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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

MEMBER OF EOTA



European Technical Assessment ETA-11/0036 of 09/08/2016

I 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:

GH TOP UV Connectors

Product family to which the above construction product belongs:

Three-dimensional nailing plate (Beam hanger for timber-to-timber connections)

Manufacturer:

GH-Baubeschläge GmbH
Austraße 34
D-73235 Weilheim/Teck
Tel. +49 7023 743323 0
Fax +49 7023 743323 90
Internet www.holzverbinder.de

Manufacturing plant:

Werk 1, Werk 2

This European Technical Assessment contains:

25 pages including 3 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:

Guideline for European Technical Approval (ETAG) No. 015 Three Dimensional Nailing Plates, April 2013, used as European Assessment Document (EAD).

This version replaces:

The previous ETA with the same number issued on 2016-02-25

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

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II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product

GH TOP UV Connectors are two-piece, face-fixed connectors to be used in timber to timber connections or timber-to-steel or timber-to-concrete connections.

The TOP UV Connectors are made from steel grade S235 according to EN 10025-2:2004 or aluminium grade EN AW-2007 or EN AW-6082 T6 according to EN 755-2:2013-12. Dimensions, hole positions, steel grade or aluminium alloy and typical installations are shown in Annexes A and C.

2 Specification of the intended use in accordance with the applicable EAD

The concealed beam hangers are intended for use in making end-grain to side-grain connections in load bearing timber structures, as a connection between a wood based joist and a solid timber or wood based header or column as well as connections between a timber joist and a concrete structure or a steel member, where requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirements 1 and 4 of Regulation (EU) 305/2011 shall be fulfilled.

The TOP UV Connectors can be installed as connections between wood based members such as:

- Structural solid timber according to EN 14081,
- Glulam or glued solid timber according to EN 14080,
- LVL according to EN 14374,
- BauBuche GL70 according to ETA-14/0354,
- Cross laminated timber according to ETA.

However, the calculation methods are only allowed for a characteristic wood density of up to 700 kg/m³. Even though the wood based material may have a larger density, this must not be used in the formulas for the load-carrying capacities of the fasteners.

Annex B states the formulas for the characteristic load-carrying capacities of the connections with TOP UV Connectors. The design of the connections shall be in

accordance with Eurocode 5 or a similar national Timber Code.

The downward directed forces $F_{2,Ed}$ and the upward directed forces $F_{3,Ed}$ are assumed to act in the middle of the joist. The lateral force $F_{4,Ed}$ is assumed to act at a distance e from the centre of the GH TOP UV Connector. The force $F_{1,Ed}$ perpendicular to the connector plate is assumed to act in the centre of the GH TOP UV Connector.

It is assumed that the header beam is prevented from rotating. If the header beam only has installed a TOP UV Connector on one side the eccentricity moment

$M_v = F_d \cdot (B_H / 2 + 14\text{mm})$ shall be considered. The same applies when the header has TOP UV Connector connections on both sides, but with vertical forces which differ more than 20%.

The TOP UV Connectors are intended for use for connections subject to static or quasi static loading.

The steel or aluminium connectors are for use in timber structures subject to the dry, internal conditions defined by the service classes 1 and 2 of EN 1995-1-1:2008, (Eurocode 5).

The scope of the hangers regarding resistance to corrosion shall be defined according to national provisions that apply at the installation site considering environmental conditions.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the connectors 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)	
Characteristic load-carrying capacity	See Annex B
Stiffness	No performance determined
Ductility in cyclic testing	No performance determined
3.2 Safety in case of fire (BWR2)	
Reaction to fire	The TOP UV hangers are made from steel or aluminium 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 specified in TR 034, dated March 2012 0**)
3.7 Sustainable use of natural resources (BWR7)	
	No Performance Determined
3.8 General aspects related to the performance of the product	
	The TOP UV hangers 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
Identification	See Annex A

*) See additional information in section 3.9 – 3.11.

**) 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.

3.9 Mechanical resistance and stability

See annex B for characteristic load-carrying capacities of the TOP UV Connectors.

The characteristic capacities of the TOP UV Connectors are determined by calculation assisted by testing as described in the EOTA Guideline 015 clause 5.1.1. They should be used for designs in accordance with Eurocode 5 or a similar national Timber Code.

The design models allow the use of fasteners described in the table on page 7 in Annex A:

Threaded nails (ringed shank nails) and screws in accordance with EN 14592 or ETA

In the formulas in Annex B the capacities for threaded nails and screws calculated from the formulas of Eurocode 5 are used assuming a thin steel plate for the joist plates and a thick steel plate for the header plates when calculating the lateral fastener load-carrying-capacity.

The load bearing capacities of the UV-T or TC connectors have been determined based on the use of connector nails 4,0 x 40 mm in accordance with the German national approval for the nails.

The characteristic withdrawal capacity of the nails has to be determined by calculation in accordance with EN 1995-1-1: 2010, paragraph 8.3.2 (head pull-through is not relevant):

$$F_{ax,Rk} = f_{ax,k} \times d \times t_{pen}$$

Where:

$f_{ax,k}$	Characteristic value of the withdrawal parameter in N/mm ²
d	Nail diameter in mm
t_{pen}	Penetration depth of the profiles in mm

$$f_{ax,k} = 50 \times 10^{-6} \times \rho_k^2$$

Where:

ρ_k	Characteristic density of the timber in kg/m ³
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The shape of the nail directly under the head shall be in the form of a truncated cone with a diameter under the nail head which exceeds the hole diameter.

No performance has been determined in relation to ductility of a joint under cyclic testing. The

contribution to the performance of structures in seismic zones, therefore, has not been assessed.

No performance has been determined in relation to the joint's stiffness properties - to be used for the analysis of the serviceability limit state.

3.10 Aspects related to the performance of the product

2.7.1 Corrosion protection in service class 1 and 2.

In accordance with ETAG 015 the TOP UV Connectors are produced from steel grade S235 according to EN 10025-2:2004 or aluminium grade EN AW-2007 according to EN 755-2:2008.

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

TOP UV Connector connections

The performances given in this ETA are based on the following:

Header – support conditions

- The header beam shall be restrained against rotation and be free from wane under the TOP UV Connector.

If the header carries joists only on one side the eccentricity moment from the joists $M_{ec} = R_{joist} (b_{header}/2 + 14\text{mm})$ shall be considered at the strength verification of the header.

R_{joist} Reaction force from the joists
 b_{header} Width of header

- For a header with joists from both sides but with different reaction forces a similar consideration applies.

Wood to wood connections

- TOP UV Connectors are fastened to wood-based headers or columns by nails or screws and to wood-based joists by screws.
- There shall either be nails or screws in all holes for connections to headers or a partial nailing pattern for connections to headers or columns as prescribed in Annex B can be used.
- There shall either be screws in all holes for connections to joists or a partial screw pattern can be used. The screws be placed symmetrically about the vertical symmetry line. There shall always be inclined screws in the 2 upper and 2 lower holes.

- The characteristic capacity of the connection with TOP UV Connectors is calculated according to the manufacturer's technical documentation, dated 2016-06-21.
- The connection with TOP UV Connectors is designed in accordance with Eurocode 5 or an appropriate national code.
- The gap between the end of the joist and the surface, where contact stresses can occur during loading shall be limited. This means that for TOP UV Connectors the gap between the surface of the header or column and the header plate or the joist plate and the end of the joist shall be maximum 1 mm.
- The joist end grain surface and the surface of the header shall have a plane surface against the whole TOP UV Connector.
- The depth of the joist shall be so large that the top (bottom) of the joist is at least 10 mm above (below) the upper (lower) screw tip in the joist.
- Nails or screws to be used shall have a diameter and head shape, which fits the holes of the TOP UV Connectors.

Wood to concrete or steel

The above mentioned rules for wood to wood connections are applicable also for the connection between the joist and the TOP UV connector.

- The TOP UV connector joint is designed in accordance with Eurocodes 2, 3, 5 or 9 or an appropriate national code.
- The TOP UV connector shall be in close contact with the concrete or steel over the whole face.
- The bolt or metal anchor shall have a diameter not less than the hole diameter minus 2 mm.
- There shall be bolts in all bolt holes.

4 Attestation and verification of constancy of performance (AVCP)

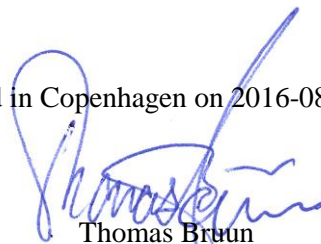
4.1 AVCP system

According to the decision 97/638/EC of the European Commission¹, as amended, 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

Issued in Copenhagen on 2016-08-09 by



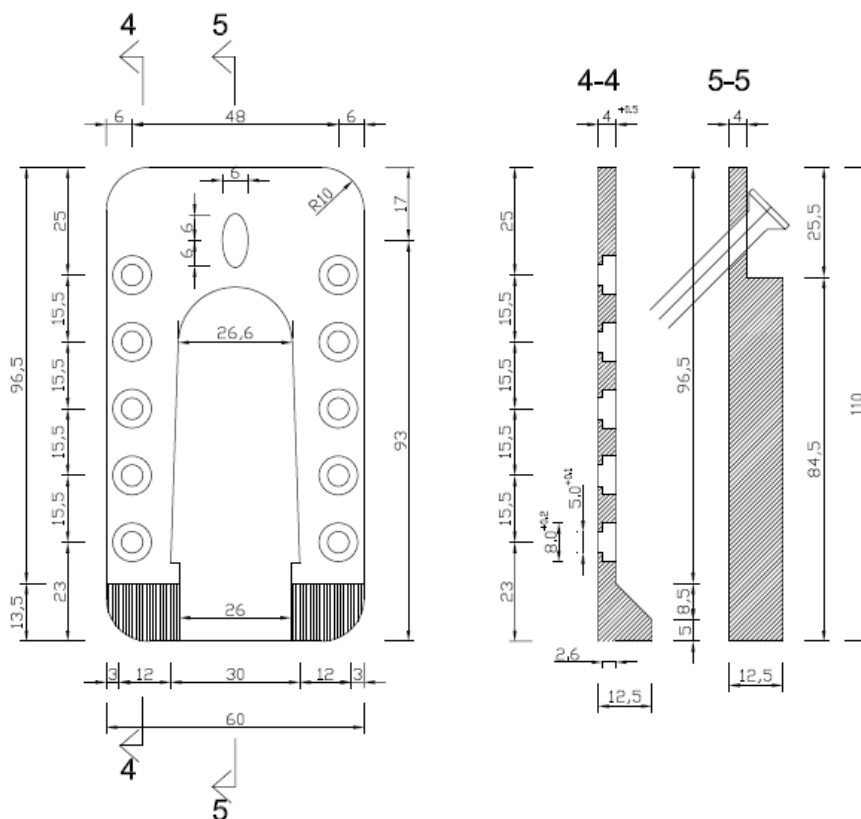
Thomas Braun
Managing Director, ETA-Danmark

Annex A
Product details and definitions

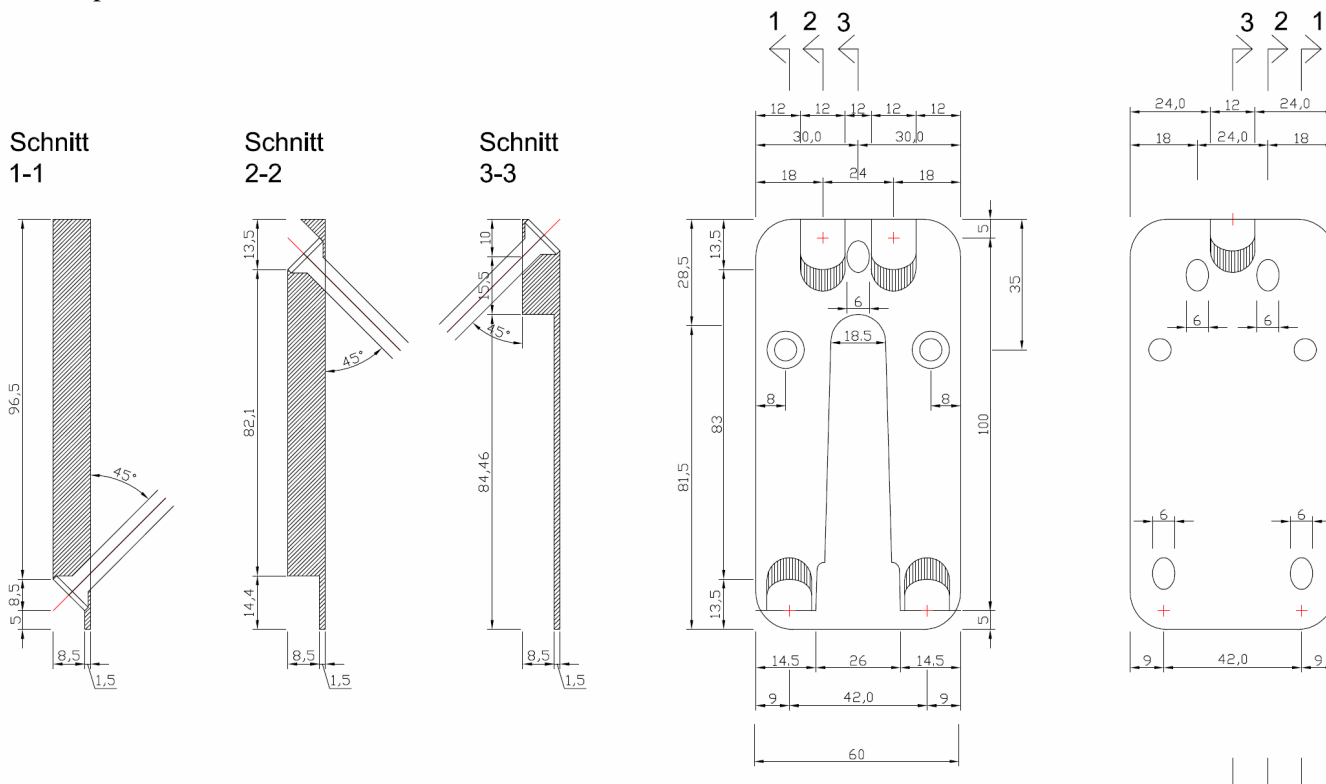
TOP UV Connector TC

Face mount connector.

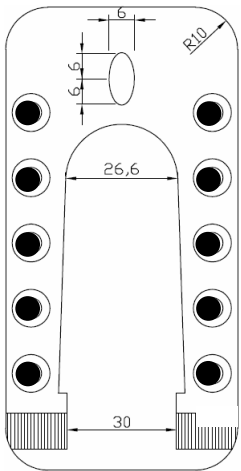
Steel grade S235 according to EN 10025-2:2004 or aluminium grade EN AW-2007 according to EN 755-2:2008.



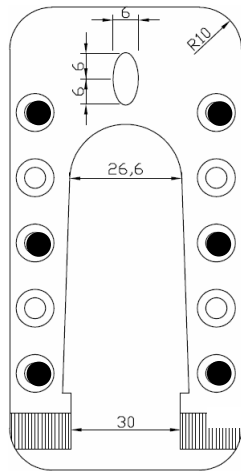
Header plate of GH TOP UV Connector TC



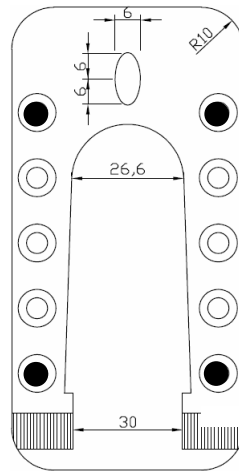
Joist plate of GH TOP UV Connector



Full:
Connection to header



Partial – 6:
Connection to header or column



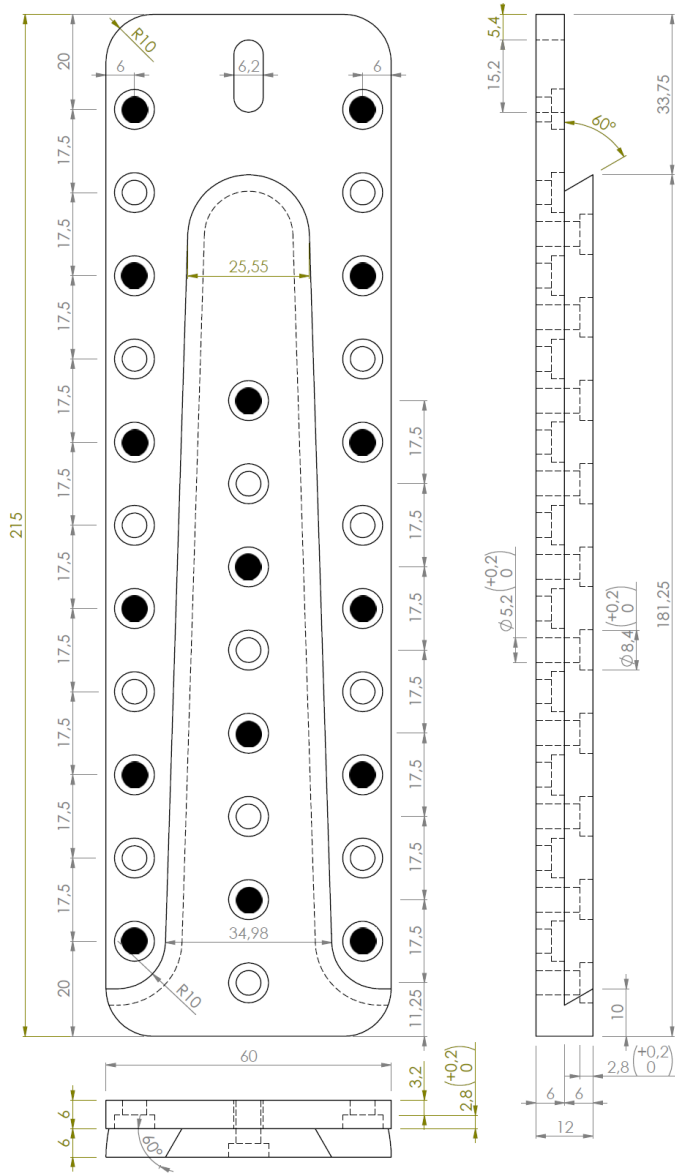
Partial – 4:
Connection to header or column

Nail or screw patterns for GH TOP UV Connectors T or TC

TOP UV Connector UV-80

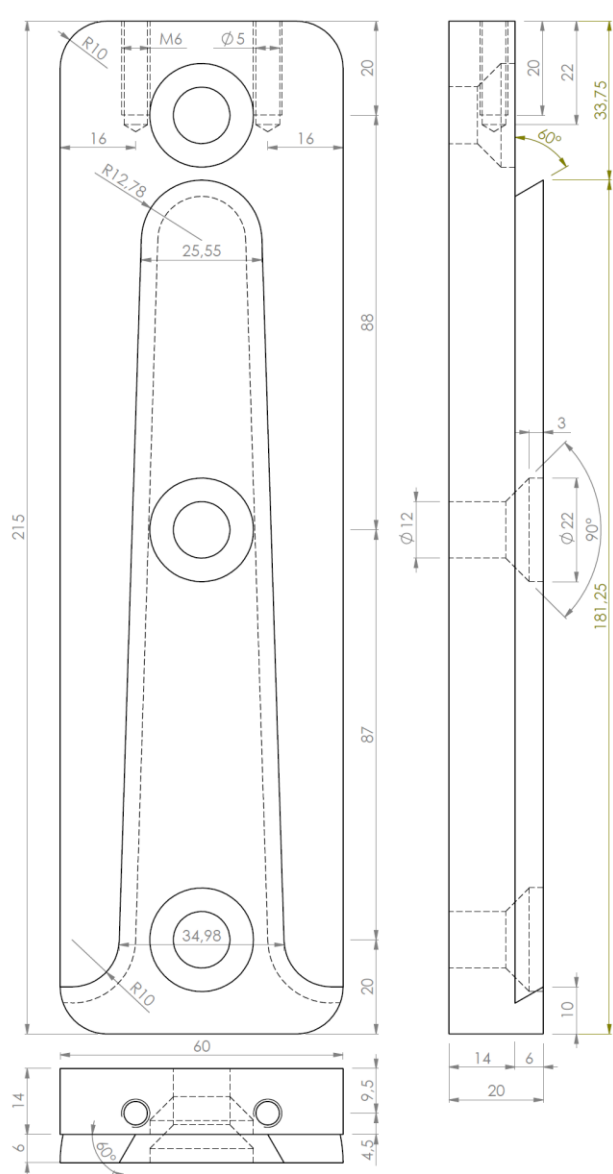
Face mount connector.

Steel grade S235 according to EN 10025-2:2004 or aluminium grade EN AW-2007 or EN AW-6082 T6 according to EN 755-2:2013.



Header plate of GH TOP UV-80 Connector

- Partial screw pattern



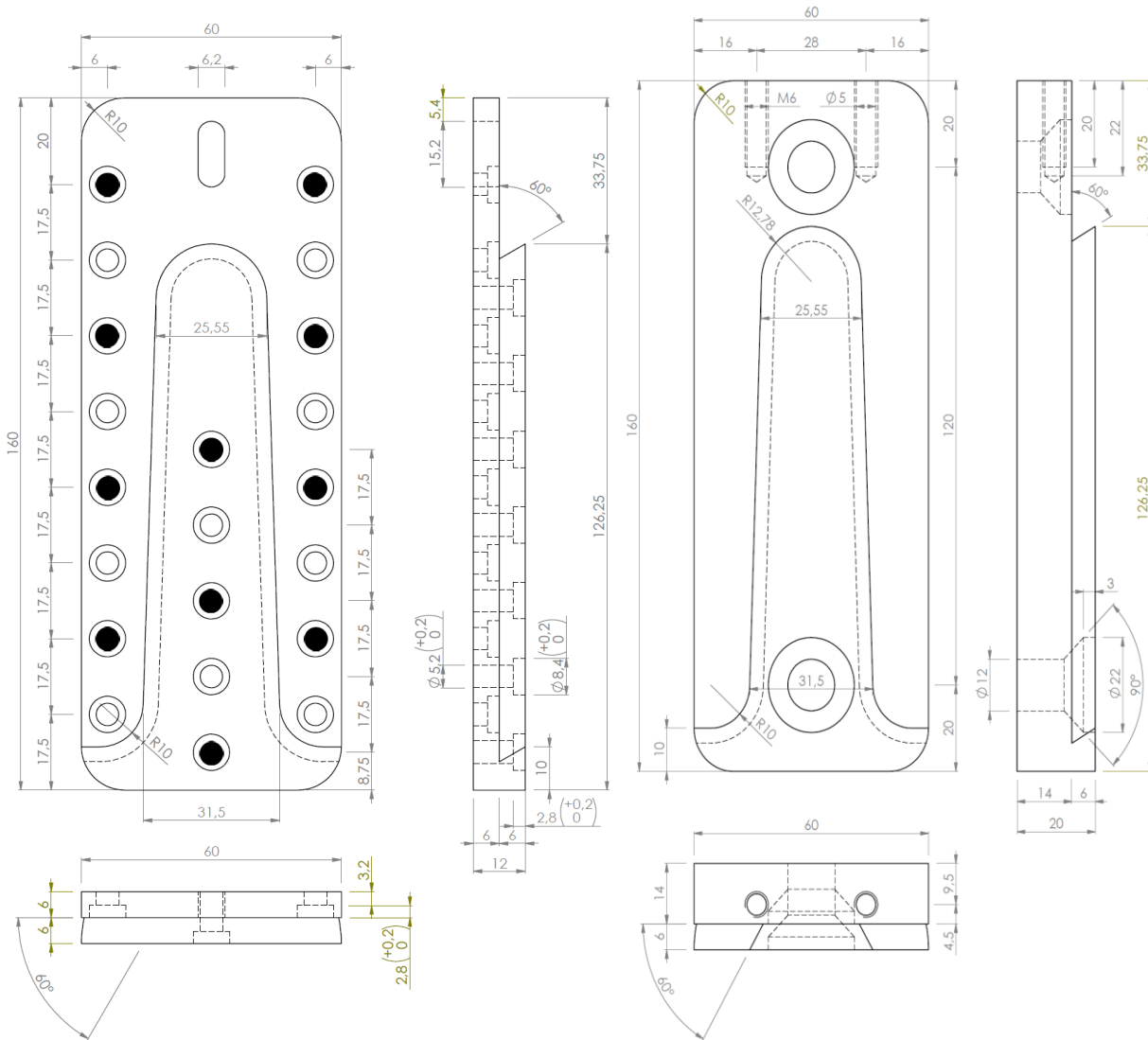
Header plate of GH TOP UV-80 Connector

Timber to concrete or steel

TOP UV Connector UV-60

Face mount connector.

Steel grade S235 according to EN 10025-2:2004 or aluminium grade EN AW-2007 or EN AW-6082 T6 according to EN 755-2:2013.

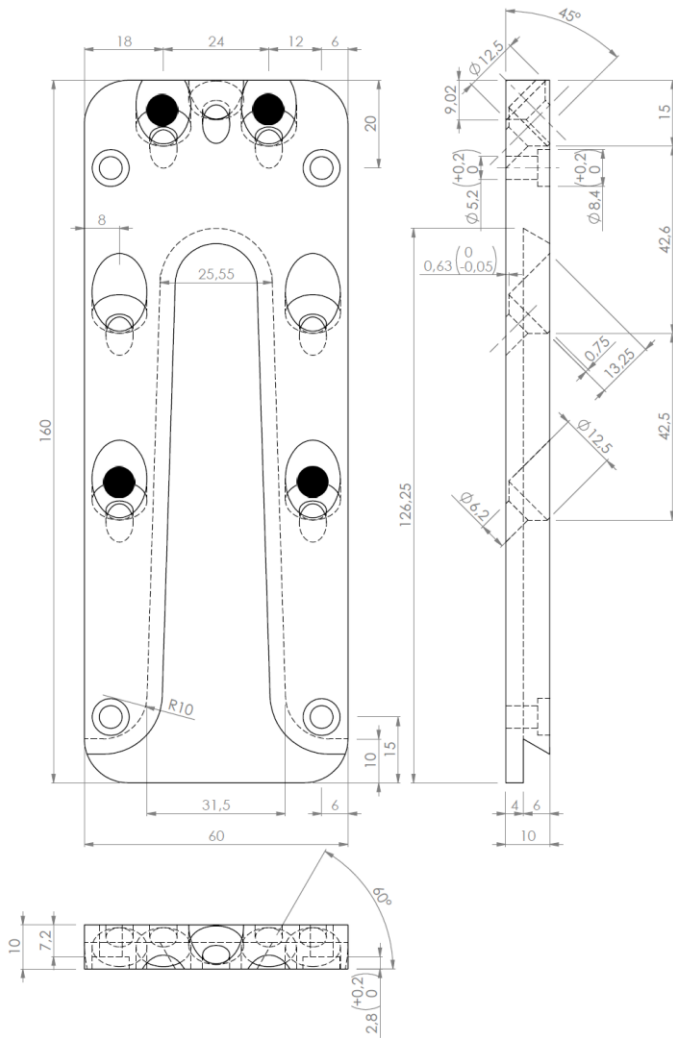


Header plate of GH TOP UV-60 Connector

- Partial screw pattern

Header plate of GH TOP UV-60 Connector

Timber to concrete or steel

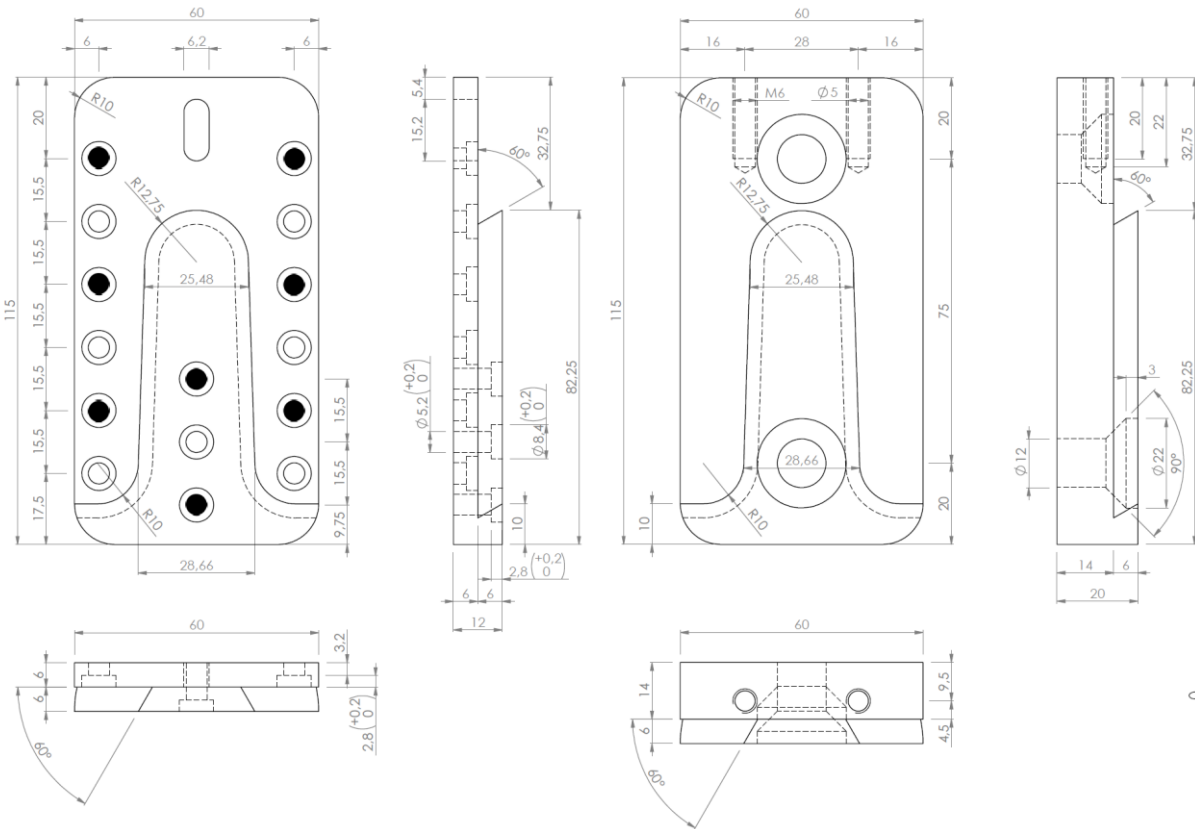


Joist plate of GH TOP UV-60 Connector; • Partial inclined screw pattern

TOP UV Connector UV-40

Face mount connector.

Steel grade S235 according to EN 10025-2:2004 or aluminium grade EN AW-2007 or EN AW-6082 T6 according to EN 755-2:2013.

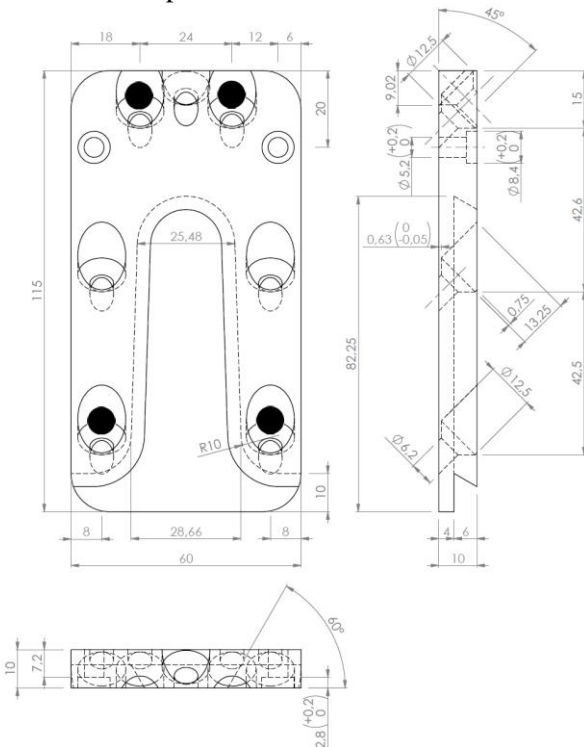


Header plate of GH TOP UV-40 Connector

• Partial screw pattern

Header plate of GH TOP UV-40 Connector

Timber to concrete or steel

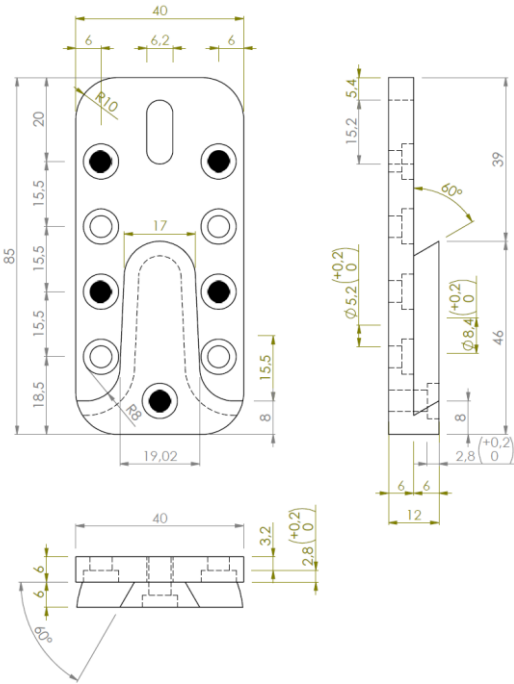


Joist plate of GH TOP UV-40 Connector; • Partial inclined screw pattern

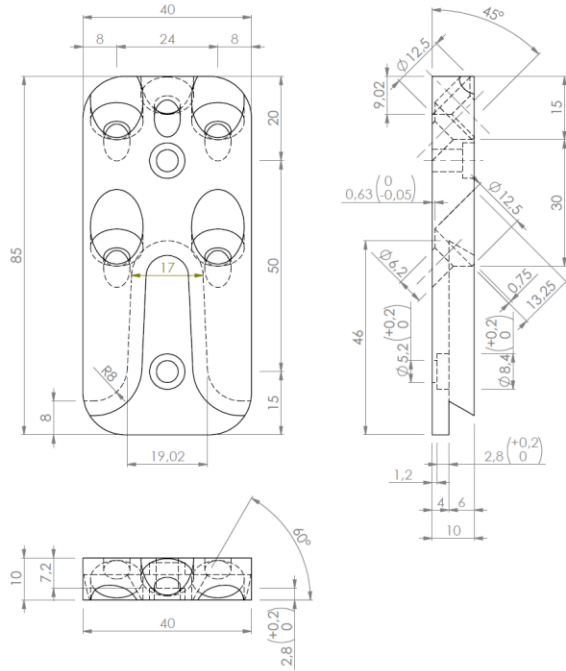
TOP UV Connector UV-30

Face mount connector.

Steel grade S235 according to EN 10025-2:2004 or aluminium grade EN AW-2007 or EN AW-6082 T6 according to EN 755-2:2013.



Header plate of GH TOP UV-30 Connector
 • Partial screw pattern

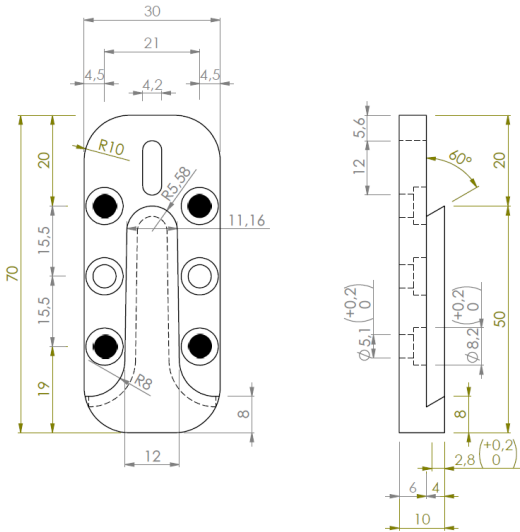


Joist plate of GH TOP UV-30 Connector

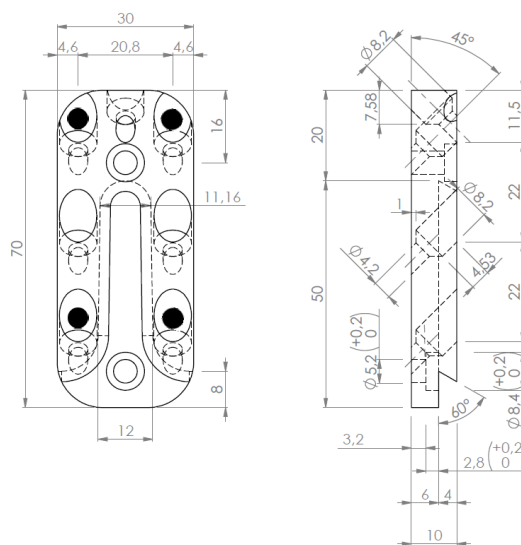
TOP UV Connector UV-20

Face mount connector.

Steel grade S235 according to EN 10025-2:2004 or aluminium grade EN AW-2007 or EN AW-6082 T6 according to EN 755-2:2013.



Header plate of GH TOP UV-20 Connector
 • Partial screw pattern



Joist plate of GH TOP UV-20 Connector
 • Partial inclined screw pattern

Fastener types and sizes

NAIL diameter	Length	Nail type
4.0	40 - 100	Ringed shank nails according to EN 14592
<p>In the formulas in Annex B the capacities for threaded nails calculated from the formulas of Eurocode 5 are used assuming a thick steel plate when calculating the lateral nail load-carrying-capacity. The load bearing capacities of the TOP UV Connectors have been determined based on the use of connector 4,0 x L mm in accordance with the German national approval for the nails. The characteristic withdrawal capacity of the nails has to be determined by calculation in accordance with EN 1995-1-1: 2004, paragraph 8.3.2 (head pull-through is not relevant):</p> $F_{ax,Rk} = f_{1,k} \times d \times t_{pen}$ <p>Where:</p> <p>$f_{1,k}$ Characteristic value of the withdrawal parameter in N/mm²</p> <p>d Nail diameter in mm</p> <p>t_{pen} Penetration depth of the profiled shank in mm</p> <p>Based on tests by Versuchsanstalt für Stahl, Holz und Steine, University of Karlsruhe, the characteristic value of the withdrawal resistance for the threaded nails used can be calculated as:</p> $f_{1,k} = 50 \times 10^{-6} \times \rho_k^2$ <p>Where:</p> <p>ρ_k Characteristic density of the timber in kg/m³</p> <p>The shape of the nail directly under the head shall be in the form of a truncated cone with a diameter under the nail head which exceeds the hole diameter.</p>		

Screw diameter	Length	Nail type
4.0	50 - 70	Self-tapping screw according to EN 14592 or to an ETA
5.0	50 - 70	Self-tapping screw according to ETA-13/0523
6.0	100 - 200	Self-tapping screw according to EN 14592 or to an ETA
<p>In the formulas in Annex B the capacities for self-tapping screws calculated from the formulas of Eurocode 5 assuming a thin steel plate for the joist plates and a thick steel plate for the header plates are used when calculating the lateral load-carrying-capacity. The load bearing capacities of the TOP UV Connectors have been determined based on the use of 5 mm connector screws according to ETA-13/0523. The characteristic withdrawal capacity of these screws should be determined by calculation in accordance with EN 1995-1-1, paragraph 8.3.2 (head pull-through is not relevant) for angles α between screw axis and grain direction $0^\circ \leq \alpha \leq 90^\circ$:</p> $F_{ax,\alpha,Rk} = k_{ax} \cdot 10,5 \cdot d \cdot \ell_{ef} \cdot \left(\frac{\rho_k}{350} \right)^{0,8}$ <p>Where:</p> <p>k_{ax} Factor, taking into account the angle between screw axis and grain direction, $k_{ax} = 1,0$ for $45^\circ \leq \alpha < 90^\circ$ $k_{ax} = 0,3 + \frac{0,7 \cdot \alpha}{45^\circ}$ for $0^\circ \leq \alpha < 45^\circ$</p> <p>$d$ Screw diameter in mm; $d = 5$ mm</p> <p>ℓ_{ef} Penetration length of the threaded part according to EN 1995-1-1 in mm</p> <p>ρ_k Characteristic density of the timber in kg/m³</p>		

LOCK SCREW diameter	Length	Fastener type
M6	20	Countersunk bolt with hexagon socket according to ISO 10642 minimum grade 8.8
M6	20	Recessed countersunk flat head screw according to ISO 7046-2 minimum grade 8.8

Annex B

Design values of load-carrying-capacities

The downward and the upward directed forces $F_{2,Ed}$ and $F_{3,Ed}$ are assumed to act in the middle of the joist. The lateral force $F_{4,Ed}$ is assumed to act at a distance e above or below the centre of the GH TOP UV Connector. The force $F_{1,Ed}$ perpendicular to the connector plate is assumed to act in the centre of the GH TOP UV Connector.

Two (UV-20 to UV-80) screw patterns for the header or joist plate or three (T or TC) nail or screw patterns for the header plate are specified. A full pattern for connections to headers, where there are nails or screws in all the holes of the header and joist plate and partial patterns for connections to headers or columns, where the number of nails or screws in the header or column or joist are specified in Annex A. For loading down, an additional inclined header screw is required for GH TOP UV Connectors type UV-20 to UV-80.

The joist plates of GH TOP UV Connectors T and TC may contain two tensile screws and optionally two additional compressive screws. For loading up, an additional tensile screw is required for all types of GH TOP UV Connectors.

Force F_1 perpendicular to the connector plate

(for GH TOP UV Connectors T and TC, four screws \varnothing 6 mm required in the joist):

$$F_{1,Rd} = \min(F_{1,alu,Rd} \cdot n_H \cdot F_{ax,H,Rd} \cdot n_{J,90,ef} \cdot F_{ax,J,Rd}) \quad (B.1.1)$$

Force F_2 downward in the direction of insertion:

GH TOP UV Connectors T and TC: (at least two inclined screws required in the joist):

$$F_{2,Rd} = \min \left\{ \begin{array}{l} \frac{1,25 \cdot n_{J,45} \cdot F_{ax,\alpha,Rd}}{\sqrt{2}} \\ \frac{1}{\sqrt{\left(\frac{1}{n_H \cdot F_{v,H,Rd}}\right)^2 + \left(\frac{1}{k_{H,Z} \cdot F_{ax,H,Rd}}\right)^2}} \end{array} \right. \quad (B.1.2)$$

GH TOP UV Connectors UV-20 to UV-80 (at least four inclined screws required in the joist, one inclined screw required in the header):

$$F_{2,Rd} = \min \left\{ \begin{array}{l} \frac{1,25 \cdot n_{J,45} \cdot F_{ax,\alpha,Rd}}{\sqrt{2}} \\ n_H \cdot F_{v,H,Rd} \end{array} \right. \quad (B.1.3)$$

Force F_3 upward against the direction of insertion (one inclined screw required in the header):

GH TOP UV Connectors T and TC: (at least two screws \varnothing 6 mm required in the joist)

$$F_{3,Rd} = \min \left\{ \begin{array}{l} \frac{1,25 \cdot F_{ax,\alpha,Rd}}{\sqrt{2}} \\ \frac{1}{\sqrt{\left(\frac{1}{n_H \cdot F_{v,H,Rd}}\right)^2 + \left(\frac{1}{k_{H,Z} \cdot F_{ax,H,Rd}}\right)^2}} \end{array} \right. \quad (B.1.4)$$

GH TOP UV Connectors UV-20 to UV-80 in timber-to-timber connections:

$$F_{3,Rd} = \frac{1,25 \cdot F_{ax,\alpha,Rd}}{\sqrt{2}} \quad (B.1.5)$$

GH TOP UV Connectors UV-20 to UV-80 in timber-to-concrete or timber-to-steel connections:

$$F_{3,Rd} = \frac{6 \text{ kN}}{\gamma_M} \quad (\text{B.1.6})$$

Force F_4 perpendicular to the direction of insertion:

GH TOP UV Connectors T and TC (four screws $\varnothing 6$ mm required in the joist):

$$F_{4,Rd} = \min \left\{ \begin{array}{l} \frac{F_{v,J,Rd}}{\sqrt{\left(\frac{1}{4} + \frac{e}{e_{1,J}}\right)^2 + \left(\frac{e}{e_{2,J}}\right)^2}} \\ \frac{F_{v,H,Rd}}{\sqrt{\left(\frac{1}{n_H} + \frac{e}{e_{1,H}}\right)^2 + \left(\frac{e}{e_{2,H}}\right)^2 + \left(\frac{F_{v,H,Rd}}{k_{H,Y} \cdot F_{ax,H,Rd}}\right)^2}} \end{array} \right. \quad (\text{B.1.7})$$

GH TOP UV Connectors UV-20 to UV-80 (at least four inclined screws required in the joist):

$$F_{4,Rd} = \min \left\{ \begin{array}{l} \frac{F_{v,J,Rd}}{\sqrt{\left(\frac{1}{(n_{J,45} + n_{J,90,ef}) + \frac{e}{e_{1,J}}}\right)^2 + \left(\frac{e}{e_{2,J}}\right)^2}} \\ \frac{F_{v,H,Rd}}{\sqrt{\left(\frac{1}{n_H} + \frac{e}{e_{1,H}}\right)^2 + \left(\frac{e}{e_{2,H}}\right)^2}} \end{array} \right.$$

Combined forces

In case of combined forces shall the following inequality be fulfilled:

$$\left(\frac{F_{1,Ed}}{F_{1,Rd}} + \frac{F_{2/3,Ed}}{F_{2/3,Rd}}\right)^2 + \left(\frac{F_{4,Ed}}{F_{4,Rd}}\right)^2 \leq 1 \quad (\text{B.1.9})$$

Where:

- n_H Number of nails or screws in the header or column connection with full or partial nail or screw pattern;
- $n_{J,90,ef}$ Number of effective screws in the joist connection (see Table B.1);
- $n_{J,45}$ Number of inclined screws in the joist connection (see Table B.1);
- $F_{1,alu,Rd}$ Design value of the load-carrying-capacity of the connector plates ($F_{1,alu,Rk}$ see Table B.1);
- $F_{ax,H,Rd}$ Design value of the axial load-carrying-capacity per nail or screw in the header;
- $F_{ax,J,Rd}$ Design value of the axial load-carrying-capacity per screw in the joist;
- for a screw $\varnothing 6$ mm for GH TOP UV T or TC,
- for a screw $\varnothing 5$ mm for GH TOP UV-20 to UV-80;
- $F_{ax,\alpha,Rd}$ Design value of the axial load-carrying-capacity per inclined joist or header screw for load direction F_2 or F_3 ;
- for a screw $\varnothing 6$ mm for GH TOP UV T or TC and GH TOP UV-30 to UV-80,
- for a screw $\varnothing 4$ mm for GH TOP UV-20;
- $F_{v,J,Rd}$ Design value of the lateral load-carrying-capacity per screw in the joist connection with an outer thin steel or aluminium plate,
- for GH TOP UV T or TC: $F_{v,J,Rd} = 560 \cdot \sqrt{f_{h,J,d}} + F_{ax,J,Rd} / 4$

for GH TOP UV-80, UV-60, UV-40 and UV-30 for $d = 5$ mm: $F_{v,J,Rd} = 163 \cdot \sqrt{f_{h,J,d}} + F_{ax,J,Rd} / 4$

for GH TOP UV-20 for $d = 4$ mm: $F_{v,J,Rd} = 118 \cdot \sqrt{f_{h,J,d}} + F_{ax,J,Rd} / 4$

$f_{h,J,d}$ Design value of the embedding strength according to equation (8.15) of Eurocode 5
 $F_{v,H,Rd}$ Design value of the lateral load-carrying-capacity per nail or screw in the header connection with an outer thick steel or aluminium plate;

$k_{H,Y}$ Factor according to Table B.1;
 $k_{H,Z}$ Factor according to Table B.1;
 e distance of the lateral force above or below the centre of the GH TOP UV Connector;
 e_1 GH TOP UV Connector dimension according to Table B.1;
 e_2 GH TOP UV Connector dimension according to Table B.1;

Table B.1: GH TOP UV Connectors: Form factors k_H and dimensions e_1 and e_2

Nail or screw pattern	n_H	$n_{J,90,ef}$	$n_{J,45}$	$F_{1,alu,Rk}$ [kN]	$k_{H,Y}$	$k_{H,Z}$	$e_{1,H}$ [mm]	$e_{2,H}$ [mm]	$e_{1,J}$ [mm]	$e_{2,J}$ [mm]
TOP UV T or TC Full	10	2,8	2	4,0	15,7	23,0	341	440	189	360
TOP UV T or TC Partial – 6	6	2,8	2	4,0	9,4	14,7	235	304	189	360
TOP UV T or TC Partial – 4	4	2,8	2	4,0	6,3	11,0	198	256	189	360
UV-20 full	6	2	6	4,0	-	-	105	155	158	350
UV-30 full	9	2	4	4,0	-	-	175	356	110	252
UV-40 full	15	2	6	7,0	-	-	425	754	299	531
UV-60 full	21	4	6	12,0	-	-	650	1778	444	1204
UV-80 full	30	4	8	20,0	-	-	1089	4171	633	2441
UV-20 partial	4	2	4	4,0	-	-	90	134	149	330
UV-30 partial	5	2	4	4,0	-	-	110	223	110	252
UV-40 partial	8	2	4	7,0	-	-	235	418	271	480
UV-60 partial	11	4	4	12,0	-	-	358	979	426	1153
UV-80 partial	16	4	4	20,0	-	-	663	2416	586	2258

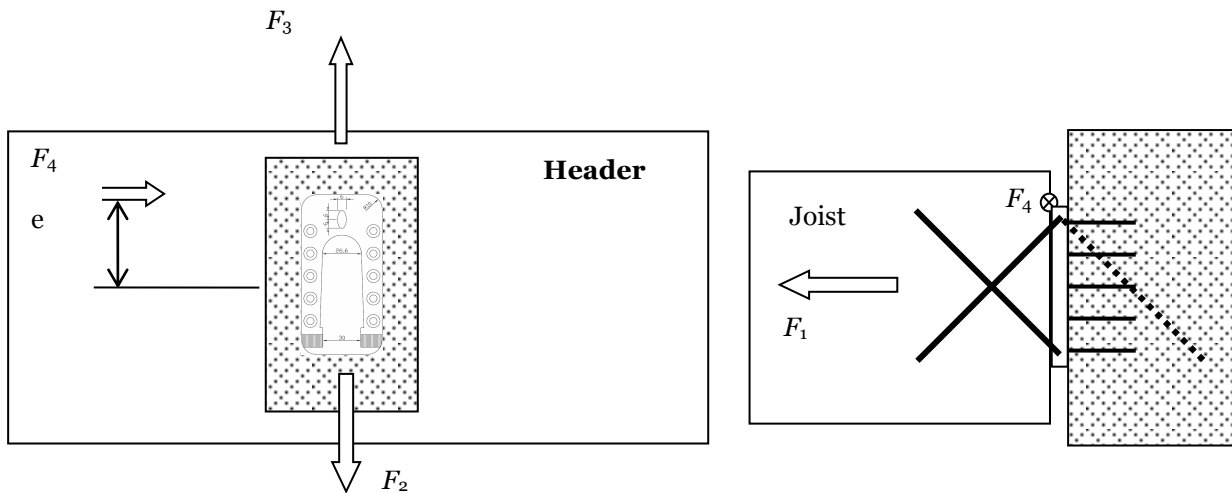
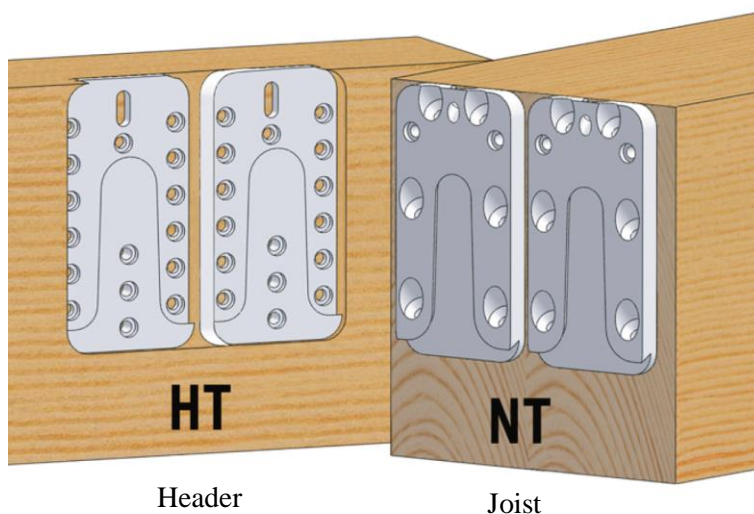


Figure B1: Definition of e

Annex C
Installation of GH TOP UV Connectors



Connection with double GH TOP UV connectors: minimum clearance = 15 mm

