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Authorised and notified according to Article 29 of the Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011

European Technical Assessment ETA-22/0083 of 2022/03/11

General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:	Eurotec Connector Nails
Product family to which the above construction product belongs:	Nails and screws for use in nailing plates in timber structures
Manufacturer:	EuroTec GmbH Unter dem Hofe 5 DE-58099 Hagen Telephone +49 2331 62450 Internet: www.eurotec.team
Manufacturing plant:	Manufacturing plant HSW 49
This European Technical Assessment contains:	10 pages including 2 annexes which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:	European Assessment Document (EAD) no EAD 130033-00-0603 “Nails and screws for use in nailing plates in timber structures”
This version replaces:	

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product

Eurotec Connector Nails are made from cold formed steel thread. The shank is cylindrical and made with annular rings on part of the shank.

The nails shall be produced from carbon steel wire. Where corrosion protection is required, the material or coating shall be declared in accordance with the relevant specification given in Annex A of EN 14592. See Annex A for drawing including material and dimensions of the nails covered by this ETA.

Geometry
The range covers nails with a diameter of 4,0 mm. The length varies from 40 mm to 60 mm. These nails are all ringed shank nails. Other dimensions appear from Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The nails are used for steel and aluminium nailing plates and three-dimensional steel and aluminium nailing plates up to 6 mm thick for connections in load bearing timber structures with members of for example solid timber, glued laminated timber, cross laminated timber and similar glued members of wood-based structural members.

Steel plates shall only be located on the side of the nail head. The following wood-based panels may be used for Eurotec nails:

- Solid wood panels according to EN 13353 and EN 13986 and cross laminated timber according to ETA
- Laminated Veneer Lumber according to EN 14374 or ETA

The nails shall be driven into the wood without pre-drilling.

The design of the connections shall be based on the characteristic load-carrying capacities of the nails. The design capacities shall be derived from the characteristic capacities in accordance with Eurocode 5 or an appropriate national code.

The nails are intended for use for connections subject to static or quasi static loading.

The scope of the nails regarding resistance to corrosion shall be defined according to national provisions that apply at the installation site considering environmental conditions. Section 3.6 of this ETA contains the corrosion protection for Eurotec Connector Nails made from carbon or stainless steel.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the Eurotec Connector Nails of 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body 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.

3 Performance of the product and references to the methods used for its assessment

Characteristic	Assessment of characteristic
3.1 Mechanical resistance and stability*) (BWR1)	
Withdrawal and lateral load-carrying capacity	See Annex B
Tensile capacity	Characteristic value $f_{tens,k}$: Eurotec Connector Nails d = 4,0 mm: $f_{tens,k}$ = 8.0 kN
Corrosion	See section 3.6
3.2 Safety in case of fire (BWR2)	
Reaction to fire	The nails are made from steel classified as Euroclass A1 in accordance with EN 13501-1 and Commission Delegated Regulation 2016/364
3.3 Hygiene, health and the environment (BWR3)	
Influence on air quality	The product does not contain/release dangerous substances**)
3.4 General aspects related to the performance of the product	The nails have been assessed as having satisfactory durability and serviceability when used in timber structures using the timber species described in Eurocode 5 and subject to the conditions defined by service class 1 and 2

*) See additional information in section 3.5 – 3.7.

**) In addition to the specific clauses relating to dangerous substances contained in this European Technical Assessment, 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 Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.5 Mechanical resistance and stability

The load-carrying capacities for Eurotec Connector Nails are applicable to the wood-based materials mentioned in paragraph 2 even though the term timber has been used in the following.

The characteristic lateral load-carrying capacities and the characteristic axial withdrawal capacities of Eurotec Connector Nails should be used for designs in accordance with Eurocode 5 or an appropriate national code. The formulas for the load-carrying capacities are restricted to characteristic densities of the non-predrilled wood-based materials up to 500 kg/m³. Even though the non-predrilled wood-based material may have a larger density, this must not be used in the formulas.

The capacities stated below are applicable to connections with metal plates.

The diameter of the nails shall be greater than the maximum width of the gaps in the layers of the cross laminated timber.

ETAs for structural members or wood-based panels must be considered where applicable.

Withdrawal capacity
The characteristic withdrawal capacity, $F_{ax,Rk}$, of a Eurotec Connector Nails in non-predrilled members shall be calculated from:

$$F_{ax,Rk} = f_{ax,k} \cdot d \cdot \ell_{ef} \cdot \left(\frac{\rho_k}{350} \right)^{0,8} \quad [N]$$

Where:
$f_{ax,k}$ is the characteristic withdrawal parameter in N/mm², see Table 1

Table 1: Characteristic withdrawal parameters in N/mm² for Eurotec Connector Nails

Nail dxL	
4x40	4,84
4x50	5,09
4x60	5,23

d is the nominal diameter of the nail in mm,
ℓef is the penetration length of the threaded part, including the point length, in the point side member in mm,
ρ_k is the characteristic timber density, ρk ≤ 500 kg/m³.

Lateral capacity
The characteristic lateral load-carrying capacity of a Eurotec Connector Nails in a metal plate shall be calculated from:

$$F_{v,Rk} = \min \begin{cases} 0,4 \cdot f_{h,k} \cdot t_1 \cdot d \\ 1,15 \cdot \sqrt{2 \cdot M_{y,Rk} \cdot f_{h,k} \cdot d} + \mu \cdot F_{ax,Rk} \end{cases} \quad [N]$$

for thin metal plates, and

$$F_{v,Rk} = \min \begin{cases} f_{h,k} \cdot t_1 \cdot d \\ f_{h,k} \cdot t_1 \cdot d \left[\sqrt{2 + \frac{4 \cdot M_{y,Rk}}{f_{h,k} \cdot d \cdot t_1^2}} - 1 \right] + \mu \cdot F_{ax,Rk} \\ 2,3 \cdot \sqrt{M_{y,Rk} \cdot f_{h,k} \cdot d} + \mu \cdot F_{ax,Rk} \end{cases} \quad [N]$$

for thick metal plates.

Where
$f_{h,k}$ is the characteristic embedding strength [N/mm²] of the timber or wood-based panel according to EN 1995-1-1;
t_1 is the minimum of the nail penetration length including the tip or the timber thickness [mm];
d is the nominal nail diameter [mm];
$M_{y,Rk}$ is the characteristic nail yield moment [Nmm];
μ is a factor for the rope effect:
μ = 0,8 for nails d = 4,0 mm

Yield moment
The characteristic yield moment $M_{y,Rk}$, of a Eurotec Connector Nailsis stated in Table B.4 in Annex B depending on the nail diameter.

Thick metal plates may be assumed for the following plate thicknesses for nails in wood-based materials with a characteristic density up to 500 kg/m³:

Eurotec Connector Nails ∅ 4,0 mm: $t_{thick} \geq 1,5$ mm

The following plate thicknesses apply for thin metal plates for nails in wood-based materials with a characteristic density up to 500 kg/m³:

Eurotec Connector Nails ∅ 4,0 mm: $t_{thin} \geq 0,9$ mm

Minimum metal plate thicknesses are:
Eurotec Connector Nails ∅ 4,0 mm:

$$t_{min} = \max \left\{ 0,9 \text{ mm}; \frac{F_{v,Rk}}{2 \cdot d \cdot f_{u,k}} \right\}$$

Where
$f_{u,k}$ is the characteristic tensile strength [MPa] of the metal plate.

For plate thicknesses between minimum thickness t_{min} and the thickness t_{thick} linear interpolation may be used.

Combined laterally and axially loaded nails

For nailed connections subjected to a combination of axial and lateral load, the following expression should be satisfied:

$$\left(\frac{F_{ax,Ed}}{F_{ax,Rd}}\right)^2 + \left(\frac{F_{v,Ed}}{F_{v,Rd}}\right)^2 \leq 1$$

where

$F_{ax,Ed}$ axial design load of the nail
$F_{v,Ed}$ lateral design load of the nail
$F_{ax,Rd}$ design load-carrying capacity of an axially loaded nail
$F_{v,Rd}$ design load-carrying capacity of a laterally loaded nail

3.6 Aspects related to the performance of the product

3.6.1 Corrosion protection in service class 1 and 2

The nails are produced from carbon wire. Carbon steel nails are electroplated. The minimum thickness of the zinc coating for electroplated nails is 7µm.

3.7 General aspects related to the fitness for use of the product

The nails are manufactured in accordance with the provisions of this European Technical Assessment using the manufacturing processes as identified in the inspection of the plant by the notified inspection body and laid down in the technical documentation.

The installation shall be carried out in accordance with Eurocode 5 or an appropriate national code unless otherwise is defined in the following. Instructions from EuroTec GmbH should be considered for installation.

For structural members according to ETAs the terms of the ETAs must be considered.

4 Assessment and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the decision 97/638/EC of the European Commission, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 2+.

5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

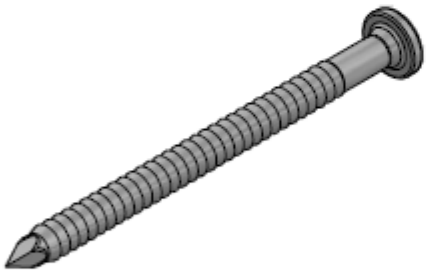
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking.

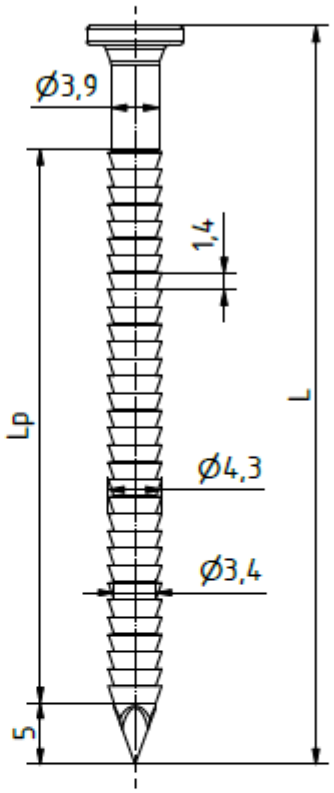
Issued in Copenhagen on 2022-03-11 by

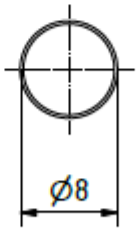
Thomas Bruun
Managing Director, ETA-Danmark

Annex A
Drawing of Eurotec Connector Nails

Nagel	L [mm]	Lp [mm]
Ø4x40	40	25
Ø4x50	50	35
Ø4x60	60	45







Annex B
Characteristic capacities for Eurotec Connector Nails

Characteristic capacities for a characteristic density of the members of solid timber, glued laminated timber, cross lam-inated timber, similar glued members and of wood-based structural members as indicated in Table B.1. The nail shall be driven without predrilling completely into the wood or wood-based material, which shall have a thickness of at leastthe length of the nail. The values given in Table B.1 presuppose that the threaded part of the nail is completely embeddedin the wood or wood-based material.

Table B.1 Characteristic capacities for electro-plated Eurotec Connector Nails

Nail	ρ_k = 290 kg/m³			ρ_k = 320 kg/m³			ρ_k = 350 kg/m³			ρ_k = 380 kg/m³			ρ_k = 400 kg/m³		
	$F_{ax,Rk}$ [N]	$F_{v,Rk}$ [N]		$F_{ax,Rk}$ [N]	$F_{v,Rk}$ [N]		$F_{ax,Rk}$ [N]	$F_{v,Rk}$ [N]		$F_{ax,Rk}$ [N]	$F_{v,Rk}$ [N]		$F_{ax,Rk}$ [N]	$F_{v,Rk}$ [N]	
		thin	thick		thin	thick		thin	thick		thin	thick		thin	thick
4,0 x 40	500	982	1631	541	1083	1768	581	1185	1904	621	1286	2040	647	1354	2130
4,0 x 50	700	1233	2006	758	1360	2147	814	1488	2262	869	1615	2374	906	1700	2447
4,0 x 60	900	1484	2187	974	1637	2320	1046	1790	2448	1118	1944	2573	1164	2046	2654
Nail	ρ_k = 430 kg/m³			ρ_k = 460 kg/m³			ρ_k = 500 kg/m³								
	$F_{ax,Rk}$ [N]	$F_{v,Rk}$ [N]		$F_{ax,Rk}$ [N]	$F_{v,Rk}$ [N]		$F_{ax,Rk}$ [N]	$F_{v,Rk}$ [N]							
		thin	thick		thin	thick		thin	thick						
4,0 x 40	685	1455	2265	723	1557	2399	773	1692	2545						
4,0 x 50	960	1828	2554	1013	1955	2658	1083	2125	2792						
4,0 x 60	1234	2200	2773	1302	2348	2889	1392	2475	3040						

$F_{ax,Rk}$ Characteristic withdrawal (axial) capacity per nail
Values for other densities (ρ_k) up to 500 kg/m³ may be calculated by multiplying the values for ρ_k = 350 kg/m³with $(\rho_k/350)^{0,8}$

$F_{v,Rk}$ Characteristic load-carrying capacity per shear plane per nailThin refers to a plate thickness = 0,9 mm
Thick refers to a plate thickness = 1,5 mm

Table B.4 Characteristic yield moments for Eurotec Connector Nails

Nail diameter [mm]		$M_{y,Rk}$ [Nmm]
4,0	Carbon steel electro-plated	6480