profiled aluminium nails shall be determined according to EN 409. The tests shall be carried out with a free length of the nail of l_2 of $2 \cdot d$. The minimum number of specimens is 10 for every nail diameter. The weakest point within the length of the nail has to be tested.

The characteristic yield moment shall be calculated according to EN 14358.

The characteristic yield moment shall be given in the ETA.

2.2.3 Characteristic withdrawal parameter

The characteristic withdrawal parameter of the profiled aluminium nails perpendicular to the grain shall be determined according to EN 1382 in softwood timber of strength class C16 to C24 according to EN 338.

At least 20 tests for every nail diameter are required. For a chosen characteristic density ρ the density of the test specimens shall fulfil the requirements of EN ISO 8970.

If necessary, the withdrawal parameter of each test has to be corrected with a factor k_p :

$$k_p = \left(\frac{\rho_k}{\rho} \right)^{0,8}$$

where:

ρ_k characteristic density of the strength class of the timber to which the test results should be related

ρ density of the test specimen

From the possibly corrected withdrawal parameters of all test results, the characteristic value of the withdrawal parameter shall be calculated according to EN 14358. This characteristic withdrawal parameter corresponds to the chosen characteristic density of the timber.

The characteristic withdrawal parameter together with characteristic density of the related strength class of the timber shall be given in the ETA.

2.2.4 Characteristic head pull-through parameter

The characteristic head pull-through parameter of the profiled aluminium nails shall be determined according to EN 1383 in softwood timber of strength class C16 to C24 according to EN 338.

At least 20 tests for every nail diameter are required. For a chosen characteristic density ρ the density of the test specimens shall fulfil the requirements of EN ISO 8970.

If necessary, the withdrawal parameter of each test has to be corrected with the factor k_p as outlined in Section 2.2.3.

From the possibly corrected head pull-through parameters of all test results, the characteristic value of the head pull-through parameter shall be calculated according to EN 14358. This characteristic head pull-through parameter corresponds to the chosen characteristic density of the timber.

The characteristic head pull-through parameter together with characteristic density of the related strength class of the timber shall be given in the ETA.

2.2.5 Characteristic tensile strength

The characteristic tensile strength of the profiled aluminium nail shall be determined according to EN 14592. The minimum number of specimens is 10 for every nail diameter.

The characteristic value of the tensile strength shall be calculated according to EN 14358.

The characteristic tensile strength of the nail shall be given in the ETA.

2.2.6 Slip modulus of single shear connection

The slip modulus of the profiled aluminium nail in single shear connections shall be determined according to EN 26891 in direction as well as perpendicular to the grain of the board. The softwood parts of the specimen shall fulfil the requirements of EN ISO 8970 and shall belong to the strength class C16 to C24 according to EN 338. The geometry of the specimen is presented in Figure 2.

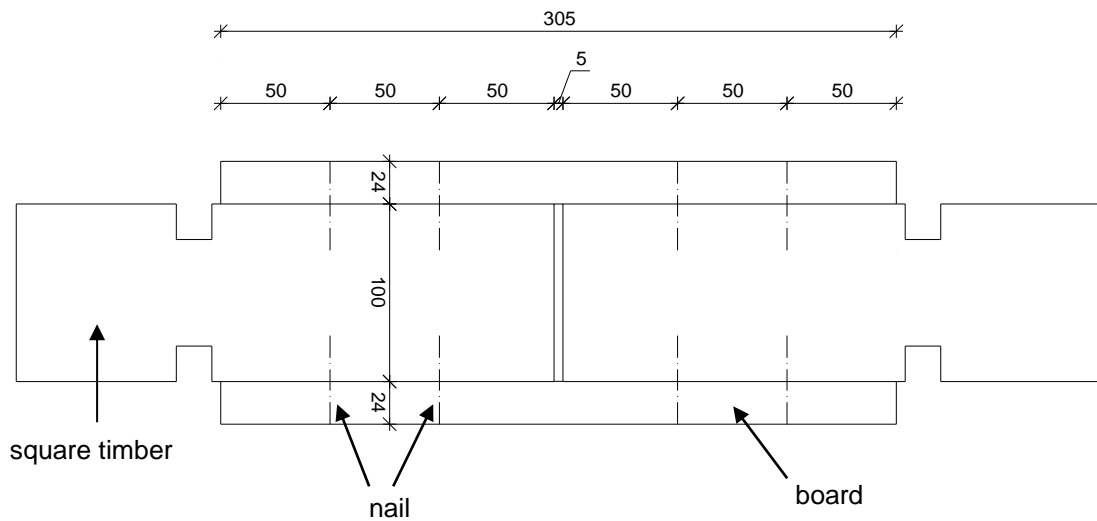


Figure 2: Geometry of the specimen for testing the slip modulus. Dimensions in mm.

The slip modulus shall be determined according to EN 26891.

The slip modulus shall be given in the ETA.

2.2.7 Resistance to corrosion

Durability against corrosion shall be assessed according to EN 1995-1-1, 4.3, and EN 1999-1-1, Annex D.

Contact between profiled aluminium nails and timber preservative treated against biological attack or fire retardants shall not result in corrosion in the intended use. If profiled aluminium nails are used in preservative treated timber the compatibility has to be assessed.

The corrosion protection shall be given in conjunction with the admissible service conditions and the admissible corrosive category according to EN 1999 1-1.

2.2.8 Reaction to fire

The profiled aluminium nail is considered to satisfy the requirements for performance class A1 of the characteristic reaction to fire in accordance with the EC Decision 96/603/EC as amended without the need for testing on the basis of it fulfilling the conditions set out in that Decision and its intended use being covered by that Decision.

3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

3.1 System(s) of assessment and verification of constancy of performance to be applied

For the products covered by this EAD the applicable European legal act is: Decision 97/176/EC

The system is: 3

3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of the product in the procedure of assessment and verification of constancy of performance are laid down in Table 2.

Table 2 Control plan for the manufacturer; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan]*					
1	Raw material of wire	Inspection certificate 3.1 according to EN 10204	According to product specification in EN 573-3	–	each working shift and each aluminium delivery
2	Dimensions	EN 14592	EN 14592	5	
3	Tensile strength	EN 14592	EN 14592	10 per diameter	each aluminium delivery
4	Yield moment	1)	–	–	
5	Withdrawal parameter	1)	–	–	
6	Head pull-through parameter	1)	–	–	
1) Indirect by control of the raw material and dimensions					

4 REFERENCE DOCUMENTS

- EN 338 (04.2016): Structural timber – Strength classes
- EN 409 (04.2009): Timber structures – Test methods – Determination of the yield moment of dowel type fasteners
- EN 573-3 (10.2013): Aluminium and aluminium alloys – Chemical composition and form of wrought products –Part 3: Chemical composition and form of products
- EN 1382 (02.2016): Timber structures – Test methods – Withdrawal capacity of timber fasteners
- EN 1383 (02.2016): Timber structures – Test methods – Pull through resistance of timber fasteners
- EN 1995-1-1 (11.2004) +AC (06.2006) +A1 (06.2008) +A2 (05.2014): Eurocode 5: Design of timber structures – Part 1-1: General – Common rules and rules for buildings
- EN 1999-1-1 (05.2007) +A1(07.2009) +A2 (12.2013): Eurocode 9: Design of aluminium structures – Part 1-1: General structural rules
- EN 10204 (10.2004): Metallic products – Types of inspection documents
- EN 14358 (06.2016): Timber structures – Calculation and verification of characteristic values
- EN 14592 (05.2012): Timber structures – Dowel-type fasteners – Requirements
- EN 26891 (02.1991): Timber structures – Joints made with mechanical fasteners – General principles for the determination of strength and deformation characteristics
- EN ISO 8970 (06.2010): Timber structures – Testing of joints made with mechanical fasteners – Requirements for wood density