



## European Technical Approval ETA-08/0186

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung  
*Trade name*

Sparrenpfettenanker rechts/links 170, 210 und 250,  
universal 170, 210 und 250 und beidseitig 170, 210 und 250

Zulassungsinhaber  
*Holder of approval*

BB Stanz- und Umformtechnik GmbH  
Nordhäuser Straße 42  
06536 Berga  
DEUTSCHLAND

Zulassungsgegenstand  
und Verwendungszweck  
*Generic type and use  
of construction product*

Blechformteile (Sparrenpfettenanker als Holzverbindungsmittel)  
*Three-dimensional nailing plates (Purlin anchor for wood to wood  
connections)*

Geltungsdauer:  
*Validity:* vom  
*from*  
bis  
*to*

20 June 2013  
20 June 2018

Herstellwerk  
*Manufacturing plant*

BB Stanz- und Umformtechnik GmbH  
Nordhäuser Straße 42  
06536 Berga  
DEUTSCHLAND

Diese Zulassung umfasst  
*This Approval contains*

15 Seiten einschließlich 2 Anhänge  
*15 pages including 2 annexes*

Diese Zulassung ersetzt  
*This Approval replaces*

ETA-08/0186 mit Geltungsdauer vom 01.09.2008 bis 31.08.2013  
*ETA-08/0186 with validity from 01.09.2008 to 31.08.2013*

## I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik 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<sup>1</sup>, modified by Council Directive 93/68/EEC<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>;
  - *Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998<sup>4</sup>, as amended by Article 2 of the law of 8 November 2011<sup>5</sup>;*
  - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC<sup>6</sup>;
  - Guideline for European technical approval of "Three-dimensional nailing plates", ETAG 015.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. 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 of this European technical approval.
- 4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
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- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

<sup>1</sup> Official Journal of the European Communities L 40, 11 February 1989, p. 12  
<sup>2</sup> Official Journal of the European Communities L 220, 30 August 1993, p. 1  
<sup>3</sup> Official Journal of the European Union L 284, 31 October 2003, p. 25  
<sup>4</sup> *Bundesgesetzblatt Teil I 1998*, p. 812  
<sup>5</sup> *Bundesgesetzblatt Teil I 2011*, p. 2178  
<sup>6</sup> Official Journal of the European Communities L 17, 20 January 1994, p. 34

## II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

### 1 Definition of the product and intended use

#### 1.1 Definition of the construction product

Purlin anchors right/left 170, 210 and 250, universal 170, 210 and 250 and double-sided 170, 210, and 250 are one-piece, non-welded timber connectors, which are fastened to timber members with nails. They are made through cold forming of zinc-coated steel S250GD + Z275 in accordance with EN 10346<sup>7</sup>.

Design, dimensions, hole positions, steel grade and a typical installation are presented in Annex A. Purlin anchors are produced from steel sheets with dimensions according to EN 10143<sup>8</sup>.

#### 1.2 Intended use

Purlin anchors are used for structural timber to timber connections in wood constructions, which are subject to the requirement "Mechanical resistance and stability" within the meaning of Essential Requirement 1 of Council Directive 89/106/EEC.

A connection always consists of two purlin anchors (see Annex A). The structural behaviour of the components and the support and restraint conditions shall comply with the specifications in section 4.2 of this ETA. The purlin anchors may only be used in service classes 1 and 2 of Eurocode 5, for structures that are primarily subject to static or quasi static loading.

The timber members can be of solid wood, glued laminated timber or wood-based materials. The requirements for the timber members are fulfilled by timber or wood-based materials with a characteristic density between 290 kg/m<sup>3</sup> and 420 kg/m<sup>3</sup>. The following softwood materials are suitable for connections with the purlin anchors produced by the company BB Stanz- und Umformtechnik GmbH:

- Structural solid timber of at least strength class C24 according to EN 338<sup>9</sup> / EN 14081-1<sup>10</sup>,
- Glulam according to EN 1194<sup>11</sup> / EN 14080<sup>12</sup>,
- Solid wood panels according to EN 13353<sup>13</sup> / EN 13986<sup>14</sup>,
- Laminated veneer lumber (LVL) according to EN 14374<sup>15</sup> (connection only perpendicular to the plane of the veneer),
- Plywood according to EN 636<sup>16</sup> / 13986,
- Oriented strand board (OSB) according to EN 300<sup>17</sup> / EN 13986.

7	EN 10346:2009	Continuously hot-dip coated steel flat products -Technical delivery conditions
8	EN 10143:2006	Continuously hot-dip coated steel sheet and strip – Tolerances on dimensions and shape
9	EN 338:2009	Timber structures - Strength classes
10	EN 14081-1:2005+A1:2011	Timber structures - Strength graded structural timber with rectangular cross section - Part 1: General requirements
11	EN 1194:1999	Timber structures - Glued laminated timber - Strength classes and determination of characteristic values
12	EN 14080:2005	Timber structures - Glued laminated timber - Requirements
13	EN 13353:2008+A1:2011	Solid wood panels (SWP) - Requirements
14	EN 13986:2004	Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking
15	EN 14374:2004	Timber structures - Structural laminated veneer lumber - Requirements
16	EN 636:2012	Plywood - Specifications
17	EN 300:2006	Oriented Strand Boards (OSB) – Definitions, classification and specifications

The members must have a thickness that is greater than the penetration depth of the nail into the member.

Annex B includes characteristic values of load-carrying capacities for connections with purlin anchors for a characteristic density of 350 kg/m<sup>3</sup>. For timber or wood-based materials with a characteristic density less than 350 kg/m<sup>3</sup> the characteristic values of the load-carrying capacity shall be reduced by a factor of  $k_{\text{dens}}$ :

$$k_{\text{dens}} = (\rho_k / 350)^{0.5}$$

Where  $\rho_k$  is the characteristic density of the timber or wood-based material in kg/m<sup>3</sup>.

The design of the connections shall be carried out according to national provisions that apply at the installation site of the certified object in line with the partial safety factor format, e.g. in accordance with Eurocode 5.

The provisions of this European technical approval are based on an assumed working life of 50 years for the purlin anchors, provided the purlin anchors are subject to appropriate use and maintenance.

The information provided on the working life cannot be interpreted as a guarantee given by the producer, but should be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the construction.

## 2 Characteristics of product and assessment

### 2.1 Characteristics

ETAG para.	Characteristics	Assessment of characteristic
6.1	<b>Mechanical resistance and stability<sup>*)</sup></b>	
6.1.1	Load-carrying capacity	See Annex B
6.1.2	Stiffness	No performance determined
6.1.3	Ductility in cyclic testing	No performance determined
6.2	<b>Safety in case of fire</b>	
	Reaction to fire	The purlin anchors are made of <b>European Class A1</b> steel in accordance with Decision 96/603/EC of the European Commission and its amendment through Decision 2000/605/EC of the European Commission.
	Resistance to fire	Resistance to fire is determined for complete structural elements with any associated finishes, but not for an individual connector. Therefore no performance is determined for this Essential Requirement.
6.3	<b>Hygiene, health and the environment</b>	
6.3.1	Release of dangerous substances	No dangerous substances <sup>**)</sup>
6.4	<b>Safety in use</b>	Not relevant
6.5	<b>Protection against noise</b>	Not relevant
6.6	<b>Energy economy and heat retention</b>	Not relevant
6.7	<b>Aspects of serviceability <sup>***)</sup></b>	
6.7.1	Durability	The purlin anchors have sufficient durability and serviceability as far as they are used with timber types as defined in service classes 1 and 2 of Eurocode 5.
6.7.2	Serviceability	
6.7.3	Identification	See Annex A

\*) See section 2.2 of this ETA

\*\*) In accordance with <http://europa.eu.int/-/comm/enterprise/construction/internal/dangsub/dangmain.htm>. 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 EC Construction Products Directive, these requirements shall also be complied with, when and where they apply.

\*\*\*) See section 2.3 of this ETA

## 2.2 Mechanical resistance and stability

The characteristic values of the load-carrying capacity of a connection with purlin anchors are based on the characteristic values of the nailed connection, the timber members and the steel sheet. To calculate the design values, the characteristic values of the load-carrying capacity given in Annex B shall be divided by the partial safety coefficient for the material properties, and multiplied by the coefficient  $k_{\text{mod}}$  for the nailed connection and the timber members with regard to the load duration and the service class defined in Eurocode 5.

According to section 6.3.5 of EN 1990 (Eurocode - Basis of structural design), in this case the design value of the load-carrying capacity may be determined by reducing the characteristic load-carrying capacity values with the different partial safety factors.

Therefore characteristic values of the load-carrying capacity have been determined both for timber failure  $F_{\text{Rk,H}}$  (obtaining the embedment strength of nails subjected to shear),  $F_{90,\text{Rk}}$  (obtaining the transverse tensile strength of timber members loaded perpendicular to the axis) as well as for steel sheet failure  $F_{\text{Rk,S}}$ . The design value of the load-carrying capacity  $F_{\text{Rd}}$  is the smallest value of:

$$F_{\text{Rd}} = \min \left\{ \frac{k_{\text{mod}} \cdot F_{\text{Rk,N}}}{\gamma_{\text{M,H}}}; \frac{F_{\text{Rk,S}}}{\gamma_{\text{M,S}}}; \frac{k_{\text{mod}} \cdot F_{90,\text{Rk}}}{\gamma_{\text{M,H}}} \right\}$$

Thus the load duration class and the service class are taken into consideration for timber failure and nailed connection failure. The different partial safety factors  $\gamma_{\text{M}}$  for steel and timber are also taken into account.

Information on the fasteners is provided in Annex A Table A.3. The related nail arrangements are presented in the product drawings in Annex A, Figures. A.1-A.9. Annex B contains the characteristic values of the load-carrying capacity for the load direction  $F_1$  parallel to the longitudinal axis of the anchor.

The characteristic values of the load-carrying capacity are determined by calculations in accordance with ETA-guideline ETAG 015. They are used for the design according to national provisions that apply at the installation site in line with the partial safety factor format, e.g. in accordance with Eurocode 5.

No performance has been determined for the ductility of a connection under cyclic loads. Thus the contribution of the connections to structural behaviour under earthquake loads is not assessed. No performance has been determined for the stiffness of a connection as verification of the serviceability limit state.

## 2.3 Aspects of serviceability

### 2.3.1 Corrosion protection in service classes 1 and 2

In line with ETAG 015, the purlin anchors are made of zinc-coated steel grade S250GD + Z275 in accordance with EN 10346.

2.3.2 In accordance with Eurocode 5 - Table 4.1 - the nails to be used with the purlin anchors may be of uncoated steel for service class 1 and require corrosion protection Fe/Zn 12c or Z275 for service class 2.

2.3.3 If preservative treatment of timber shall be used national regulations apply.

### 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<sup>18</sup>, system 2+ of the attestation of conformity applies.

This system of attestation of conformity is defined as follows:

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 the 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 attained. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use the raw materials listed in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the "Control plan relating to the European technical approval ETA-08/0186 which is part of the technical documentation of this European technical approval. The control plan is specified in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik<sup>19</sup>.

The incoming raw materials shall be checked and tested by the manufacturer before acceptance. The check of materials, such as the steel sheet, shall include control of the test certificates presented by suppliers (comparison with nominal values), including verification of dimensions and determination of material properties, e.g. chemical composition, mechanical properties and thickness of the zinc coating.

The manufactured construction products shall be checked visually and for dimensional accuracy. The control plan includes details of the scope, type and frequency of testing and controls to be carried out within factory production control.

<sup>18</sup> Official Journal of the European Union L 268/36, 1.10.97

<sup>19</sup> The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan. The records shall include at least the following information:

- designation of the product, basic material and components,
- type of control or test,
- date of manufacture of the product and date of testing the product or its basic material and components,
- results of control and testing and, if applicable, comparison with requirements,
- signature of the person responsible for factory production control.

The records shall be submitted to the body approved for the continuous surveillance and, on demand, to Deutsches Institut für Bautechnik.

#### 3.2.1.2 Other tasks for the manufacturer

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 purlin anchors in order 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 involved.

For initial type-testing of the product, the results of the tests performed as part of the assessment for the European technical approval may be used, unless there are changes to the production line or plant. In such cases the necessary initial type testing has to be agreed between Deutsches Institut für Bautechnik and the notified body.

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-08/0186.

### 3.2.2 Tasks for the approved bodies

The approved body shall perform the following tasks in accordance with the provisions laid down in the control plan:

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

#### 3.2.2.1 Initial inspection of the factory and of factory production control

The approved body should ascertain that, in accordance with the prescribed control plan, the factory, in particular the staff and equipment, and the factory production control, are suitable to ensure a continuous and orderly manufacturing of the purlin anchors with this European technical approval.

#### 3.2.2.2 Continuous surveillance

The approved body shall visit the factory at least twice a year for routine inspections. It shall be verified that the system of factory production control and the specified manufacturing processes are maintained in accordance with the control plan.

#### 3.2.2.3 Other tasks for the approved bodies

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.

The results of continuous surveillance shall be made available on demand by the certification body to Deutsches Institut für Bautechnik.



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 the Deutsches Institut für Bautechnik without delay.

### 3.3 CE marking

The CE marking shall be affixed on each packaging of purlin anchors. 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 manufacture),
- the last two digits of the year in which the CE marking was affixed,
- the number of EC certificate of conformity for the factory production control,
- the number of the European technical approval,
- the number of the guideline for the European technical approval (ETAG 015),
- the name and size of product.

## 4 Assumptions under which the fitness of the product for the intended use was favourably assessed

### 4.1 Manufacturing

The BB purlin anchors shall be manufactured in accordance with the provisions of the European technical approval using the manufacturing processes as identified in the inspection of the plant by the notified inspection body and described in the technical documentation.

The European technical approval is issued for the product on the basis of agreed data/information, which is deposited with Deutsches Institut für Bautechnik and 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 Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik 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

The connection of timber members with purlin anchors is considered to be suitable for the intended use provided:

#### *Support and restraint conditions*

It is assumed that members connected by purlin anchors are prevented from rotation.

#### *Nail arrangement*

The holes shall be nailed from the end of the purlin anchor. The nail arrangement is shown in Annex A.

#### *Wane*

Wane is not permissible; timber members must be sharp-edged in the area of the purlin anchors.

*Others*

The members must have a thickness that is greater than the penetration depth of the nail into the member.

Installation is carried out by personnel under the direction of supervisors. The personnel is appropriately qualified for this work. Installation is in accordance with the manufacturer's technical documentation.

**5 Recommendations**

**5.1 Packaging, transport, storage**

BB purlin anchors are packed in boxes that bear the name of the manufacturer, product type, dimensions, quantity, date of manufacture and details of the delivery batch.

In relation to transportation and storage, the purlin anchors should be treated as conventional metallic building products.

**5.2 Use, maintenance, repair**

Assessment of the fitness for use is based on the assumption that repair is not required during the assumed working life. Should repair prove necessary, this is normally done by replacement of the purlin anchor.

Andreas Kummerow  
p. p. Head of Department

*beglaubigt:*  
Baumann

## Annex A

### Product details

Table A.1 Material specifications

Purlin anchor type	Thickness (mm)	Steel designation	Zinc coating
right/left (170-250)	2.0	S250GD	Z275
universal (170-250)	2.0	S250GD	Z275
double-sided (170-250)	2.0	S250GD	Z275

Table A.2 Dimensions

Purlin anchor type	Length (mm)		Width (mm)	
	min	max	min	max
right/left 170	169	172	34.5	35.5
right/left 210	209	212	34.5	35.5
right/left 250	249	252	34.5	35.5
universal 170	169	172	34.5	35.5
universal 210	209	212	34.5	35.5
universal 250	249	252	34.5	35.5
double-sided 170	169	172	34.5	35.5
double-sided 210	209	212	34.5	35.5
double-sided 250	249	252	34.5	35.5

Table A.3 Fastener specifications  
Nail arrangement presented in Figures A.1-A.9  
(Holes to be nailed are marked in black)

Nail type	Nail size (mm)		Finish
	Diameter	Length	
Acc. prEN 14592 Threaded nail with a truncated cone under the head	4.0	40	Electro plated zinc

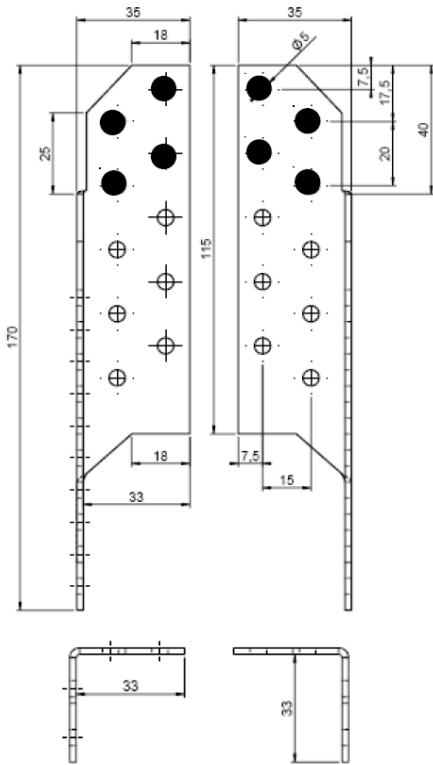


Figure A.1 Dimensions of purlin anchor right/left 170

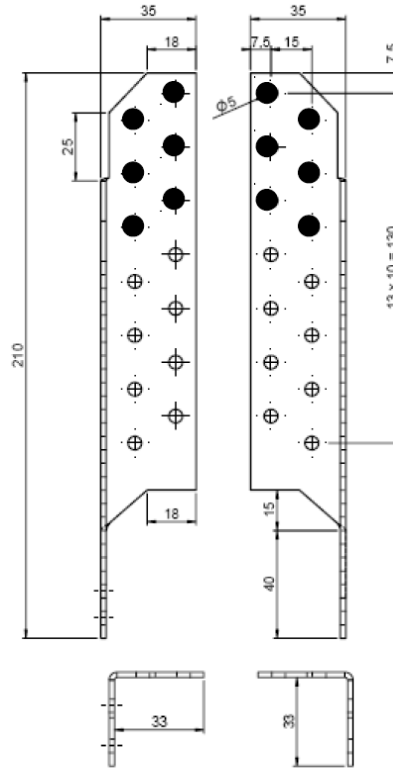


Figure A.2 Dimensions of purlin anchor right/left 210

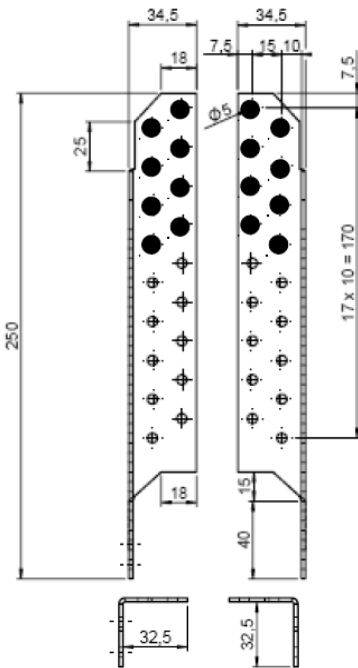


Figure A.3 Dimensions of purlin anchor right/left 250

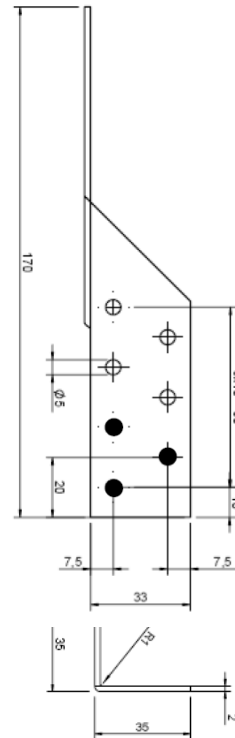


Figure A.4 Dimensions of purlin anchor universal 170

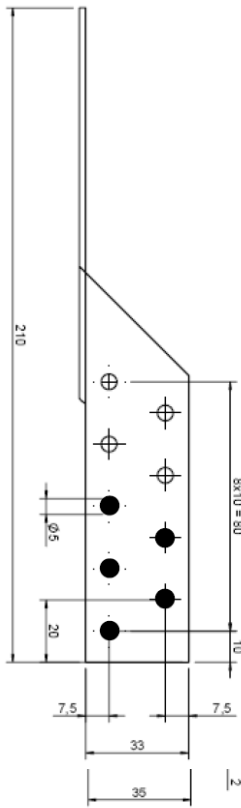


Figure A.5 Dimensions of purlin anchor universal 210

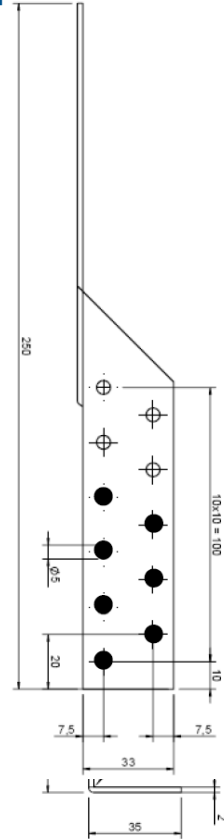


Figure A.6 Dimensions of purlin anchor universal 250

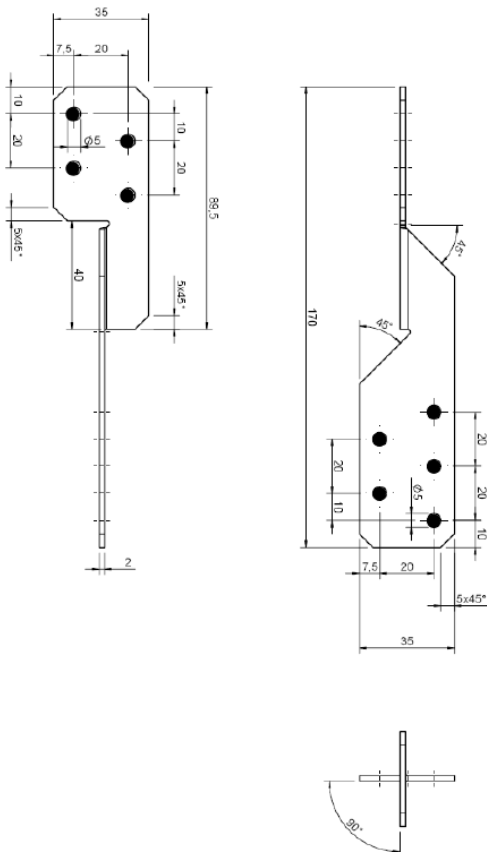


Figure A.7 Dimensions of purlin anchor double sided 170

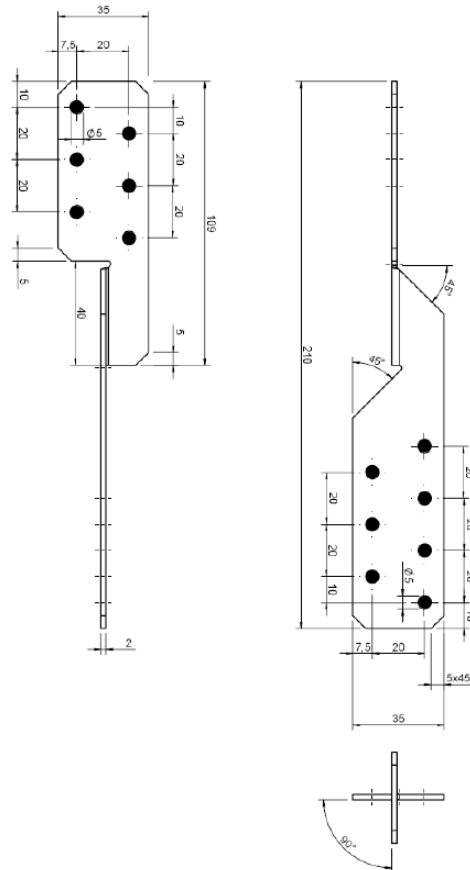


Figure A.8 Dimensions of purlin anchor double sided 210

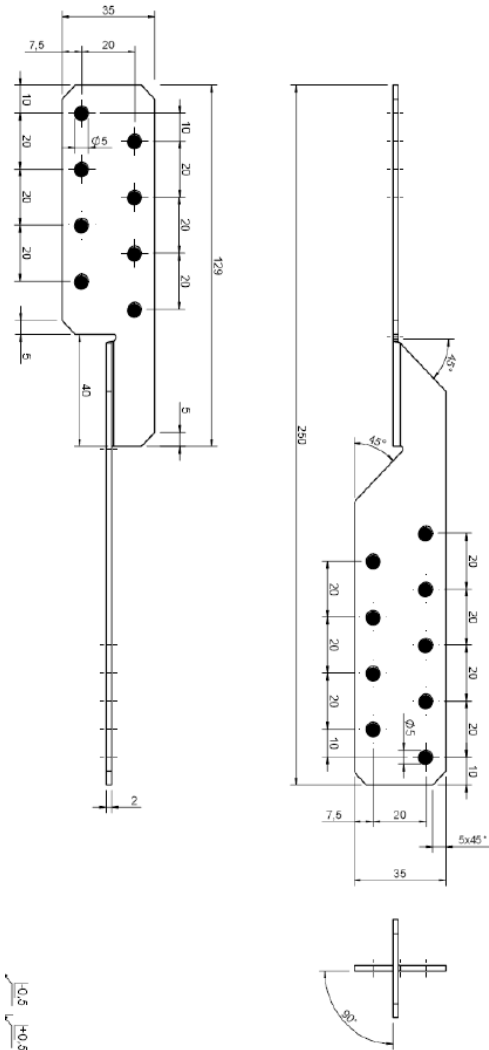


Figure A.9 Dimensions of  
purlin anchor double sided 250

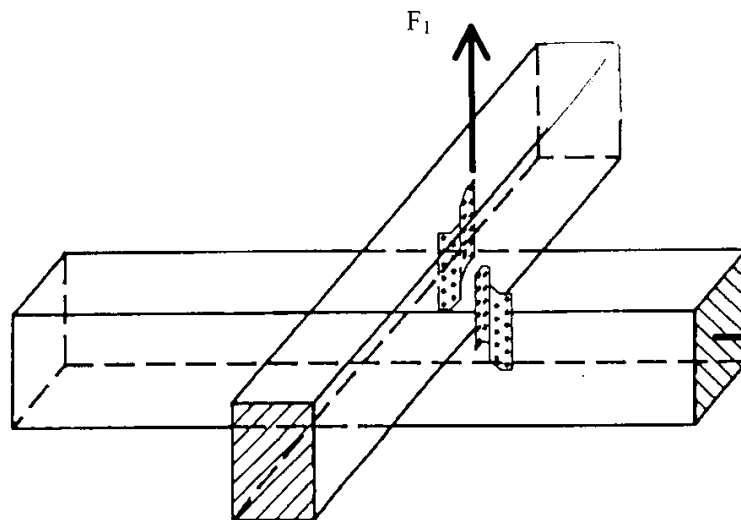


Figure A.10 Typical installation (Load direction  $F_1$ )

## Annex B

### Characteristic load-carrying capacity values

#### Limit load table for connections with two purlin anchors per connection

**Table B.1:** Characteristic values of load-carrying capacity in load direction  $F_1$  - 2 purlin anchors per connection

Purlin anchor	Number of nails per purlin anchor	Nail failure $F_{Rk,H}$	Steel failure $F_{Rk,S}$	Traverse tensile failure $F_{90,Rk}$
right/le right/left 170	2 x 4	5.24 kN	10.4 kN	Design according to equation (B.1)
right/left 210	2 x 6	9.56 kN	10.4 kN	
right/left 250	2 x 8	15.0 kN	10.4 kN	
universal universal 170	2 x 3	4.82 kN	10.1 kN	
universal universal 210	2 x 5	8.64 kN	10.1 kN	
universal universal 250	2 x 7	13.5 kN	10.1 kN	
double-sided 170	4 + 5	12.3 kN	6.2 kN	
double-sided 210	6 + 7	18.9 kN	6.2 kN	
double-sided 250	8 + 9	25.4 kN	6.2 kN	

#### Splitting

If necessary, a traverse tensile test on uplift power  $F_1$  shall be carried out on both members. The load-carrying capacity of a connection with two purlin anchors on both sides of a timber member is calculated according to the general traverse tensile test for connections with mechanical fasteners according to EN 1995:2004 at:

$$F_{90,Rk} = 14 \cdot b \cdot \sqrt{\frac{h_e}{\left(1 - \frac{h_e}{h}\right)}} \quad (B.1)$$

With:

- $F_{90,Rk}$  Characteristic value of the load-carrying capacity perpendicular to the member's axis in N
- $b$  Width of the timber member in mm
- $h_e$  Distance of the fastener situated furthest from the loaded timber edge in mm
- $h$  Height of the timber member in mm

The design value of the force component perpendicular to the axis of the member has to be lower than the design value of the load-carrying capacity  $F_{90,Rd}$ .