Declaration of Performance

No **5 - 005 - 220867 - 2022/01** **EN**

1.) Unique identification code of the product-type:

Three-dimensional nailing plates / EJOT Purlin Anchors

2.) Intended use:

Purlin Anchors for timber to timber

3.) Manufacturer:

EJOT Baubefestigungen GmbH, In der Stockwiese 35, 57334 Bad Laasphe - Germany

4.) System of AVCP:

System 2+

5.)

European Assesment Document:	**EAD 130186-00-0603**
European Technical Assessment:	**ETA 22/0867**
Technical assessment body:	**Eurofins Expert Services Oy**
Notified body:	**1336 - Inspecta Estonia OÜ**

6.) Declared Performance:

a) Mechanical resistance and stability (BWR 1) and safety and accessibility (BWR 4)

Essential characteristic	Performance
Joint strength	Characteristic resistance values are given in Annex 2
Stiffness	NPD
Ductility in cyclic testing	NPD
Resistance to seismic actions	NPD
Resistance to corrosion and deterioration	The purlin anchors have been assessed as having satisfactory durability and serviceability when used in timber structures using the timber species described in Eurocode 5 (EN 1995-1-1: 2004) and subject to the conditions defined by service class 1 and 2

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b) Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	The purlin anchors are made from steel classified to have reaction to fire class A1 according to EN 13501-1.
Resistance to fire	NPD

c) Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance

d) Protection against noise (BWR 5)

Essential characteristic	Performance

e) Energy economy and heat retention (BWR 6)

Essential characteristic	Performance

f) Sustainable use of natural resources (BWR 7)

Essential characteristic	Performance

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

Dr. Jens Weber
(Name)

Bad Laasphe, 27/12/2022
(Place and date of issue)

(Signature)

ANNEX 2. CHARACTERISTIC LOAD-CARRYING CAPACITIES

Characteristic resistances for EJOT Purlin Anchors - calculation method

Lateral load-carrying capacity of fastener

The characteristic load-carrying capacity for nails and screws in EJOT Purlin Anchor connections per fastener should be taken as the minimum value found from the following expressions:

- for a thick fastener $d \geq 4$ mm:

$$F_{v,Rk} = \min \begin{cases} 0{,}4 f_{h,k} t_1 d & \text{(a)} \\ 1{,}15\sqrt{2 M_{y,Rk} f_{h,k} d} + \frac{F_{ax,Rk}}{4} & \text{(b)} \end{cases} \quad (1)$$

- for a thin fastener $d \leq 2$ mm:

$$F_{v,Rk} = \min \begin{cases} f_{h,k} t_1 d & \text{(a)} \\ f_{h,k} t_1 d \left[\sqrt{2 + \frac{4 M_{y,Rk}}{f_{h,k} d\, t_1^2}} - 1 \right] + \frac{F_{ax,Rk}}{4} & \text{(b)} \\ 2{,}3\sqrt{M_{y,Rk} f_{h,k} d} + \frac{F_{ax,Rk}}{4} & \text{(c)} \end{cases} \quad (2)$$

- for a fastener 2 mm < d < 4 mm, linear interpolation between equations (1) and (2) is used.

In equations (1) and (2) the penetration length of fastener in timber $t_1 = L - t$, when L is the length of fastener and t is the thickness of steel plate, d is the nominal diameter of nail or the effective diameter of screw = 1,1di, when di is the inner diameter of threaded part of screw, $M_{y,k}$ is the characteristic yield moment of the fastener determined according to standards EN 14952 and EN 409, $F_{ax,k}$ is the characteristic withdrawal capacity of the fastener with a limitation of term $F_{ax,k}/4$ at maximum to 1/3 with nails and to 1/2 with screws from the load-carrying capacity $F_{v,Rk}$ and the characteristic embedding strength

$$f_{h,k} = 0{,}082 \rho_k d^{-0{,}3} \quad \text{N/mm}^2 \quad (3)$$

where ρ_k is the characteristic density of timber.

The capacity according to equation (2) may be used for anchor nails of diameter 4,0 mm provided, that it has a cone head with minimum conical part length of 4 mm and the minimum cone diameter of 5,2 mm at the head of nail.

Load-carrying capacity of Purlin Anchor connection

The Purlin Anchors are used as a purlin to beam or a purlin to column connection subjected to a tension load F_d parallel to the length direction of the connector (see Figure A.2.1). The Purlin Anchors are not assumed to have any load-carrying capacity for lateral forces perpendicular to the length direction of the connector. Two same sizes of connectors with the same number of fasteners are always used symmetrically at both sides of the beam for that a pure tension force would act on the plane of the flange of the connector without any eccentricity.

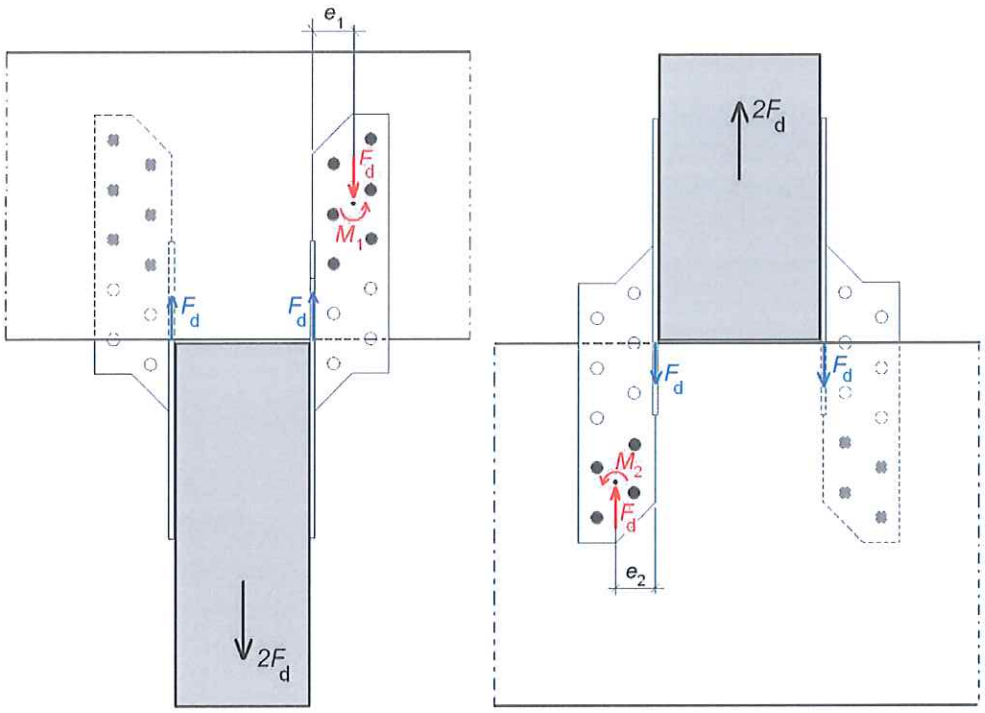

Figure A.2.1 Use of Purlin Anchors as tension connectors and the forces and moments acting in the Purlin Anchor.

The characteristic load-carrying capacity per purlin anchor should be taken as follows:

- for failure in steel:

$$F_{Rk,S} = 3{,}66 \text{ kN} \tag{4}$$

- for failure in nailed or screwed timber-to-steel connection:

$$F_{Rk,H} = \min\left\{ \frac{F_{v,Rk,1}}{\frac{1}{n_1} + \frac{e_1}{\sum_{i=1}^{n_1} r_{i,1}}} \; ; \; \frac{F_{v,Rk,2}}{\frac{1}{n_2} + \frac{e_2}{\sum_{i=1}^{n_2} r_{i,2}}} \right\} \tag{5}$$

where:

$F_{v,Rk,j}$ is the characteristic lateral load-carrying resistance of the fastener in the timber member of flange j = 1 or 2 calculated according to expressions (1) and (2);

e_j is the eccentricity of the fastener group from the line of bent edge in the flange j = 1 or 2 (see Figure A.2.1);

$r_{i,j}$ is the distance of fastener i from the centroid of the fastener group in flange j;

n_j is the number of fasteners in flange j = 1 or 2.

Values of e_j and $\Sigma r_{i,j}$ for the certain number of fasteners n_1 and n_2 are presented in Table A.2.1, when the fasteners are inserted to the all holes from the ends of the connector (see Figure A.2.1).

Table A.2.1 Purlin Anchors – article numbers and nominal dimensions. Presented eccentricities e_j and moments arms $\Sigma r_{i,j}$ are valid for the given number of fasteners n_j.

Product type name	Art. No.	size (mm)	e_1 (mm)	e_2 (mm)	n_1	n_2	$Sr_{i,1}$ (mm)	$Sr_{i,2}$ (mm)
Purlin anchor 170 R	72101 Right	170x32x2,0	16,1	16,1	6	4	103,8	51,6
Purlin anchor 170 L	72102 Left	170x32x2,0	16,1	16,1	6	4	103,8	51,6
Purlin anchor 210 R	72103 Right	210x32x2,0	16,1	16,1	8	6	175,4	103,8
Purlin anchor 210 L	72104 Left	210x32x2,0	16,1	16,1	8	6	175,4	103,8
Purlin anchor 250 R	72105 Right	250x32x2,0	16,1	16,1	10	8	266,6	175,4
Purlin anchor 250 L	72106 Left	250x32x2,0	16,1	16,1	10	8	266,6	175,4
Purlin anchor 290 R	72107 Right	290x32x2,0	16,1	16,1	12	10	377,6	266,6
Purlin anchor 290 L	72108 Left	290x32x2,0	16,1	16,1	12	10	377,6	266,6
Purlin anchor 330 R	72109 Right	330x32x2,0	16,1	16,1	14	12	508,5	377,6
Purlin anchor 330 L	72110 Left	330x32x2,0	16,1	16,1	14	12	508,5	377,6
Purlin anchor 370 R	72111 Right	370x32x2,0	16,1	16,1	16	14	659,2	508,5
Purlin anchor 370 L	72112 Left	370x32x2,0	16,1	16,1	16	14	659,2	508,5

Design condition

The following design condition shall be satisfied:

$$F_d \leq \min\left\{\begin{array}{l}\dfrac{k_{mod} \cdot F_{Rk,H}}{\gamma_M} \\ \dfrac{F_{Rk,S}}{\gamma_{M0}}\end{array}\right. \qquad (6)$$

where

F_d is the design tension force per connector according to Figure A.2.1;

k_{mod} is the modification factor according to Eurocode 5 taking into account the effect of the duration of the load and moisture content for the timber member;

γ_M is the partial safety factor for the resistance of connections according to the actual National annex of EN 1995-1-1;

$F_{Rk,H}$ is the characteristic load-carrying capacity of the connector according to the expression (5);

γ_{M0} is the partial safety factor for the resistance of steel cross-section according to the actual National annex of EN 1993-1-1;

$F_{Rk,S}$ is the characteristic load-carrying capacity of connector according to the expression (4).

Structural requirements

The following provisions apply:

- The nailing pattern may be determined by case by case. However, at least two fasteners shall be used in both flanges of the connector.
- All minimum spacings and edge/end distances in accordance with Eurocode 5 shall be complied with.
- The splitting resistance of the timber members shall be verified according to Eurocode 5.
- The cross section of the connected timber members shall have a plane surface without wane against the purling anchor.

- There are no specific requirements relating to preparation of the timber members.
- In service class 2, the nails and screws shall have an electroplated zinc coating according to EN ISO 2081 at least of type and thickness Fe/Zn 12 c, or they shall be hot dip zinc coated according to EN ISO 1461, thickness at least 39 µm.
- The purlin anchors shall not be used without adequate protection for connections where resistance to fire is required.