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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-08/0053 of 2025/05/01

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:** | Simpson Strong-Tie Skewed and Sloped joist hangers<br>See type numbers in section II.1 of the ETA |
| **Product family to which the above construction product belongs:** | Three-dimensional nailing plate (joist hangers for timber-to-timber connections/ timber-to- rigid support connections) |
| **Manufacturer:** | Simpson Strong-Tie Int. Ltd<br>For local branch addresses refer to www.strongtie.eu |
| **Manufacturing plant:** | SIMPSON STRONG-TIE Manufacturing facilities |
| **This European Technical Assessment contains:** | 55 pages including 4 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:** | EAD 130186-00-0603 for Three Dimensional Nailing Plates |
| **This version replaces:** | The ETA with the same number issued on 2017-09-22 |

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## II SPECIAL CONDITIONS OF THE EUROPEAN TECHNICAL ASSESSMENT

## 1 Technical description of product

This ETA covers the following hanger types:
S45, S1530, SUL, SUR, HSUL, HSUR, LSSU, SPR, RR, HRC, ACI, SDEA and VPA.

The hangers are one piece, non-welded, skewed joist hangers. They are intended for timber-to-timber, timber-to-concrete or timber-to-steel connections fastened by a range of nails, screws or bolts.

The joist hangers are made from pre-galvanized steel Grade S 250 GD + min. Z275 according to EN 10346:2009 and EN 10143: 1993, or Grade G90 galv. Steel SS Grade 33 to ASTM A653, Min. yield strength 227 MPa and Min. ultimate strength 310 MPa. Dimensions, hole positions and typical installations are shown in Annex B and D.

All the hangers can also be produced from stainless steel number 1.4401, 1.4404, 1.4521, 1.4301 or 1.4509 according to EN 10088-2 or a stainless steel with a minimum characteristic 0.2% yield stress of 240 MPa, a minimum 1.0% yield stress of 270 MPa and a minimum ultimate tensile strength of 530 MPa. In the rest of this document, the steel types will be named as:
Steel ref. 1: S250GD + Z275
Steel ref. 2: Stainless Steel 1.4401, 1.4404, 1.4521
Steel ref. 3: Stainless Steel 1.4301, 1.4509
Steel ref. 4: SS Grade 33 + G90 (~Z275) or G185 (~Z600)
Steel ref. 5: Stainless Steel 1.4259
Steel ref. 6: S250GD + Z800 or ZM310 or similar coatings acc. to EN 10346, that has been tested to ISO 11997-1 Cyclic Corrosion Testing In artificial Atmosphere

A coloured top paint can be applied to all connectors

## 2 Specification of the intended use in accordance with the applicable European Assessment document (hereinafter EAD)

The joist 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, they are also intended for use in making an end-grain connection 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 joist hangers can be installed as connections between wood based members such as:
- Solid timber classified to C14-C40 according to EN 338 / EN 14081.
- Glued members of timber classified to C14 – C40 according to EN338 / EN14081 when structural adhesives are used.
- Glued laminated timber classified to GL24c or better according to EN 1194 / EN 14080.
- Solid Wood Panels, SWP according to EN 13353.
- Laminated Veneer Lumber LVL according to EN 14374.
- Plywood according to EN 636
- Oriented Strand Board, OSB according to EN 300
- I-beams with backer blocks on both side of the web in the header and web stiffeners in the joist.
- Cross Laminated Timber (CLT) acc. to EN 16351 or ETA

Annex D states the characteristic load-carrying capacities of the joist hanger connections.
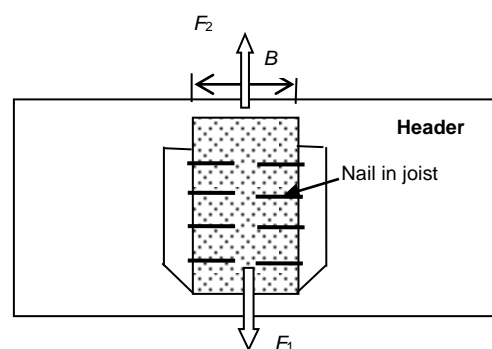


It is assumed that the forces acting on the joist hanger connection are the following $F_1$ and $F_2$ as shown in the figure below. The forces $F_1$ and $F_2$ shall act in the middle of the joist hanger.

It is assumed that the header is prevented from rotating. Similar it is assumed that the concrete structure or the steel member to which the joist hanger is bolted does not rotate. If the header beam only has installed a joist hanger on one side the eccentricity moment $M_v = F_d \cdot (B_H / 2 + 30 mm)$ shall be considered. The same applies when the header has joist hanger

connections on both sides, but with vertical forces which differ more than 20%.

The loads acting on the VPA hangers are described in the figure on page 20.

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

The zinc-coated hangers are for use in timber structures subject to dry, internal conditions defined by the service classes 1 and 2 of EN 1995-1-1:2004, (Eurocode 5).

The joist hangers can also be used in outdoor timber structures, service class 3, when a corrosion protection in accordance with Eurocode 5 is applied, or when stainless steel with similar or better characteristic yield and ultimate strength is employed (Steel ref. 2, 3 and 6)

For timber or wood based material with a lower characteristic density than 350 $kg/m^3$ the load-carrying capacities shall be reduced by the $k_{dens}$ factor (see Annex C4-2)

For timber or wood based material with a higher characteristic density than 350 $kg/m^3$ the load-carrying capacities shall be taken as that for 350 $kg/m^3$.

The wood members shall have a thickness which is larger than the penetration depth of the nails into the members.

**Assumed working life**

The assumed intended working life of the joist hangers for the intended use is 50 years, provided that they are subject to appropriate use and maintenance.

The information on the working life should not be regarded as a guarantee provided by the manufacturer or ETA-Danmark A/S. An "assumed intended working life" means that it is expected that, when this working life has elapsed, the real working life may be, in normal use conditions, considerably longer without major degradation affecting the essential requirements.

## 3    Characteristics of product and assessment

| Characteristic | Assessment of characteristic |
|---|---|
| **3.1    Mechanical resistance and stability (BWR 1)\*)** | |
| Joint Strength - Characteristic load-carrying capacity | See Annex D |
| Joint Stiffness | See Annex D |
| Joint ductility | No performance assessed |
| Resistance to seismic actions | No performance assessed |
| Resistance to corrosion and deterioration | See section 3.6 |
| **3.2    Safety in case of fire (BWR 2)** | |
| Reaction to fire | SIMPSON Strong- Hangers and Joist End connectors are made from steel classified as **Euroclass A1** in accordance with EN 13501-1 and Commission Delegated Regulation 2016/364 |
| Resistance to fire | No performance assessed |
| **3.3    General aspects related to the performance of the product** | The SIMPSON Strong-Tie Hangers and Joist End connectors 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, 2 and 3 |

\*) See additional information in section 3.4 – 3.7.

## 3.4    Methods of verification
### Safety principles and partial factors
The characteristic load-carrying capacities have been calculated considering different ratios between the partial factors for timber connections and steel cross sections.

According to clause 6.3.5 of EN 1990 (Eurocode – Basis of structural design) the characteristic resistance for structural members that comprise more than one material acting in association should be calculated as

$$R_d = \frac{1}{\gamma_{M,1}} R \left\{ \eta_1 X_{k,1}; \eta_i X_{k,i(i>1)} \frac{\gamma_{m,1}}{\gamma_{m,i}}; a_d \right\}$$

where $\gamma_{M,1}$ is the global partial factor for material 1 (in this case wood), $\gamma_{m,1}$ is the partial factor on the material and $\gamma_{m,i}$ are material partial factors for the other materials, i.e. the calculations are made with material parameters modified by multiplication by

$$k_{modi} = \gamma_{m,1} / \gamma_{m,i}$$

The characteristic load-carrying capacities have been calculated considering a ratio between the partial factor for timber connections and steel cross sections

$$k_{modi} = 1,18 \qquad (EC5: \quad k_{modi} = \frac{1,30}{1,10} = 1,18 )$$

For $k_{modi}$> 1,18 the load-carrying capacities stated in Annex D are valid (on the safe side).
For $k_{modi}$<1,18 the load-carrying capacities stated in Annex D have to be multiplied by a factor

$$f = \frac{k_{modi}}{1,18}$$

## 3.5 Mechanical resistance and stability
See annex D for characteristic load-carrying capacity in the different directions.

The characteristic capacities of the hangers are determined by calculation assisted by testing as described in the EAD 130186-00-0603. They should be used for designs in accordance with Eurocode 5 or a similar national Timber Code.

No performance has been assessed 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.

### Fasteners
Connector nails and screws in accordance to ETA-04/0013
In the formulas in Annex C the capacities for connector nails and connector screws in accordance with ETA-04/0013 are used.

Square Twist nails in accordance with EN 14592
The capacities of square twist nails have been calculated from the formulas of Eurocode 5 assuming a thick steel plate when calculating the lateral nail load bearing capacity.

Round smooth nails in accordance with EN 14592
The capacities of round smooth nails have been calculated from the formulas of Eurocode 5 assuming a thin steel plate when calculating the lateral load bearing capacity.

Threaded nails in accordance with EN 14592
The design model also allows the use of threaded nails in accordance with EN 14592 with a diameter in the range 4,0 – 4,2 mm and a minimum length of 35 mm, assuming a thick steel plat when calculating the lateral nail load-carrying capacity. If no calculations are made a reduction factor equal to the ratio between the characteristic withdrawal capacity of the actual used threaded nail and the characteristic withdrawal capacity of the corresponding connector nail according to table in annex B in ETA-04/0013 is applicable for all load-carrying capacities of the connection.

For any other information about fasteners or characteristic capacity modification method for different fasteners, please see Annex C4-1.

The hangers can be mounted using different nail/screw patterns. The nail/screw patterns for each hanger and different connection type is described and shown in annex D.

### Stainless steel
All the hangers can also be produced from stainless steel number 1.4401, 1.4404, 1.4521 (Steel ref. 2) and 1.4301, 1.4509 (Steel ref. 3) according to EN 10088-2 or a stainless steel with a minimum characteristic 0.2% yield stress of 240 MPa, a minimum 1.0% yield stress of 270 MPa and a minimum ultimate tensile strength of 530 MPa. The characteristic load carrying capacities can be considered as the same as those published in this document subject to the use of stainless CNA connector nails or CSA connector screws covered by the ETA-04/0013 or stainless threaded nails or screws in accordance to the standard EN 14592

respecting the rules given in the paragraph "fasteners" above.

## 3.6 Aspects related to the performance of the product

3.6.1 Corrosion protection in service class 1 and 2.

In accordance with EAD 130186-00-0603 shall the hangers have a zinc coating weight of Z275. The steel employed is S250 GD with Z275 (Steel ref. 1 or 4) according to EN 10346.

3.6.2 Corrosion protection in service class 3.

In accordance with Eurocode 5 the joist hangers shall be produced from stainless steel (Steel ref. 2 or 3 or 5).

## 3.7 General aspects related to the use of the product

Simpson Strong-Tie hanger types S45, S1530, SUL, SUR, HSUL, HSUR, LSSU, SPR, RR, HRC, ACI, SDEA and VPA 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.

# 4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

## 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 provided for 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 2025-05-01 by

Thomas Bruun

Managing Director, ETA-Danmark A/S

# Annex A - Revision History

| Modifications and additions to the previous versions of ETA-08/0053 | |
|---|---|
| Issue No. | Update |
| 0 | First release |
| 1.0 | Adding of new hangers type LSSU and VPA |
| | Adding material properties and drawings for hangers type LSSU and VPA |
| | Revision of tables of fasteners |
| | Adding of characteristic resistance capacities for new hangers type LSSU and VPA |
| 2.0 | Modification of download values of S1530/38/1.5 (New tests) |
| | New S1530/80/2 |
| | Add SDEA |
| | Add ACI |
| | Add ABF |
| | Merging with ETA-09/0122 |
| | Precision about nails for LSSU and VPA |
| | Add American manufacturing plant |
| | Remove laminated strand lumber (Not sell anymore in Europe) |
| 3.0 | SDEA150 – update of values |
| | SPR - new range of sizes, additional capacities for square twist nails |
| | S1530 - additional applications and uplift capacities |
| | S45D/G250/38 - additional applications and uplift capacities |
| | RR47 replace RR50 (modification of width) |
| 4.0 | Change ETA-No. on top of all pages (from 06/0106 into 08/0053) |
| | Add ZM310 references (for SC3) |
| | Insert a sentence regarding painted products in part II, section 1: "The connectors can be applied with a coloured top paint" |

# Annex B - Typical Installation

## B1 Conditions for using I-beam headers

When an I-beam is used as header beam it is a condition for the load-carrying capacity, that 2 backer blocks are installed, because it prevents a bending failure of the web in the I-beam as explained in the following. Further, the nails, which normally are nailed in the side of the solid header beam, can instead be nailed into the backer blocks. Therefore, the sum of the thicknesses of the backer blocks and the web shall at least be equal to the length of the nails in the header

For both reasons it is important that the backer block supports the underside of the top flange of the header I-beam and is sufficiently connected to the web of the head I-beam.

The rope effect results in a tensile force $F_t$ directed toward the edge of the flange. If there are no backer blocks installed, there exists a risk for a bending failure by $M_{web}$ at the neck of the web due to the torsion. With at backer block installed the torsional moment will be taken by a compression force $F_{c,web}$ between the backer block and the underside of the flange and tensile force in the web.
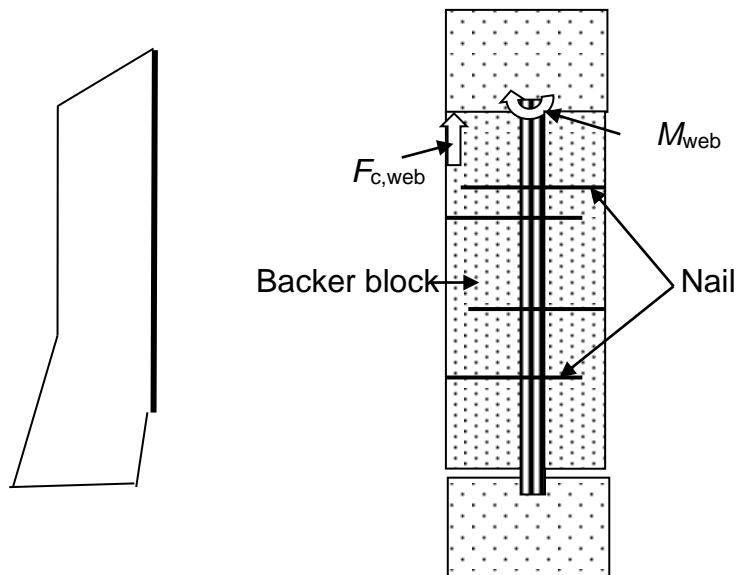


Static model for a vertical force downward. The header beam has been drawn a little away to the right to show the forces acting. The header is shown with the forces and moment acting on it.

The surface of the backer block shall be flush with the side of the flange and shall fit tight to the underside of the flange and shall be nailed with sufficient nails to secure, that the backer blocks and the web functions as one piece of solid timber. It is required that the number of nails in the backer block shall be determined from:

$$n_{nail,bac\ker blcok} = 2 \cdot n_{header}$$

Where: $n_{header}$ is the total number of nails from the joist hanger into the header. If the header has a joist hanger on each side, the number of nails shall be doubled.

The nails in the backer block shall have a length so their tip will go through the web and at least 20 mm into the opposite backer block.
The I-beam can be prevented from rotation by several means. For example can the wood based panel normally nailed to the top flange and the boards typically nailed to the bottom flange prevent the I-beam from rotating.

## B2 Conditions for using I-beam joists

When an I-beam is used as a joist it is a condition for the load-carrying capacity, that 2 web stiffeners are nailed to the web of the joist, one on each side.
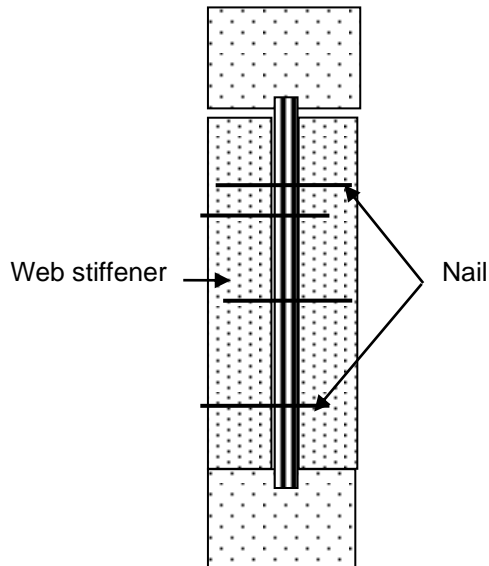


Web stiffeners on the joist at the joist hanger. The web stiffener shall fit to the bottom flange and have a width of 2/3 of the height between the inner sides of the flanges.

The surface of the web stiffeners shall be flush with the side of the flange of the joist and shall fit tight to the lower flange and shall be nailed with sufficient nails to secure, that the web stiffeners and the web functions as one piece of solid timber. So, the number of nails in each web stiffener shall be:

$$n_{nail,web-stif} = n_{joist}$$

Where: $n_{joist}$ is the total number of nails from the joist hanger into the joist.

## B3 S1530 – Typical installation

*See* C3, table 4 , *for nails and screws that can be used with the S1530*
The S1530 product family can be used to make angle between 15° and 30°. See the following drawings for the installation.
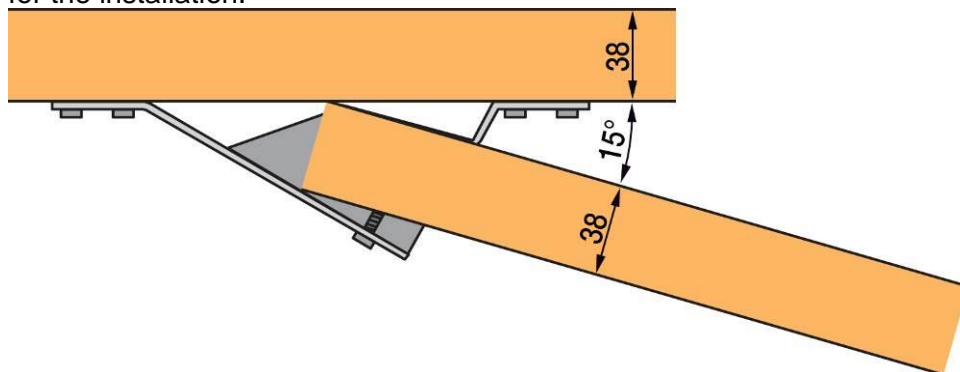


**Figure 1: S1530D/38/1.5 at 15°**
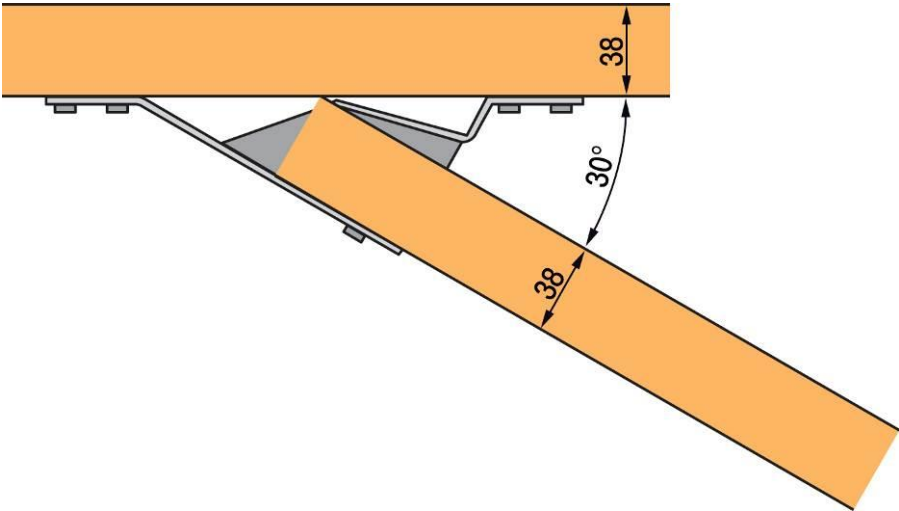
**Figure 2: S1530D/38/1.5 at 30°**
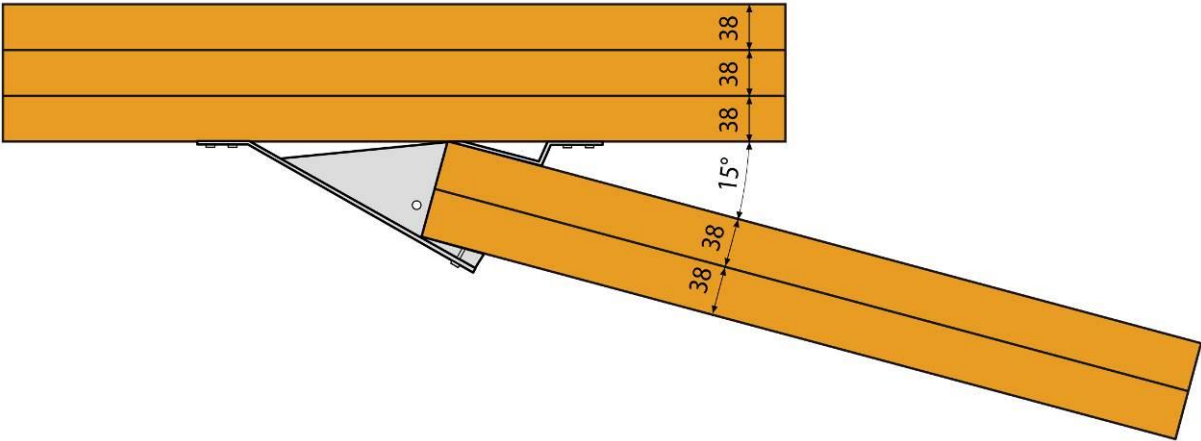
**Figure 3: S1530D/80/2 at 15°**
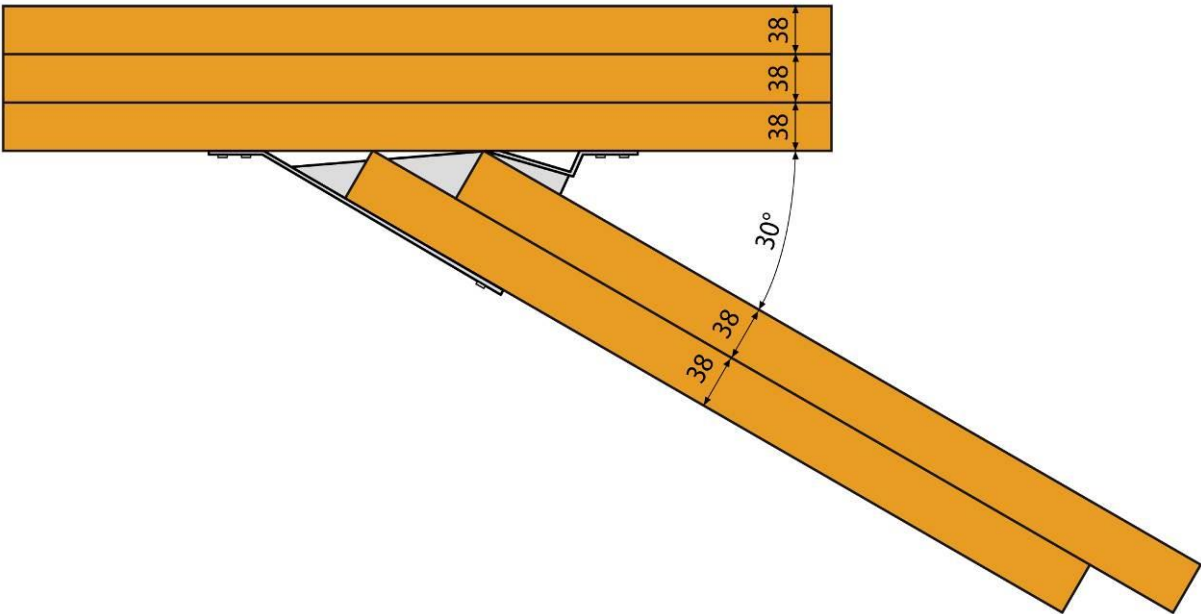
**Figure 4: S1530D/80/2 at 30°**

## B4 LSSU – Typical installation

LSSU can be used either with only a slope (Figure 5) either with a slope and a skew (Figure 6)
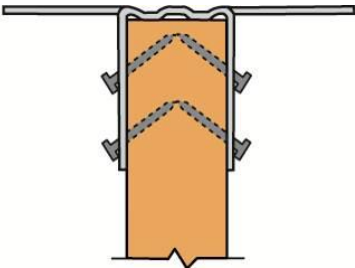


**Figure 5 : LSSU with only a slope**
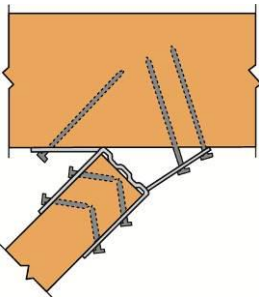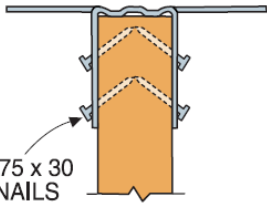


**Figure 6: LSSU with a slope and a skew**

To install LSSU with slope and skew please use the installation sequence that follows.
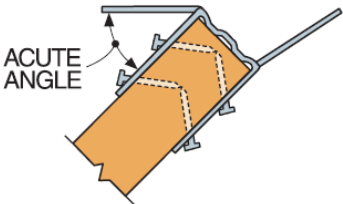


**LSSU Installation Step 1**

3.75 x 30 NAILS

Nail hanger to slope-cut carried member, installing seat nail first. No bevel necessary for skewed installation.
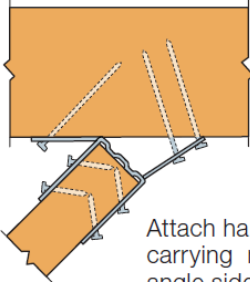
**LSSU Installation Step 2**

ACUTE ANGLE

Skew flange to form acute angle. Bend other flange back along centerline of slots. Bend once only.

**LSSU Installation Step 3**

Attach hanger to the carrying member, acute angle side first. Install nails at an angle.

**Figure 7: Installation sequence of LSSU**

## B5 VPA – Typical installation

To install VPA please use the following installation sequence.



**Step 1**
Install top nails and face PAN nails in the "A" flange to outside wall top plate.

**Step 2**
Seat rafter with a hammer, adjusting the "B" flange to the required pitch.

**Step 3**
Install "B" flange nails in the obround nails holes, locking the pitch.

**Step 4**
Install rafter PAN nails.
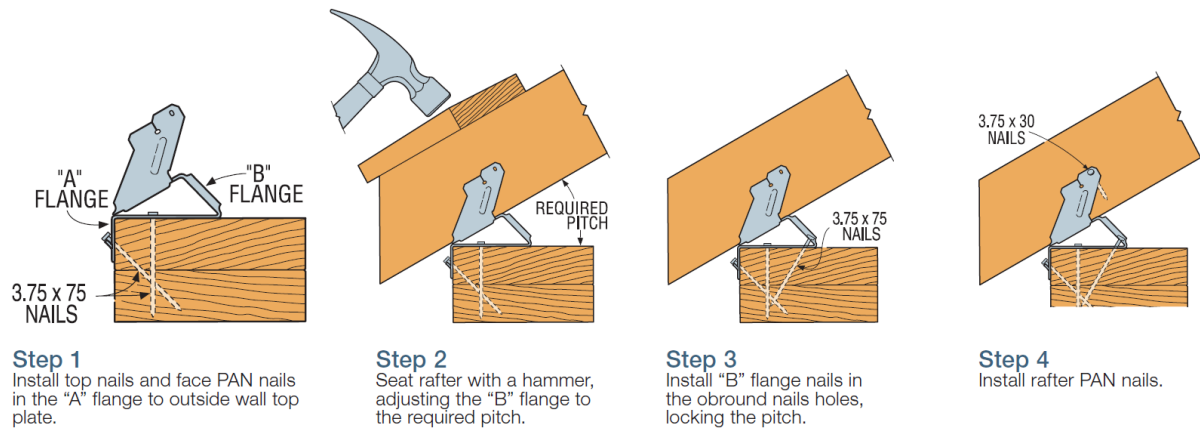
**Figure 8: Installation sequence of VPA**

## B6 HRC – Typical installation

HRC can be installed in two different ways. See below the possible installation



Typical HRC Installation on the Edge of a Ridge

Optional HRC Installation
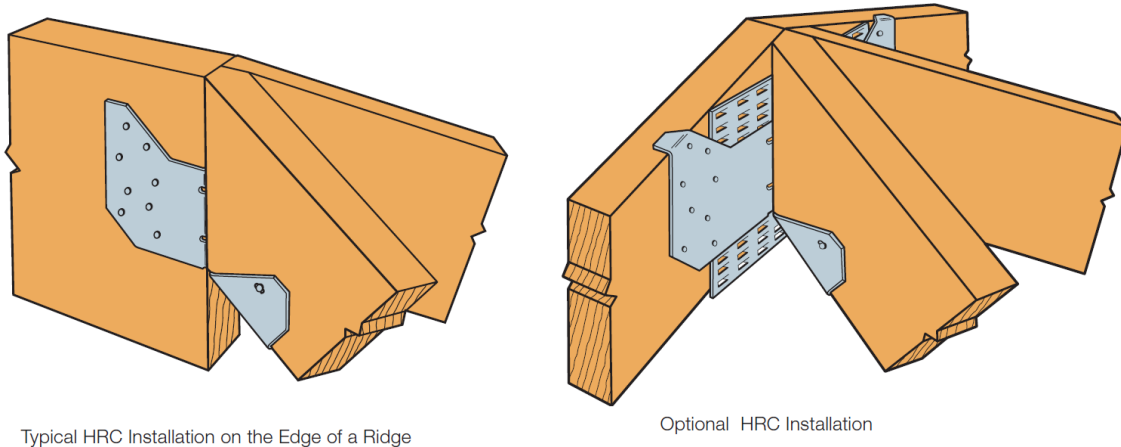
## B7 SPR – Typical installation

SPR has to be installed, allowing the bottom part to be only bent once to match the slope of the beam.
The bending can be made up or down.
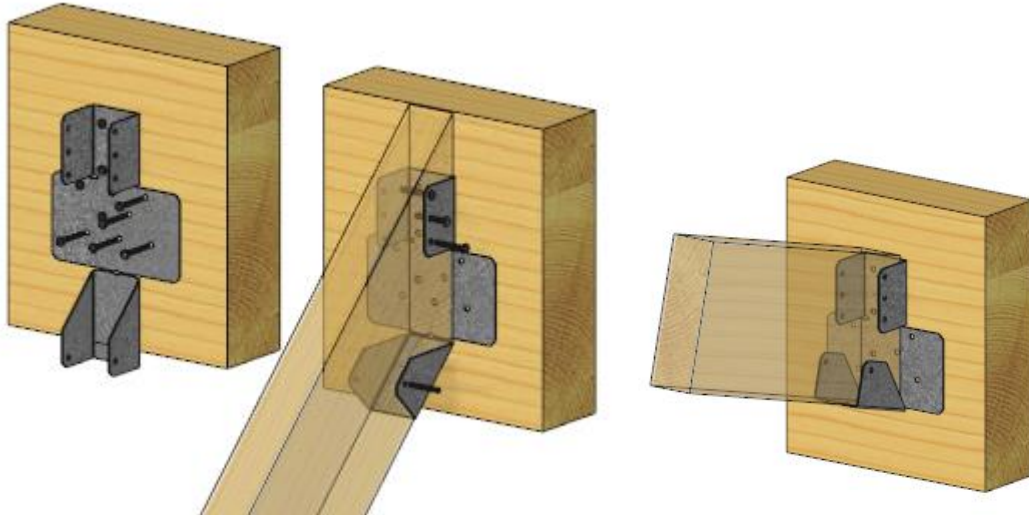
## B8 SDEA – Typical installation

*SEE* C3, table 4 , *for nails and screws that can be used with SDEA.*

1°- Put the two parts 1, on the header, at a distance corresponding to the width of the joist. Put nails in the holes colored in black
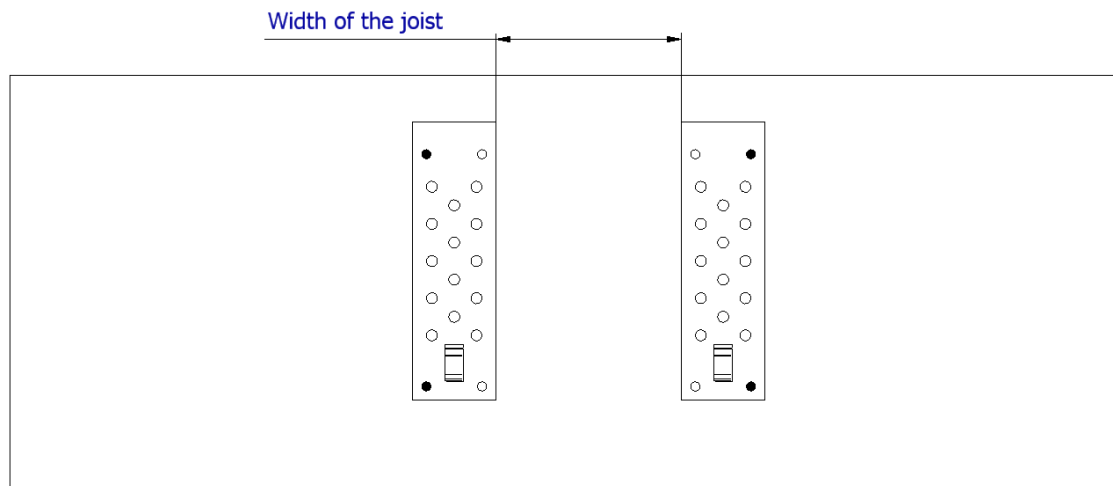
2°- Put the Part2 flush to the end of the joist and add the nails in the holes colored in black. One part 2 must be installed on each side of the joist.
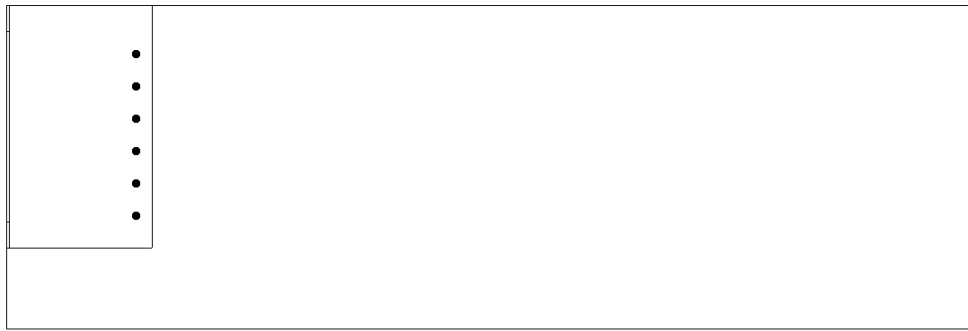
3°- Slip the joist in the header
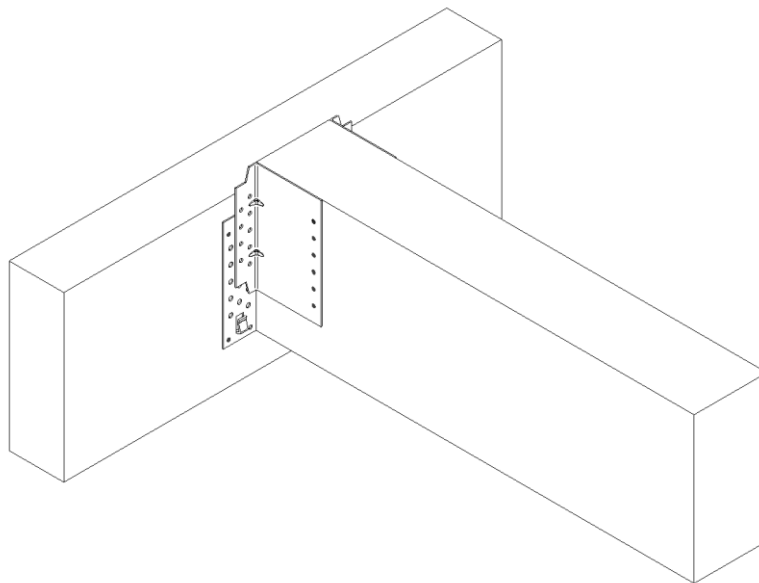
4°- Add the missing nails represented by the holes colored in black
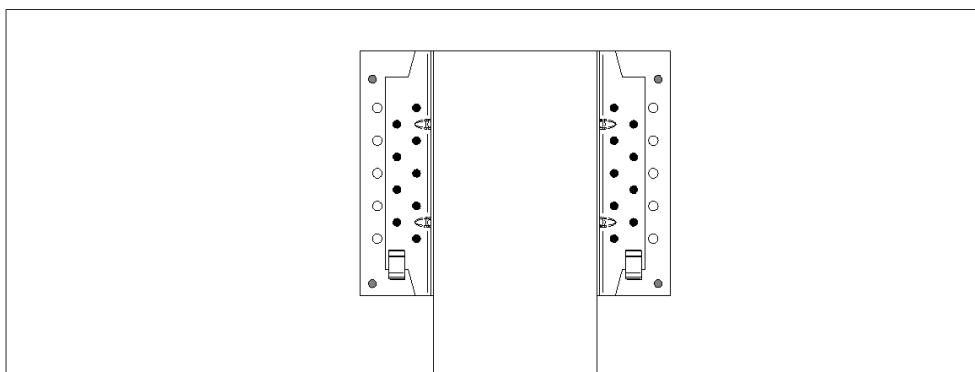
Slope of the joist:  α = +45° to -45°
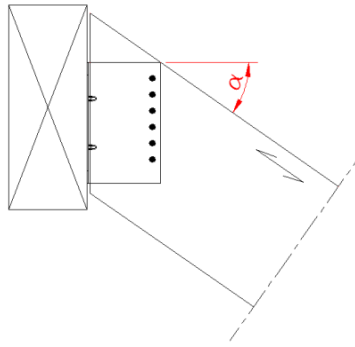
## B9 ABF230 – Typical installation

ABF230 must be installed and adjusted / folded on site to the correct angle according to the image below.
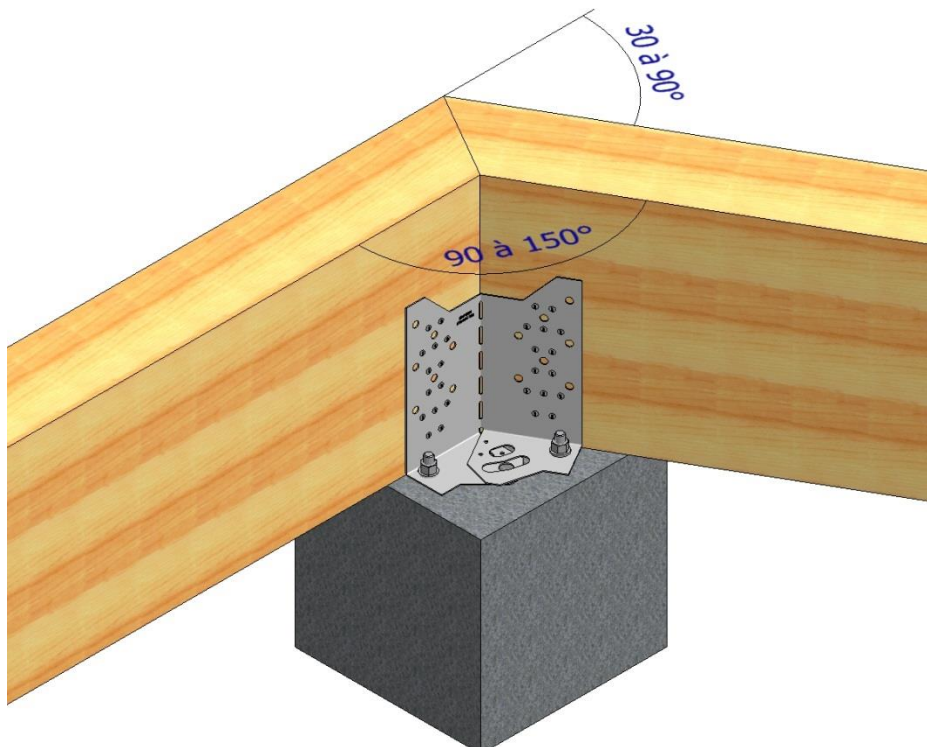
# Annex C - Basis of design

## Annex C1 – Basis of Design

All the general basis of design are given here. These rules applied to all products listed in this ETA except if something else is stated in Annex D for a particular product.

All of the capacities stated in the Annex D tables are **characteristic capacities** $R_k$. Therefore, the design capacities are obtained according to the following formula:

$$R_d = \frac{R_k \times k_{mod}}{\gamma_M}$$

**Combined forces**
For practical purposes, the strength verification is always carried out for design forces and design capacities.

For all hangers included in this ETA, the following inequalities shall be fulfilled:

$$\left(\frac{F_{1,d}}{R_{1,d}}\right)^2 + \left(\frac{F_{2,d}}{R_{2,d}}\right)^2 + \left(\frac{F_{3,d}}{R_{3,d}}\right)^2 \leq 1$$

**Timber splitting**
For forces acting perpendicular to the grain in the timber it must be checked that splitting will not occur in accordance with Eurocode 5 or a similar national Timber Code.

## Annex C2 – Definition of forces direction
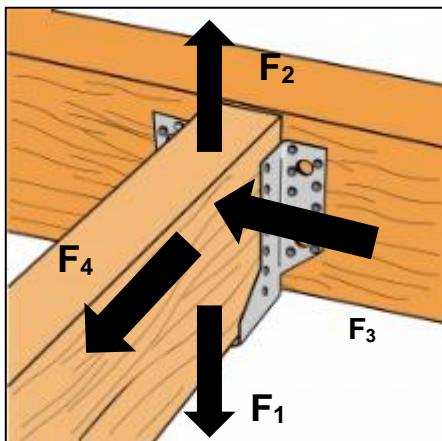
## Annex C3 – Fasteners specification and capacities

**Table 1: Nail and screw specification for timber to timber connections with fasteners in accordance with ETA-04/0013**

| Nail and screw type | Nail and screw size (mm) | | Finish |
|---|---|---|---|
| According to ETA-04/0013 | Diameter | Length | |
| Connector nail | 3.7 | 50 | Electroplated zinc |
| Connector nail | 4.0 | 35 | Electroplated zinc |
| Connector nail | 4.0 | 40 | Electroplated zinc |
| Connector nail | 4.0 | 50 | Electroplated zinc |
| Connector nail | 4.0 | 60 | Electroplated zinc |
| Connector nail | 4.2 | 35 | Electroplated zinc |
| Connector nail | 4.2 | 50 | Electroplated zinc |
| Connector screw | 5.0 | 35 | Electroplated zinc |
| Connector screw | 5.0 | 50 | Electroplated zinc |

**Table 2: Nail specifications for timber to timber connections with nails in accordance with EN 14592**

| Nail and screw type | Nail and screw size (mm) | | Finish |
|---|---|---|---|
| | Diameter | Length | |
| Square Twist nail | 3.75 | 30 | Galvanized |
| Smooth Shank Nail | 3.75 | 75 | Galvanized |
| Smooth Shank nail | 4.0 | 90 | Galvanized |
| Smooth Shank Nail | 4.0 | 100 | Galvanized |

**Table 3: Bolt specification**

| Bolt type | Bolt size (mm) | | Capacities |
|---|---|---|---|
| | Diameter | Length | |
| Bolt M10/12/16 Quality 4.6 or higher | 10 / 12 / 16 | - | For relevant joist hangers see the assumed characteristic capacities of the bolt connection and compare with the specification of the manufacturer |

The downward and the upward directed forces are assumed to act in the middle of the joist.
- There shall be nails or screws in the holes as described in the tables of this annex.
  Typically there shall be nails in all holes.
- The type and size of the fasteners shall be those stated in the tables.
- Connector nails are Simpson connector nails
  Smooth nails and square twist nails are in accordance with EN 14592
- The thickness of the joist shall be at least B - 3 mm, where B is the width of the joist hanger.

The characteristic load-carrying capacities of the skew joist hanger connections for timber to timber connections are stated in the following tables.

For timber to timber connections the following tables state the type of nails and their sizes.

For joist hanger type S45 it is possible to fasten the joist hanger to a member made from concrete or similar material by using 12 mm anchor bolts. This is not an option for the other joist hanger types.

The following fasteners are used for connections to wood:

**Table 4: Hanger capacities are to be determined for the following range of fastener types (in accordance with ETA-04/0013 and EN14592)**

| Nail size and type | Hanger type | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | S45 | S1530 | HSUR/HSUL | SUR/SUL | LSSU | VPA | SDEA | ACI | HRC | SPR | RR |
| CNA3.7 x 50 | | | | | X | X | | | | | |
| CNA4.0 x 35 | X | X | | | | | | X | | X | |
| CNA4,0 x 50 | X | X | | | | | X | | | X | |
| CNA4.0 x 60 | | | X | X | | X | | | | | |
| CNA4.2 x 35 | X | X | | | | | | X | | | |
| CNA4.2 x 50 | X | X | | | | | X | | | | |
| 3.75 x 30 ST | | | X | X | X | X | | | X | X | X |
| 3.75 x 75 SS | | | | | X | X | | | | | |
| 4.0 x 90 SS | | | X | X | | | | | X | | |
| 4.0 x 100 SS | | | | | X | | | | | | |
| CSA5.0 x 35 | X | X | | | | | | X | | X | |
| CSA5.0 x 50 | X | X | | | | | X | | | X | |

CNA = Connector Nail    ST = Square Twist    SS = Smooth Shank    CSA= Connector Screw

**Annex C4 – Characteristic capacity modification methods for timber types**

**C4 –1: Characteristic capacity modification method for different timber types**

Annex D states the load-carrying capacities of the hanger connections for a characteristic density of 350 kg/m$^3$.

For timber or wood-based material with a lower characteristic density than 350 kg/m$^3$ the load-carrying capacities shall be reduced by the $k_{dens}$ factor:

$$k_{dens} = \left( \frac{\rho_k}{350} \right)^2$$ Where $\rho_k$ is the characteristic density of the timber in kg/m$^3$.

# Annex D - Product definition and capacities

## D1 – S45

### Product Name:

| Product Name | Material reference acc. to clause II-1 |
|---|---|
| S45D*[size]* | Steel ref. 1 |
| S45G*[size]* | Steel ref. 1 |

[size] :  blank / width / thickness

### Table D1-1: Geometrical data for S45 Right

| Item | Dimensions (mm) | | | | | | | Nail holes, no and size | | | Bolt holes, no and size | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | t | header | Joist (open side) | Joist (closed side) | header | Joist |
| S45D250/38/1,5 | 38 | 105 | 38 | 36 | 80 | 80 | 1,5 | 16 - ø5 | 8 - ø5 | 8 - ø5 | 2 - ø11 | 4 - ø9 |
| S45D320/64/2 | 64 | 128 | 70 | 40 | 102 | 144 | 2 | 18 - ø5 | 5 - ø5 | 5 - ø5x7,5 | 4 - ø13 | -- |
| S45D380/76/2 | 76 | 152 | 70 | 40 | 102 | 156 | 2 | 26 - ø5 | 6 - ø5 + 1 opt | 6 - ø5x7.5 + 1 opt | 4 - ø13 | -- |
| S45D440/80/2 | 80 | 180 | 70 | 40 | 102 | 160 | 2 | 28 - ø5 | 7 - ø5 + 1 opt | 7 - ø5x7.5 + 1 opt | 4 - ø13 | -- |
| S45D500/100/2 | 100 | 200 | 70 | 40 | 102 | 102 | 2 | 34 - ø5 | 9 - ø5 + 1 opt | 9 - ø5x7.5 + 1 opt | 4 - ø13 | -- |

### Figure D1-1: Dimensioned drawing of right skewed hangers S45
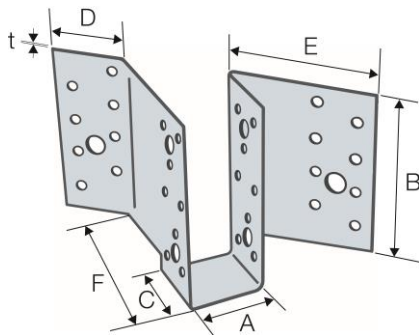


### Table D1-2-: Geometrical data for S45 Left

| Item | Dimensions (mm) | | | | | | | Nail holes, no and size | | | Bolt holes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | t | header | Joist (open side) | Joist (closed side) | header | Joist |
| S45G250/38/1,5 | 38 | 105 | 38 | 36 | 80 | 80 | 01.Jan | 16 - ø5 | 8 - ø5 | 8 - ø5 | 2 - ø11 | 4 - ø9 |
| S45G320/64/2 | 64 | 128 | 70 | 40 | 102 | 144 | 2 | 18 - ø5 | 5 - ø5 | 5 - ø5x7,5 | 4 - ø13 | -- |
| S45G380/76/2 | 76 | 152 | 70 | 40 | 102 | 156 | 2 | 26 - ø5 | 6 - ø5 + 1 opt | 6 - ø5x7.5 + 1 opt | 4 - ø13 | -- |
| S45G440/80/2 | 80 | 180 | 70 | 40 | 102 | 160 | 2 | 28 - ø5 | 7 - ø5 + 1 opt | 7 - ø5x7.5 + 1 opt | 4 - ø13 | -- |
| S45G500/100/2 | 100 | 200 | 70 | 40 | 102 | 102 | 2 | 34 - ø5 | 9 - ø5 + 1 opt | 9 - ø5x7.5 + 1 opt | 4 - ø13 | -- |

The "Left" version is mirror-image to the "Right" version.

For timber to concrete connection the number and size of the nails in the joist shall be those stated in the table. The anchor bolts into the concrete or similar type of structural member shall have a characteristic lateral capacity as stated in the table. The quality of the bolt material shall be at least 4.6.

**Table D1-3: Characteristic load-carrying capacities of type S45, number and size of Simpson connector nails, 12 mm bolts 4.6.**

| Joist hanger size | Timber to timber connections | | | | Joist hanger on a concrete wall | | |
|---|---|---|---|---|---|---|---|
| | Connector nails, Nail types and sizes | | Characteristic capacities | | 12 mm bolts in the wall | | |
| | Number of nails and size | | | | Characteristic capacities | | Provided minimum |
| | Header | Joist | $R_{1.k}$ | $R_{2.k}$ | $R_{1.k}$ | $R_{2.k}$ | charac. Lateral capacity of each bolt |
| | | | kN | kN | kN | kN | kN |
| S45 250/38 | 2x8x 4.0x50 | 8x 4.0x35 | 4.99 | 4.95 | 0 | 0 | 0 |
| S45 250/38* | 2x5x 4.0x50 | 5x 4.0x35 | 2.57 | 2.5 | 0 | 0 | 0 |
| S45 320/38 | 2x9x 4.0x50 | 2x5x 4.0x35 | 14.0 | 3.2 | 14.0 | 3.2 | 7.4 |
| S45 320/64 | 2x9x 4.0x50 | 2x5x 4.0x35 | 14.0 | 3.2 | 14.0 | 3.2 | 7.4 |
| S45 380/76 | 2x13x 4.0x50 | 2x6x 4.0x50 | 16.2 | 4.2 | 16.2 | 4.2 | 8.8 |
| S45 440/80 | 2x14x 4.0x50 | 2x7x 4.0x50 | 18.5 | 5.6 | 18.5 | 5.6 | 9.3 |
| S45 500/100 | 2x17x 4.0x50 | 2x9x 4.0x50 | 23.4 | 8.3 | 23.0 | 8.3 | 12.0 |

*For connection with timber elements with a height of 97mm
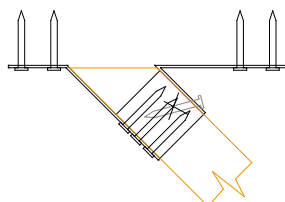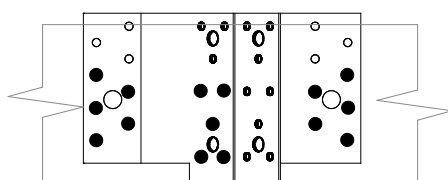


Partial nailing for timber element with a height 97mm

## D2 S1530

**Product Name:**

| Product Name | Material reference acc. to clause II-1 |
|---|---|
| S1530D/38/1.5 | Steel ref. 1 |
| S1530G/38/1.5 | Steel ref. 1 |
| S1530D/80/2.0 | Steel ref. 1 |
| S1530G/80/2.0 | Steel ref. 1 |

**Dimension**

| Type | Dimensions [mm] | | | | | | Holes | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | joist | | header | |
| | A | B | C | D | F | t | Qty | size | Qty | size |
| S1530D/38/1.5 | 52 | 125 | 85 | 220 | 124 | 1,5 | 3/2 | 5x7.5/Ø5 | 11/2 | Ø5/Ø11 |
| S1530G/38/1.5 | 52 | 125 | 85 | 220 | 124 | 1,5 | 3/2 | 5x7.5/Ø5 | 11/2 | Ø5/Ø11 |
| S1530D/80/2.0 | 95 | 125 | 154 | 310 | 200 | 2 | 5 | 5x7.5 | 18/4 | Ø5/Ø11 |
| S1530G/80/2.0 | 95 | 125 | 154 | 310 | 200 | 2 | 5 | 5x7.5 | 18/4 | Ø5/Ø11 |
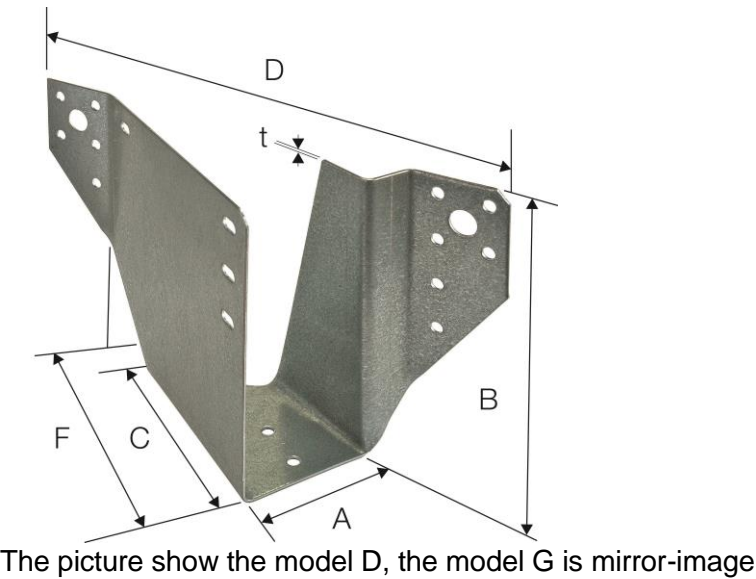


The picture show the model D, the model G is mirror-image

For timber to timber connections the number and size of the nails in the joist and the header shall be those stated in the table. There shall be nails in all holes. In the bottom plate there shall be 2 nails from below.

The width of the joist shall be 38 mm for S1530/38/1.5 and 80mm for S1530/80/2.

**Table D2-1: Characteristic load-carrying capacities of type S1530 for joist and header with height of ≥140mm and full nailing, number and size of Simpson connector nails and depending on the angle between the header and the joist, which can be either 15° or 30°**

| | Nails in joist | Nails in header | Characteristic capacities | |
|---|---|---|---|---|
| | 4.0x35 | 4.0x35 | $R_{1.k}$ | $R_{2.k}$ |
| Type / angle | Number | Number | kN | kN |
| S1530/38//1.5 15° | 3 + 2 | 5 + 6 | 7.5 | 1,2 |
| S1530/38/1.5 30° | 3 + 2 | 5 + 6 | 7.7 | 1,2 |
| S1530/80/2 15° | 5 | 18 | 8.2 | 1.2 |
| S1530/80/2 30° | 5 | 18 | 12.8 | 1.2 |

**Table D2-2: Characteristic load-carrying capacities of type S1530 for joist and header with height of ≥97mm and partial nailing, number and size of Simpson connector nails and depending on the angle between the header and the joist, which can be either 15° or 30°**

| Type / angle | Nails in joist | Nails in header | Characteristic capacities. | |
|---|---|---|---|---|
| | 4.0x35 | 4.0x35 | $R_{1.k}$ | $R_{2.k}$ |
| | Number | Number | kN | kN |
| S1530/38/1.5 15° | 2 | 3 | 1.6 | 0.45 |
| S1530/38/1.5 30° | 1+2 | 3 | 1.6 | 0.85 |
| S1530/80/2 15° | 2 | 10 | 5.4 | 1.22 |
| S1530/80/2 30° | 3+3 | 10 | 5.4 | 4.3 |

For connection with an angle between 15° and 30° are to use the values for 15°.



30°

15°
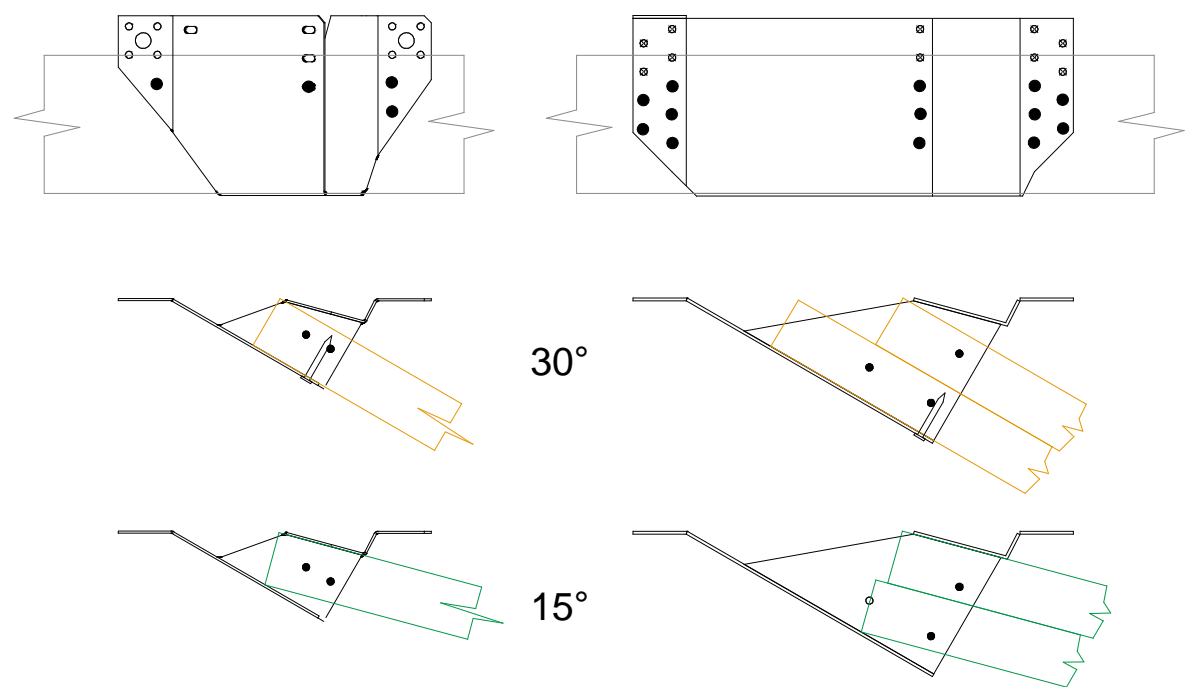
Figure D2-4: Partial nailing    S1530/38/1,5                    S1530/80/2

## D3. SUL/R hangers

### Product Name:

| Product Name | Material reference acc. to clause II-1 |
|---|---|
| SUL [type digits] | Steel ref. 1 |
| SUR [type digits] | Steel ref. 1 |

### SUL hangers

**Table D3-1: Geometrical data for SUL**

| Item | Dimensions (mm) | | | | | | Nail holes, no and size | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | Thick | $n_h$ header (open flange) | $n'_h$ header (closed flange) | $n_j$ Joist (open side) | $n'_j$ Joist (closed side) |
| SUL24 | 40 | 80 | 50 | 35 | 25 | 1,5 | 2 - ø4 | 2 - ø4x6 | 2 - ø4 | 2 - ø4x6 |
| SUL26 | 40 | 127 | 50 | 35 | 25 | 1,5 | 3 - ø4 | 3 - ø4x6 | 3 - ø4 | 3 - ø4x6 |
| SUL90/50 | 50 | 90 | 84 | 40 | 30 | 1,5 | 4 - ø4 | 4 - ø4x6 | 2 - ø4 | 2 - ø4x6 |
| SUL135/50 | 50 | 135 | 84 | 40 | 30 | 1,5 | 6 - ø4 | 6 - ø4x6 | 3 - ø4 | 3 - ø4x6 |
| SUL210/50 | 50 | 210 | 84 | 40 | 30 | 1,5 | 10 - ø4 | 10 - ø4x6 | 4 - ø4 | 4 - ø4x6 |
| SUL210 | 40 | 206 | 50 | 35 | 25 | 1,5 | 5 - ø4 | 5 - ø4x6 | 5 - ø4 | 5 - ø4x6 |
| SUL214 | 40 | 254 | 50 | 35 | 25 | 1,5 | 6 - ø4 | 6 - ø4x6 | 6 - ø4 | 6 - ø4x6 |
| SUL1.81/9 | 46 | 233 | 50 | 35 | 19 | 1,5 | 6 - ø4 | 6 - ø4x6 | 4 - ø4 | -- |
| SUL.1.81/11 | 46 | 254 | 50 | 35 | 19 | 1,5 | 8 - ø4 | 8 - ø4x6 | 5 - ø4 | -- |
| SULI3510/12 | 58 | 228 | 73 | 44 | 43 | 1,5 | 7 - ø4 | 7 - ø4x6 | 3 - ø4 | 3 - ø4x6 |
| SULI3514/20 | 58 | 330 | 73 | 44 | 43 | 1,5 | 9 - ø4 | 9 - ø4x6 | 4 - ø4 | 4 - ø4x6 |
| SUL210-2 | 80 | 220 | 62 | 56 | 32 | 1,5 | 7 - ø4 | 7 - ø4x6 | 3 - ø4 | 3 - ø4x6 |
| SUL410 | 90 | 216 | 62 | 56 | 25 | 1,5 | 7 - ø4 | 7 - ø4x6 | 3 - ø4 | 3 - ø4x6 |
| SUL414 | 90 | 317 | 62 | 56 | 25 | 1,5 | 9 - ø4 | 9 - ø4x6 | 4 - ø4 | 4 - ø4x6 |
| SUL310 | 65 | 227 | 67 | 51 | 38 | 1,5 | 7 - ø4 | 7 - ø4x6 | 3 - ø4 | 3 - ø4x6 |
| SUL314 | 65 | 330 | 67 | 51 | 38 | 1,5 | 9 - ø4 | 9 - ø4x6 | 4 - ø4 | 4 - ø4x6 |
| SUL2.06/9 | 52 | 231 | 81 | 54 | 41 | 1,6 | 7 - ø4 | 7 - ø4x6 | 4 - ø4 | -- |
| SUL2,1/9 | 53 | 230 | 81 | 54 | 40 | 1,6 | 7 - ø4 | 7 - ø4x6 | 4 - ø4 | -- |
| SUL2.37/9 | 60 | 227 | 81 | 54 | 33 | 1,6 | 7 - ø4 | 7 - ø4x6 | 4 - ø4 | -- |
| SUL2.56/9 | 65 | 225 | 81 | 54 | 28 | 1,6 | 7 - ø4 | 7 - ø4x6 | 4 - ø4 | -- |
| SUL2.06/11 | 52 | 285 | 81 | 54 | 41 | 1,6 | 8 - ø4 | 8 - ø4x6 | 4 - ø4 | -- |
| SUL2.1/11 | 53 | 284 | 81 | 54 | 40 | 1,6 | 8 - ø4 | 8 - ø4x6 | 4 - ø4 | -- |
| SUL2.37/11 | 60 | 284 | 81 | 54 | 33 | 1,6 | 8 - ø4 | 8 - ø4x6 | 4 - ø4 | -- |
| SUL2.56/11 | 65 | 284 | 81 | 54 | 28 | 1,6 | 8 - ø4 | 8 - ø4x6 | 4 - ø4 | -- |
| SUL2.06/14 | 52 | 345 | 81 | 54 | 41 | 1,6 | 9 - ø4 | 9 - ø4x6 | 4 - ø4 | -- |
| SUL2.1/14 | 53 | 344 | 81 | 54 | 40 | 1,6 | 9 - ø4 | 9 - ø4x6 | 4 - ø4 | -- |
| SUL2.37/14 | 60 | 341 | 81 | 54 | 33 | 1,6 | 9 - ø4 | 9 - ø4x6 | 4 - ø4 | -- |
| SUL2.56/14 | 65 | 339 | 81 | 54 | 28 | 1,6 | 9 - ø4 | 9 - ø4x6 | 4 - ø4 | -- |
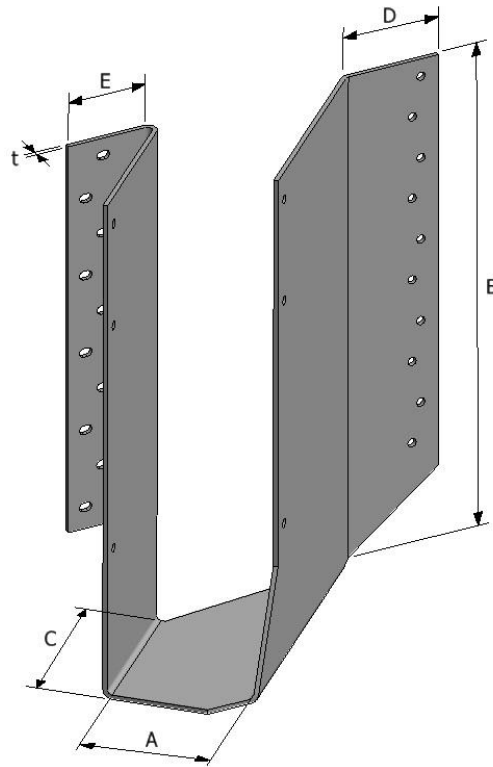
**Figure D3-1: Dimensioned drawing of SUL hangers**

**SUR hangers**

**Table D3-2: Geometrical data for SUR**

| Item | Dimensions (mm) | | | | | | Nail holes, no and size | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | Thick | $n_h$ header (open flange) | $n'_h$ header (closed flange) | $n_j$ Joist (open side) | $n'_j$ Joist (closed side) |
| SUR24 | 40 | 80 | 50 | 35 | 25 | 1,5 | 2 - ø4 | 2 - ø4x6 | 2 - ø4 | 2 - ø4x6 |
| SUR26 | 40 | 127 | 50 | 35 | 25 | 1,5 | 3 - ø4 | 3 - ø4x6 | 3 - ø4 | 3 - ø4x6 |
| SUR90/50 | 50 | 90 | 84 | 40 | 30 | 1,5 | 4 - ø4 | 4 - ø4x6 | 2 - ø4 | 2 - ø4x6 |
| SUR135/50 | 50 | 135 | 84 | 40 | 30 | 1,5 | 6 - ø4 | 6 - ø4x6 | 3 - ø4 | 3 - ø4x6 |
| SUR210/50 | 50 | 210 | 84 | 40 | 30 | 1,5 | 10 - ø4 | 10 - ø4x6 | 4 - ø4 | 4 - ø4x6 |
| SUR210 | 40 | 206 | 50 | 35 | 25 | 1,5 | 5 - ø4 | 5 - ø4x6 | 5 - ø4 | 5 - ø4x6 |
| SUR214 | 40 | 254 | 50 | 35 | 25 | 1,5 | 6 - ø4 | 6 - ø4x6 | 6 - ø4 | 6 - ø4x6 |
| SUR1.81/9 | 46 | 233 | 50 | 35 | 19 | 1,5 | 6 - ø4 | 6 - ø4x6 | 4 - ø4 | -- |
| SUR.1.81/11 | 46 | 254 | 50 | 35 | 19 | 1,5 | 8 - ø4 | 8 - ø4x6 | 5 - ø4 | -- |
| SURI3510/12 | 58 | 228 | 73 | 44 | 43 | 1,5 | 7 - ø4 | 7 - ø4x6 | 3 - ø4 | 3 - ø4x6 |
| SURI3514/20 | 58 | 330 | 73 | 44 | 43 | 1,5 | 9 - ø4 | 9 - ø4x6 | 4 - ø4 | 4 - ø4x6 |
| SUR210-2 | 80 | 220 | 62 | 56 | 32 | 1,5 | 7 - ø4 | 7 - ø4x6 | 3 - ø4 | 3 - ø4x6 |
| SUR410 | 90 | 216 | 62 | 56 | 25 | 1,5 | 7 - ø4 | 7 - ø4x6 | 3 - ø4 | 3 - ø4x6 |
| SUR414 | 90 | 317 | 62 | 56 | 25 | 1,5 | 9 - ø4 | 9 - ø4x6 | 4 - ø4 | 4 - ø4x6 |
| SUR310 | 65 | 227 | 67 | 51 | 38 | 1,5 | 7 - ø4 | 7 - ø4x6 | 3 - ø4 | 3 - ø4x6 |
| SUR314 | 65 | 330 | 67 | 51 | 38 | 1,5 | 9 - ø4 | 9 - ø4x6 | 4 - ø4 | 4 - ø4x6 |
| SUR2.06/9 | 52 | 231 | 81 | 54 | 41 | 1,6 | 7 - ø4 | 7 - ø4x6 | 4 - ø4 | -- |
| SUR2,1/9 | 53 | 230 | 81 | 54 | 40 | 1,6 | 7 - ø4 | 7 - ø4x6 | 4 - ø4 | -- |
| SUR2.37/9 | 60 | 227 | 81 | 54 | 33 | 1,6 | 7 - ø4 | 7 - ø4x6 | 4 - ø4 | -- |
| SUR2.56/9 | 65 | 225 | 81 | 54 | 28 | 1,6 | 7 - ø4 | 7 - ø4x6 | 4 - ø4 | -- |
| SUR2.06/11 | 52 | 285 | 81 | 54 | 41 | 1,6 | 8 - ø4 | 8 - ø4x6 | 4 - ø4 | -- |
| SUR2.1/11 | 53 | 284 | 81 | 54 | 40 | 1,6 | 8 - ø4 | 8 - ø4x6 | 4 - ø4 | -- |
| SUR2.37/11 | 60 | 284 | 81 | 54 | 33 | 1,6 | 8 - ø4 | 8 - ø4x6 | 4 - ø4 | -- |
| SUR2.56/11 | 65 | 284 | 81 | 54 | 28 | 1,6 | 8 - ø4 | 8 - ø4x6 | 4 - ø4 | -- |
| SUR2.06/14 | 52 | 345 | 81 | 54 | 41 | 1,6 | 9 - ø4 | 9 - ø4x6 | 4 - ø4 | -- |
| SUR2.1/14 | 53 | 344 | 81 | 54 | 40 | 1,6 | 9 - ø4 | 9 - ø4x6 | 4 - ø4 | -- |
| SUR2.37/14 | 60 | 341 | 81 | 54 | 33 | 1,6 | 9 - ø4 | 9 - ø4x6 | 4 - ø4 | -- |
| SUR2.56/14 | 65 | 339 | 81 | 54 | 28 | 1,6 | 9 - ø4 | 9 - ø4x6 | 4 - ø4 | -- |

The "Right" version is mirror-image to the "Left" version.

For timber to timber connections the number and size of the nails in the joist and the header shall be those stated in the table.

**Table D3-3: Characteristic load-carrying capacities of type SUL / SUR, type, number and size of SS Smooth Shank round nails and ST Square Twist nails**

| Joist Hanger Type | Header | Joist | Characteristic capacities | |
|---|---|---|---|---|
| | Nail types and sizes | | | |
| | SS | ST | | |
| | 4.0 x 90 | 3.75 X 30 | R$_{1.k}$ | R$_{2.k}$ |
| | Number of nails | | kN | kN |
| SUL / SUR | | | | |
| 210 | 2x5 | 2x5 | 11.38 | 10.83 |
| 214 | 2x6 | 2x6 | 13.24 | 11.49 |
| 1.81/9 | 2x6 | 4 | 4.19 | 0 |
| 1.81/11 | 2x8 | 4 | 4.28 | 0 |
| 3510/12 | 2x7 | 2x3 | 14.59 | 5.59 |
| 3514/20 | 2x9 | 2x4 | 20.02 | 9.35 |
| 310 | 2x7 | 2x3 | 14.48 | 5.78 |
| 314 | 2x9 | 2x4 | 19.86 | 9.57 |
| 210-2 | 2x7 | 2x3 | 13.18 | 5.69 |
| 410 | 2x7 | 2x3 | 14.14 | 5.34 |
| 414 | 2x9 | 2x4 | 18.80 | 8.96 |
| 24 | 2x2 | 2x2 | 3.48 | 2.75 |
| 26 | 2x3 | 2x3 | 6.13 | 8.38 |
| 90/50 | 2x4 | 2x2 | 4.55 | 1.46 |
| 135/50 | 2x6 | 2x3 | 8.44 | 2.86 |
| 210/50 | 2x10 | 2x4 | 15.66 | 6.11 |
| 2.06/9 | 2x7 | 4 | 4.55 | 0 |
| 2.1/9 | 2x7 | 4 | 4.64 | 0 |
| 2.37/9 | 2x7 | 4 | 4.88 | 0 |
| 2.56/9 | 2x7 | 4 | 5.08 | 0 |
| 2.06/11 | 2x8 | 4 | 4.66 | 0 |
| 2.1/11 | 2x8 | 4 | 4.75 | 0 |
| 2.37/11 | 2x8 | 4 | 5.00 | 0 |
| 2.56/11 | 2x8 | 4 | 5.21 | 0 |
| 2.06/14 | 2x9 | 6 | 6.48 | 0 |
| 2.1/14 | 2x9 | 6 | 6.55 | 0 |
| 2.37/14 | 2x9 | 6 | 6.97 | 0 |
| 2.56/14 | 2x9 | 6 | 7.18 | 0 |

Instead of the connector nails mentioned in D3-3 the connector nails can be substituted by the nails or screws mentioned in D3-4. These fasteners have larger characteristic capacities than the mentioned connector nails according to the ETA 04/0013.

**Table D3-4: Substitution possibilities of fasteners. The smooth round nails may be substituted by the connector nail**

| Smooth round nail which may be substituted by the other connector nail | Other connector nails |
|---|---|
| 4.0x90 mm | 4.0x60 mm |

# D4 HSUR/L hangers

## Product Name :

| Product Name | Material reference acc. to clause II-1 |
|---|---|
| HSUR *[type digits]* | Steel ref. 1 |
| HSUL *[type digits]* | Steel ref. 1 |

## HSUR hangers

**TableD4-1: Geometrical data for HSUR**

| Item | Dimensions (mm) | | | | | | Nail holes, no and size | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | Thick | $n_h$ header (open flange) | $n'_h$ header (closed flange) | $n_j$ Joist (open side) | $n'_j$ Joist (closed side) |
| HSUR26-2 | 80 | 125 | 62 | 56 | 32 | 2 | 6 - ø4 | 6 - ø4x6 | 2 - ø4 | 2 - ø4x6 |
| HSUR410 | 90 | 216 | 62 | 56 | 25 | 2 | 10 - ø4 | 10 - ø4x6 | 3 - ø4 | 3 - ø4x6 |
| HSUR414 | 90 | 317 | 62 | 56 | 25 | 2 | 13 - ø4 | 13 - ø4x6 | 4 - ø4 | 4 - ø4x6 |

*No individual drawing: The "Right" version is mirror-image to the "Left" version HSUL.*

**Figure D4-1: Dimensioned drawing of HSUR hangers**

## HSUL hangers

**Table D4-2: Geometrical data for HSUL**

| Item | Dimensions (mm) | | | | | | Nail holes, no and size | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | Thick | $n_h$ header (open flange) | $n'_h$ header (closed flange) | $n_j$ Joist (open side) | $n'_j$ Joist (closed side) |
| HSUL26-2 | 80 | 125 | 62 | 56 | 32 | 2 | 6 - ø4 | 6 - ø4x6 | 2 - ø4 | 2 - ø4x6 |
| HSUL410 | 90 | 216 | 62 | 56 | 25 | 2 | 10 - ø4 | 10 - ø4x6 | 3 - ø4 | 3 - ø4x6 |
| HSUL414 | 90 | 317 | 62 | 56 | 25 | 2 | 13 - ø4 | 13 - ø4x6 | 4 - ø4 | 4 - ø4x6 |
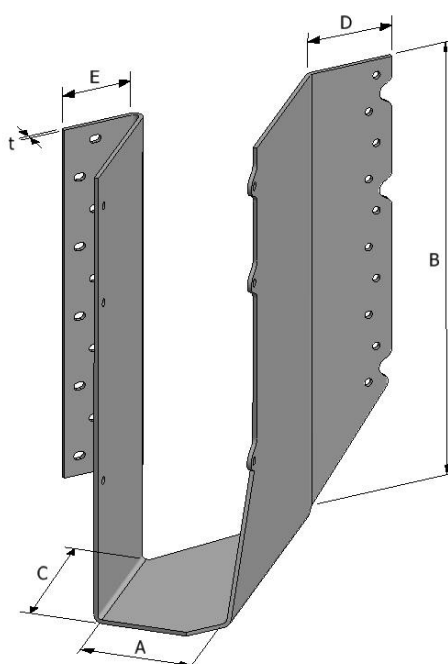


**Figure D4-2: Dimensioned drawing of HSUL hangers**

For timber to timber connections the number and size of the nails in the joist and the header shall be those stated in the table.

**Table D4-3: Characteristic load-carrying capacities of type SUL / SUR, type, number and size of SS Smooth Shank round nails and ST Square Twist nails**

| Joist Hanger Type | Header | Joist | Characteristic capacities | |
|---|---|---|---|---|
| | Nail types and sizes | | | |
| | SS | ST | $R_{1.k}$ | $R_{2.k}$ |
| | 4.0 x 90 | 3.75 X 30 | | |
| | Number of nails | | kN | kN |
| HSUL / HSUR | | | | |
| HSUL26-2 | 2x6 | 2x2 | 8.57 | 2.40 |
| HSUL410 | 2x10 | 2x3 | 17.35 | 5.57 |
| HSUL414 | 2x13 | 2x4 | 29.78 | 9.23 |

Instead of the connector nails mentioned in Table  the connector nails can be substituted by the nails or screws mentioned in Table 4 . These fasteners have larger characteristic capacities than the mentioned connector nails according to the ETA 04/0013.

**Table D4-4: Substitution possibilities of fasteners. The smooth round nails may be substituted by the connector nail**

| Smooth round nail which may be substituted by the other connector nail | Other connector nails |
|---|---|
| 4.0x90 mm | 4.0x60 mm |

## D5 LSSU Hangers

**Product Name :**

| Product Name | Material reference acc. to clause II-1 |
|---|---|
| LSSU *[type digits]* | Steel ref. 1 |
| LSU *[type digits]* | Steel ref. 1 |

**Figure D5-1: Drawings of LSSU hangers**
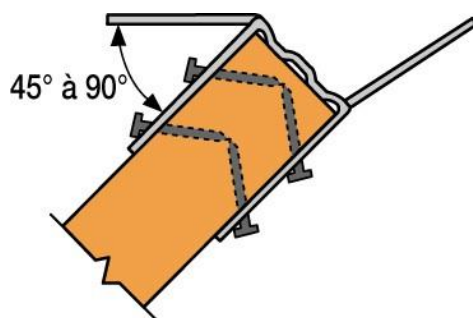
**Table D5-1: Geometrical data for LSSU**

| Item | Dimensions (mm) | | | | | Nail number | |
|---|---|---|---|---|---|---|---|
| | A | B | C | D | t | Supporting Member (1) | Supported Member (2) |
| LSU26 | 38 | 124 | 75 | 38 | 1.2 | 6 | 5 |
| LSSU28 | 38 | 181 | 90 | 44 | 1.2 | 10 | 5 |
| LSSU210 | 38 | 216 | 90 | 44 | 1.2 | 10 | 7 |
| LSSUI25 | 45 | 216 | 90 | 44 | 1.2 | 10 | 7 |
| LSSU170/50 | 50 | 170 | 90 | 58 | 1.2 | 10 | 11 |
| LSSU275/50 | 50 | 275 | 90 | 58 | 1.2 | 18 | 11 |
| LSSUI2.06 | 52 | 216 | 90 | 47 | 1.2 | 10 | 7 |
| LSSU170/58 | 58 | 170 | 90 | 58 | 1.2 | 10 | 11 |
| LSSU275/58 | 58 | 275 | 90 | 58 | 1.2 | 18 | 11 |
| LSSUI35 | 60 | 216 | 90 | 50 | 1.2 | 10 | 7 |
| LSSU170/66 | 66 | 170 | 90 | 58 | 1.2 | 10 | 11 |
| LSSU275/66 | 66 | 275 | 90 | 58 | 1.2 | 18 | 11 |
| LSSU170/71 | 71 | 170 | 90 | 65 | 1.2 | 10 | 11 |
| LSSU275/71 | 71 | 275 | 90 | 65 | 1.2 | 18 | 11 |
| LSSU170/75 | 75 | 170 | 90 | 65 | 1.2 | 14 | 12 |
| LSSU275/75 | 75 | 275 | 90 | 65 | 1.2 | 18 | 12 |
| LSSU210-2 | 78 | 216 | 90 | 75 | 1.2 | 18 | 12 |
| LSSU410 | 90 | 216 | 90 | 69 | 1.5 | 18 | 12 |
| LSSU170/96 | 96 | 170 | 90 | 80 | 1.2 | 10 | 11 |
| LSSU275/96 | 96 | 275 | 90 | 80 | 1.2 | 18 | 11 |
| LSSU170/100 | 100 | 170 | 90 | 80 | 1.2 | 14 | 12 |
| LSSU275/100 | 100 | 275 | 90 | 80 | 1.2 | 18 | 12 |
| LSU4.12 | 105 | 228 | 90 | 59 | 1.2 | 24 | 12 |
| LSU3510-2 | 120 | 228 | 90 | 89 | 1.5 | 24 | 16 |

(1) Can be installed with either of the following types: 3.75 x 75 Smooth Shank Nail, 3.7 x 50 Annular Ring Shank Nail or 4.0 x 100 Smooth Shank Nail
(2) Can be installed with SST Square Twist Nail 3.75 x 30
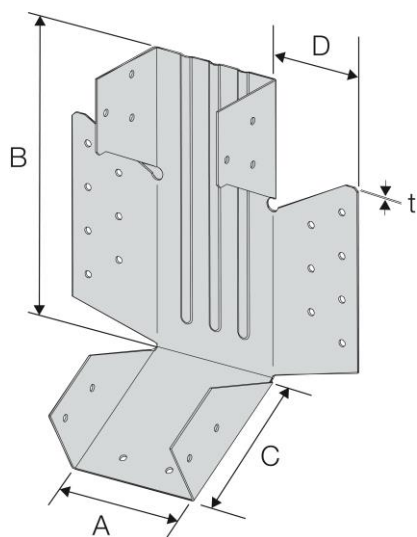
**Table D5-2: characteristic values for LSSU**

| Joist Size | Item Code | Characteristic Load Capacities (kN) – full nailing | | | | | |
|---|---|---|---|---|---|---|---|
| | | I-Joists | | | | Solid Section | |
| | | LVL Flanges | | Solid Flanges | | C24 | |
| | | $R_{1.k}$ | $R_{2.k}$ | $R_{1.k}$ | $R_{2.k}$ | $R_{1.k}$ | $R_{2.k}$ |
| **Sloped Hangers Only** | | | | | | | |
| 38 x 150 | LSU26 | 6.81 | 2.55 | 7.26 | 2.55 | 7.26 | 2.55 |
| 38 x 241 | LSSU28 | 5.13 | 2.38 | 7.26 | 2.38 | 7.26 | 2.38 |
| 38 x 302 | LSSU210 | 5.13 | 2.38 | 7.26 | 2.38 | 7.26 | 2.38 |
| 45 x 241 to 356 | LSSUI25 | 5.13 | 2.38 | 9.93 | 3.98 | 9.93 | 3.98 |
| 47 x 195 to 245 | LSSU170/50 | - | - | 11.35 | 5.71 | 11.35 | 5.71 |
| 47 x 300 to 450 | LSSU275/50 | - | - | 10.59 | 5.71 | 10.59 | 5.71 |
| 51 x 241 to 356 | LSSUI2.06 | 5.13 | 2.38 | - | - | - | - |
| 55 x 195 to 245 | LSSU170/58 | 5.13 | 2.38 | 11.35 | 5.71 | 11.35 | 5.71 |
| 55 x 300 to 450 | LSSU275/58 | 5.13 | 2.38 | 10.59 | 5.71 | 10.59 | 5.71 |
| 58 x 241 to 356 | LSSUI35 | 9.14 | 2.38 | 9.93 | 3.98 | 9.93 | 3.98 |
| 63 x 195 to 245 | LSSU170/66 | - | - | 11.35 | 5.71 | 11.35 | 5.71 |
| 63 x 300 to 450 | LSSU275/66 | - | - | 10.59 | 5.71 | 10.59 | 5.71 |
| 68 x 195 to 245 | LSSU170/71 | 9.14 | 2.38 | 11.35 | 5.71 | 11.35 | 5.71 |
| 68 x 300 to 450 | LSSU275/71 | 9.14 | 2.38 | 10.59 | 5.71 | 10.59 | 5.71 |
| 72 x 195 to 300 | LSSU170/75 | - | - | 11.35 | 5.71 | 11.35 | 5.71 |
| 72 x 300 to 400 | LSSU275/75 | - | - | 10.59 | 5.71 | 10.59 | 5.71 |
| (2) 38 x 241 | LSSU210-2 | 9.14 | 2.38 | - | - | - | - |
| 89 x 241 to 356 | LSSU410 | 11.17 | 2.99 | 12.45 | 2.26 | 12.45 | 2.26 |
| (2) 47 x 195 to 245 | LSSU170/96 | - | - | 11.35 | 5.71 | 11.35 | 5.71 |
| (2) 47 x 300 to 450 | LSSU275/96 | - | - | 10.59 | 5.71 | 10.59 | 5.71 |
| 97 x 195 to 300 | LSSU170/100 | - | - | 13.11 | 5.71 | 13.11 | 5.71 |
| 97 x 300 to 400 | LSSU275/100 | - | - | 14.29 | 5.71 | 14.29 | 5.71 |
| (2) 51 x 241 to 356 | LSU4.12 | 11.17 | 2.99 | - | - | - | - |
| (2) 58 x 241 to 356 | LSU3510-2 | 15.19 | 3.66 | 12.55 | 4.55 | 12.55 | 4.55 |
| **Skewed Hangers or Sloped and Skewed** | | | | | | | |
| 38 x 150 | LSU26 | 4.16 | 2.55 | 3.24 | 2.55 | 3.24 | 2.55 |
| 38 x 241 | LSSU28 | 3.45 | 1.47 | 3.24 | 1.47 | 3.24 | 1.47 |
| 38 x 302 | LSSU210 | 3.45 | 1.47 | 3.24 | 1.47 | 3.24 | 1.47 |
| 41 x 195 to 245 | LSSU170/44 | 3.45 | 1.47 | - | - | - | - |
| 41 x 300 to 450 | LSSU275/44 | 3.45 | 1.47 | - | - | - | - |
| 45 x 241 to 356 | LSSUI25 | 3.45 | 1.47 | 8.10 | 3.98 | 8.10 | 3.98 |
| 47 x 195 to 245 | LSSU170/50 | - | - | 6.34 | 5.71 | 6.34 | 5.71 |
| 47 x 300 to 450 | LSSU275/50 | - | - | 10.78 | 5.71 | 10.78 | 5.71 |
| 51 x 241 to 356 | LSSUI2.06 | 3.45 | 1.47 | - | - | - | - |
| 55 x 195 to 245 | LSSU170/58 | 3.45 | 1.47 | 6.34 | 5.71 | 6.34 | 5.71 |
| 55 x 300 to 450 | LSSU275/58 | 3.45 | 1.47 | 10.78 | 5.71 | 10.78 | 5.71 |
| 58 x 241 to 356 | LSSUI35 | 6.81 | 6.63 | 8.10 | 3.98 | 8.10 | 3.98 |
| 63 x 195 to 245 | LSSU170/66 | - | - | 6.34 | 5.71 | 6.34 | 5.71 |
| 63 x 300 to 450 | LSSU275/66 | - | - | 10.78 | 5.71 | 10.78 | 5.71 |
| 68 x 195 to 245 | LSSU170/71 | 6.81 | 2.38 | 6.34 | 5.71 | 6.34 | 5.71 |
| 68 x 300 to 450 | LSSU275/71 | 6.81 | 2.38 | 10.78 | 5.71 | 10.78 | 5.71 |
| 72 x 195 to 300 | LSU170/75 | - | - | 6.34 | 5.71 | 6.34 | 5.71 |
| 72 x 300 to 400 | LSU275/75 | - | - | 10.78 | 5.71 | 10.78 | 5.71 |
| (2) 38 x 241 | LSSU210-2 | 6.81 | 2.38 | - | - | - | - |
| 89 x 241 to 356 | LSSU410 | 7.20 | 2.99 | 7.12 | 2.26 | 7.12 | 2.26 |
| (2) 47 x 195 to 245 | LSSU170/96 | - | - | 6.34 | 5.71 | 6.34 | 5.71 |
| (2) 47 x 300 to 450 | LSSU275/96 | - | - | 10.78 | 5.71 | 10.78 | 5.71 |
| 97 x 195 to 300 | LSU170/100 | - | - | 4.69 | 5.71 | 4.69 | 5.71 |
| 97 x 300 to 400 | LSU275/100 | - | - | 8.16 | 5.71 | 8.16 | 5.71 |
| (2) 51 x 241 to 356 | LSU4.12 | 7.20 | 2.99 | - | - | - | - |
| (2) 58 x 241 to 356 | LSU3510-2 | 11.14 | 3.66 | 11.89 | 4.55 | 11.89 | 4.55 |

Note: The connectors should be bent once only

# D6 VPA – Hangers

**Product Name :**

| Product Name | Material reference acc. to clause II-1 |
|---|---|
| VPA *[type digits]* | Steel ref. 1 |



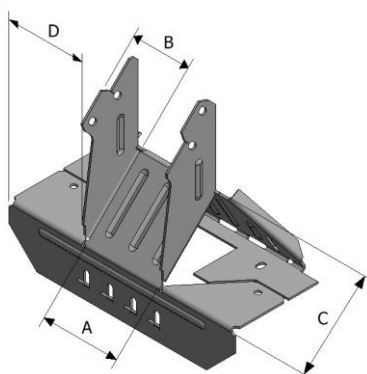**Figure D6-1: Dimensioned drawings of VPA hangers**
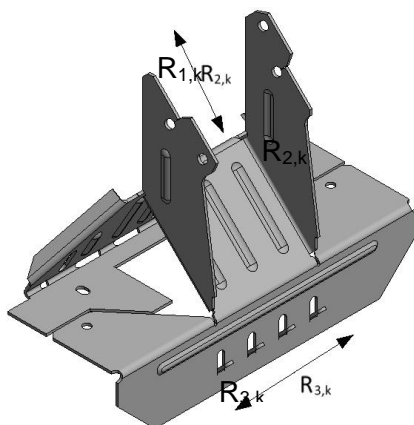


**Figure D6-2: Load directions for VPA hangers**

**Table D6-1: Geometrical data for VPA**

| Item | Dimensions (mm) | | | | | Nail number | |
|---|---|---|---|---|---|---|---|
| | A | B | C | D | Thickness | Supporting Member (1) | Supported Member (2) |
| VPA2 | 40 | | | 46 | 1.2 | 8 | 2 |
| VPA25 | 46 | | | 42 | 1.2 | 8 | 2 |
| VPA50 | 50 | 45 | 57 | 36 | 1.2 | 9 | 2 |
| VPA2.06 | 52 | | | 50 | 1.2 | 9 | 2 |
| VPA58 | 58 | 45 | 57 | 32 | 1.2 | 9 | 2 |
| VPA35 | 59 | | | 46 | 1.2 | 9 | 2 |
| VPA66 | 66 | 45 | 57 | 32 | 1.2 | 9 | 2 |
| VPA71 | 71 | 45 | 57 | 32 | 1.2 | 9 | 2 |
| VPA75 | 75 | 52 | 57 | 34 | 1.2 | 11 | 2 |
| VPA4 | 90 | | | 45 | 1.2 | 11 | 2 |
| VPA96 | 96 | 52 | 57 | 34 | 1.2 | 11 | 2 |
| VPA100 | 100 | 52 | 57 | 34 | 1.2 | 11 | 2 |

(1) Can be installed with either of the following types: 3.75 x 75 Smooth Shank Nail. 3.7 x 50 Annular Ring Shank Nail or 4.0 x 60 Annular Ring Shank Nail
(2) Can be installed with SST Square Twist Nail 3.75 x 30

**Table D6-2: Characteristic values for VPA used in conjunction with corresponding LSSU**

| Joist Width | Item Codes | | Characteristic Load Capacity (kN) – full nailing | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | I-Joists | | | | | | Solid Section | | |
| | | | LVL Flanges | | | Solid Flanges | | | C24 | | |
| | | | $R_{1.k}$ | $R_{2.k}$ | $R_{3.k}$ | $R_{1.k}$ | $R_{2.k}$ | $R_{3.k}$ | $R_{1.k}$ | $R_{2.k}$ | $R_{3.k}$ |
| 38 | VPA2 | LSSU28 | 4.76 | 3.69 | 3.04 | - | - | - | - | - | - |
| 45 | VPA25 | LSSUI25 | 4.76 | 3.69 | 3.04 | 5.31 | 1.94 | 2.17 | 5.31 | 1.94 | 2.17 |
| 47 | VPA50 | LSSU***/50 | - | - | - | 5.31 | 1.78 | 2.17 | 5.31 | 1.78 | 2.17 |
| 51 | VPA2.06 | LSSUI2.06 | 6.79 | 3.69 | 2.37 | - | - | - | - | - | - |
| 55 | VPA58 | LSSU***/58 | 6.79 | 3.69 | 2.37 | - | - | - | - | - | - |
| 58 / 60 | VPA35 | LSSUI35 | 6.79 | 3.69 | 2.37 | 6.19 | 1.94 | 2.17 | 6.19 | 1.94 | 2.17 |
| 63 | VPA66 | LSSU***/66 | - | - | - | 8.19 | 1.78 | 2.17 | 8.19 | 1.78 | 2.17 |
| 68 | VPA71 | LSSU***/71 | 6.79 | 3.69 | 2.37 | - | - | - | - | - | - |
| 70 / 72 | VPA75 | LSSU***/75 | - | - | - | 8.19 | 1.78 | 2.17 | 8.19 | 1.78 | 2.17 |
| 89 / 90 | VPA4 | LSSU410 | 14.16 | 3.69 | 2.96 | 7.94 | 1.94 | 2.17 | 7.94 | 1.94 | 2.17 |
| (2) 47 | VPA96 | LSSU***/96 | - | - | - | 8.19 | 1.78 | 2.17 | 8.19 | 1.78 | 2.17 |
| 100 | VPA100 | LSSU***/100 | - | - | - | 8.19 | 1.78 | 2.17 | 8.19 | 1.78 | 2.17 |

Capacities are when VPA's are used in conjunction with corresponding LSSU connector

# D7 HRC

## Product Name :

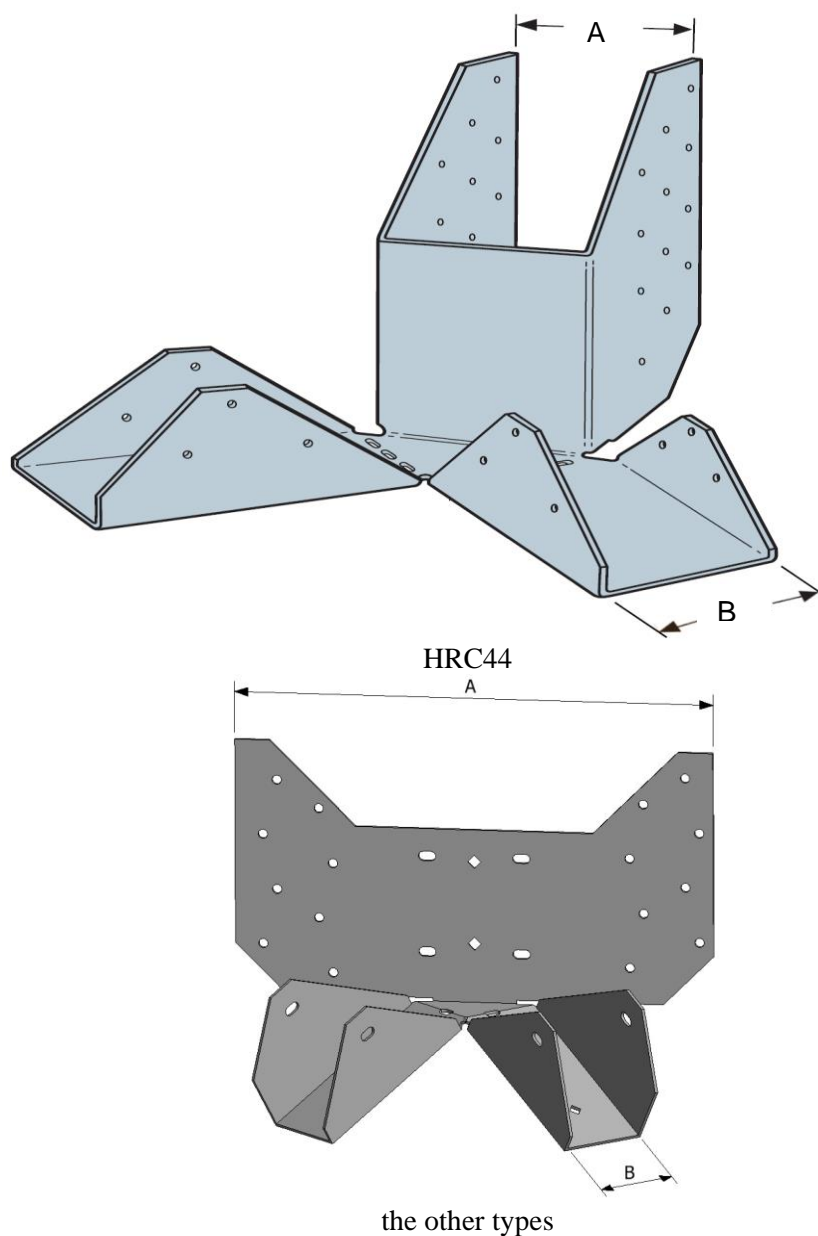| Product Name | Material reference acc. to clause II-1 |
|---|---|
| HRC *[type digits]* | Steel ref. 1 |

HRC44

the other types

**Figure D7-1: Dimensioned drawing of HRC**

**Table D7-1: Geometrical data for HRC connector**

| Model | Dimension (mm) | | header holes | | | joist holes | | |
|---|---|---|---|---|---|---|---|---|
| | A | B | Ø4.3 | square 4.3 | 4.4x7.9 | Ø4.3 | square 4.3 | 4.4x7.9 |
| HRC22 | 218 | 40 | 16 | 2 | 4 | | 2 | 6 |
| HRC1.81 | 218 | 46 | 16 | 2 | 4 | | 2 | 6 |
| HRC50 | 218 | 50 | 16 | | 4 | | | 6 |
| HRC44 | 90 | 90 | 24 | | | 12 | 4 | |

**Table D7-2: Characteristic values for HRC connector**

| Model | No. Fasteners (3.75x30mm ST) | | Characteristic capacity C24 [kN] | |
|---|---|---|---|---|
| | Header | Each Hip | $R_{1.k}$ | $R_{2.k}$ |
| HRC22 | 16 | 2 | 2.82 | 0.94 |
| HRC1.81 | 16 | 2 | 2.82 | 0.94 |
| HRC50 | 16 | 2 | 2.82 | 0.94 |
| HRC44 | 24* | 6* | 8.90 | 3.52 |

*use 4.0x90mm nails with HRC44

Notes
- On the end of the ridge. use optional slots to secure the HRC22. HRC50 and HRC1.81. Bend face flanges back flush with the ridge and complete nailing
- On face of ridge. adjust to correct height and install nails
- Oblong nails holes ease rafter installation
- Optional diamond holes on the HRC range (except HRC44) are for installation convenience.
- Double bevel cut hip members to achieve full bearing capacity
- May be sloped to 45° with no reduction in loads

# D8 SPR

**Product Name :**

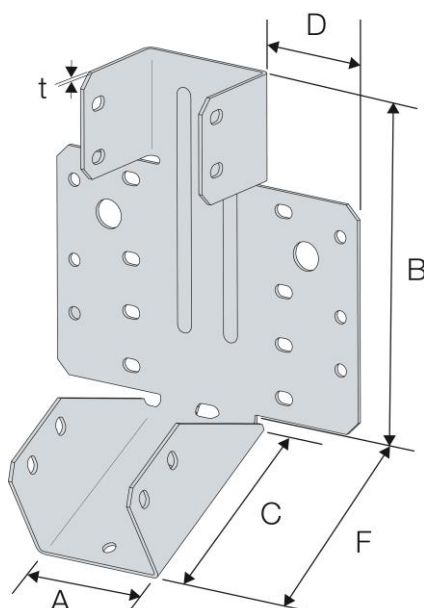| Product Name | Material reference acc. to clause II-1 |
|---|---|
| SPRxx | Steel ref. 1 |
| SPR-xx/yyy | Steel ref. 1 |
| SPR-Bxx/yyy | Steel ref. 1 |

xx= width ; yyy = height   in [mm]

**Drawing:**



**Figure D8-1: Dimensioned drawings of SPR type 38 / 50 /64 / 76**
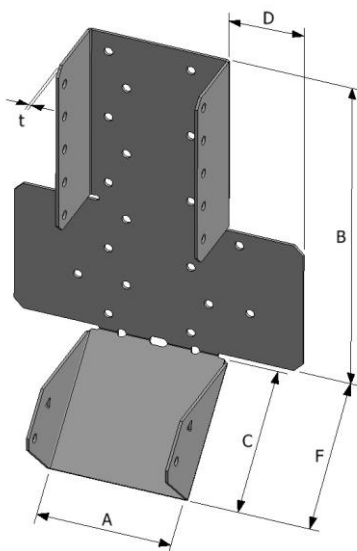


**Figure D8-2: Dimensioned drawings of SPR xx/yyy**

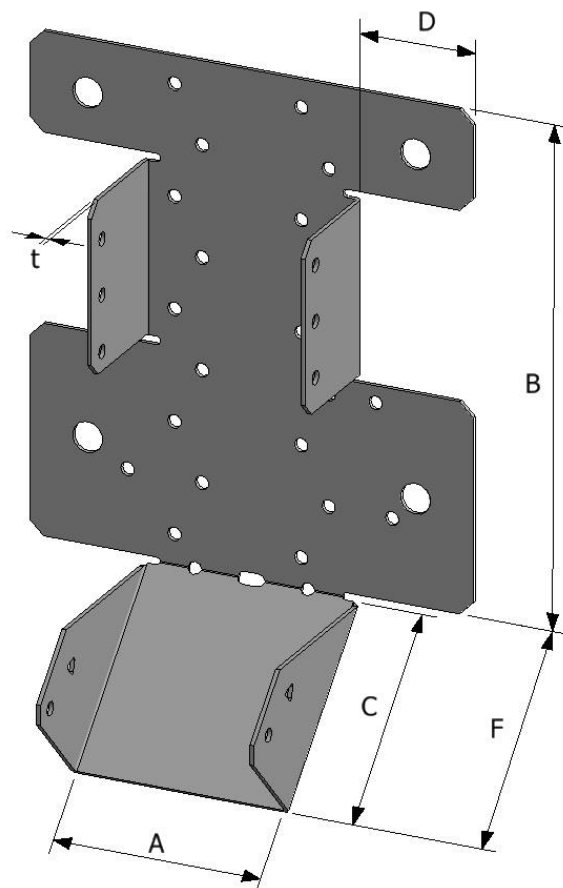**Figure D8-3: Dimensioned drawings for optional version SPR-Bxx/yyy**

**Table D8-1: Geometrical data and characteristic values for SPR connector**

| Model | Dimensions [mm] | | | | | Number of holes Ø5mm | |
|---|---|---|---|---|---|---|---|
| | A | B | C | D | F | Header | Joist |
| SPR38 | 38 | 110 | 59 | 40 | 61 | 12 | 5 |
| SPR50 | 50 | 132 | 74 | 40 | 77 | 14 | 10 |
| SPR64 | 64 | 152 | 74 | 40 | 77 | 16 | 10 |
| SPR76 | 76 | 174 | 74 | 40 | 77 | 20 | 12 |
| SPR47/140 | 47 | 140 | 75 | 41 | 76 | 13 | 10 |
| SPR47/160 | 47 | 160 | 75 | 41 | 76 | 14 | 12 |
| SPR47/180 | 47 | 180 | 75 | 41 | 76 | 16 | 14 |
| SPR47/200 | 47 | 200 | 75 | 41 | 76 | 17 | 16 |
| SPR91/140 | 91 | 140 | 75 | 41 | 76 | 18 | 10 |
| SPR91/160 | 91 | 160 | 75 | 41 | 76 | 20 | 12 |
| SPR91/180 | 91 | 180 | 75 | 41 | 76 | 22 | 14 |
| SPR91/200 | 91 | 200 | 75 | 41 | 76 | 24 | 16 |
| SPRxx/yyy | 38 to 140 | 100 to 400 | 75 | 41 | 76 | ≤44 | ≤ 32 + 2 |
| SPR-Bxx/yyy | 38 to 140 | 220 to 400 | 75 | 41 | 76 | ≤44 | ≤ 28 + 2 |

xx = the size A . yyy = the size B by step of 20mm

Note:
- A readjustment may be permitted in order to finalize the slope
- The connectors should be bent once only
- If several bends are performed. the connector must be replaced
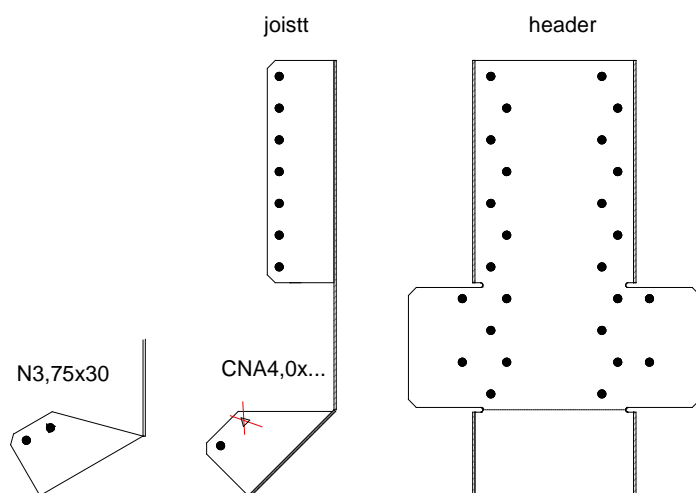
nail pattern

joistt          header

N3,75x30          CNA4,0x...

**Table D8-2: The capacities for the SPRxx/yyy**

| Model | Number of Fasteners | | Type of fastener | Characteristic capacities - timber C24 [kN] | |
|---|---|---|---|---|---|
| | | | | Direction | |
| | Header | Joist | | $R_{1.k}$ | $R_{2.k}$ |
| SPR38 | 12 | 5 | CNA4.0x35 | 5.94 | 2.68 |
| SPR50 | 14 | 10 | CNA4.0x35 | 13.20 | 3.21 |
| | 14 | 10 | N3.75x30 | 6.75 | 3.81 |
| SPR64 | 16 | 10 | CNA4.0x50 | 13.2 | 3.21 |
| SPR76 | 20 | 12 | CNA4.0x50 | 10.88 | 6.7 |
| SPR47/140 | 13 | 10 | N3.75x30 | 6.0 | 6.0 |
| SPR47/160 | 14 | 12 | N3.75x30 | 8.1 | 8.1 |
| SPR47/180 | 16 | 14 | N3.75x30 | 10.1 | 10.1 |
| SPR47/200 | 17 | 16 | N3.75x30 | 12.2 | 12.2 |
| SPR91/140 | 18 | 10 | N3.75x30 | 8.3 | 8.3 |
| SPR91/160 | 20 | 12 | N3.75x30 | 10.4 | 10.4 |
| SPR91/180 | 22 | 14 | N3.75x30 | 12.4 | 12.4 |
| SPR91/200 | 24 | 16 | N3.75x30 | 14.5 | 14.5 |
| SPRxx/yyy | ≤44 | ≤ 32 + 2 | CNA4.0x L | $R_{1.k.side}$ + $R_{1.k.bottom}$ | $R_{1.k.side}$ |
| SPR-Bxx/yyy | ≤44 | ≤ 28 + 2 | CNA4.00x L | see table 3+4 | see table 3 |

**Table D8-3: The capacities for the SPRxx/yyy and SPR-Bxx/yyy**

| SPR B [mm] | SPR-B B [mm] | number of nails in the joist | number of nails in the header for A<50 | number of nails in the header for A>=50 | $R_{1.k \ sides}$ [kN] CNA nail: | | | |
|---|---|---|---|---|---|---|---|---|
| | | $n_J$ | $n_H$ | $n_H$ | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| 100 | | 6 | 8 | 12 | 1.7 | 2.2 | 2.8 | 3.20 |
| 120 | | 6 | 9 | 14 | 2.9 | 3.3 | 4.2 | 4.90 |
| 140 | | 8 | 13 | 18 | 4.0 | 4.5 | 5.8 | 6.60 |
| 160 | | 10 | 14 | 20 | 6.3 | 7.2 | 9.1 | 10.50 |
| 180 | 220 | 12 | 16 | 22 | 9.0 | 10.2 | 12.8 | 14.60 |
| 200 | 240 | 14 | 17 | 24 | 11.8 | 13.3 | 16.7 | 19.00 |
| 220 | 260 | 16 | 19 | 26 | 14.7 | 16.5 | 20.9 | 23.40 |
| 240 | 280 | 18 | 20 | 28 | 17.7 | 20.0 | 24.9 | 28.00 |
| 260 | 300 | 20 | 22 | 30 | 20.7 | 23.5 | 28.9 | 32.50 |
| 280 | 320 | 22 | 23 | 32 | 23.8 | 26.8 | 33.4 | 37.10 |
| 300 | 340 | 24 | 25 | 34 | 27.0 | 30.1 | 37.2 | 42.60 |
| 320 | 360 | 26 | 26 | 36 | 30.2 | 33.4 | 41.6 | 48.10 |
| 340 | 380 | 28 | 28 | 38 | 33.2 | 37.2 | 46.7 | 53.60 |
| 360 | 400 | 30 | 29 | 40 | 36.2 | 40.8 | 51.8 | 59.10 |
| 380 | | 32 | 31 | 42 | 39.2 | 45.0 | 56.9 | 64.60 |
| 400 | | 34 | 32 | 44 | 43.1 | 49.3 | 62.00 | 70.00 |
| | | | | A [mm] ≥ | 38 | 55 | 65 | 75 |

For a down load ($R_{1.k}$) the capacity ($R_{1.k \ side}$) shall be increased by the bottom part ($R_{1.k \ bottom}$). based on the width. for intermediate values a linear interpolation can be made.

**Table D8-4: The capacities (with CNA-nails)  for the SPRxx/yyy and SPR-Bxx/yyy bottom plate**

The capacities are given only for connection timber to timber connection with nails.

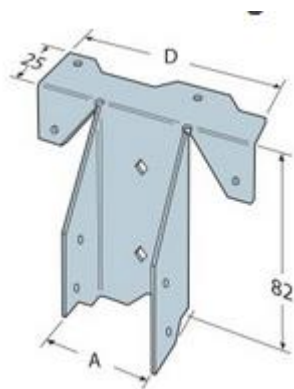| A [mm] | $R_{1.k \ bottom}$ [kN] |
|---|---|
| 40 | 2.1 |
| 50 | 2.6 |
| 60 | 3.1 |
| 70 | 3.6 |
| 80 | 4.1 |
| 100 | 5.2 |
| 140 | 7.2 |
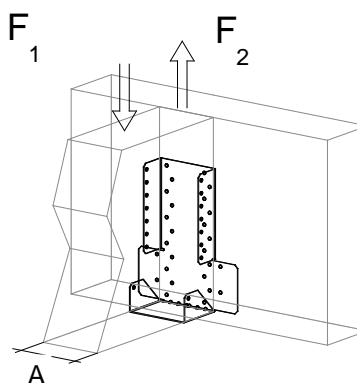


$R_{1.k} = R_{1.k \ side} + R_{1.k \ bottom}$

$R_{2.k} = R_{1.k \ side}$

## D9 RR

**Product Name :**

| Product Name | Material reference acc. to clause II-1 |
|---|---|
| RR | Steel ref. 1 |
| RR47 | Steel ref. 1 |



**Figure D9-3: Dimensioned drawings of RR**

**Table D9-1:** Product dimensions

| Model | Minimum joist size | Dimensions (mm) | | | | header holes | | joist holes |
|---|---|---|---|---|---|---|---|---|
| | | A | B | D | t | Ø4 | square 5 | Ø4 |
| RR | 35x100 | 38 | 82.5 | 102 | 1.2 | 4 | 2 | 4 |
| RR47 | 44x100 | 47 | 82.5 | 113.5 | 1.2 | 4 | 2 | 4 |

**Table D9-2 : Characteristic capacities**

| Model | No. Fasteners (3.75x30mm) | | Characteristic Capacities (kN) |
|---|---|---|---|
| | Header | Joist | $R_{1.k}$ |
| RR | 4 | 4 | 0.62 |
| RR47 | 4 | 4 | 0.62 |

**D10 ACI**

**Product Name :**

| Product Name | Material reference acc. to clause II-1 |
|---|---|
| ACI 100/80 | Steel ref. 1 |
| ACI 140/80 | Steel ref. 1 |

**ACI**

Angle Connector for I joist
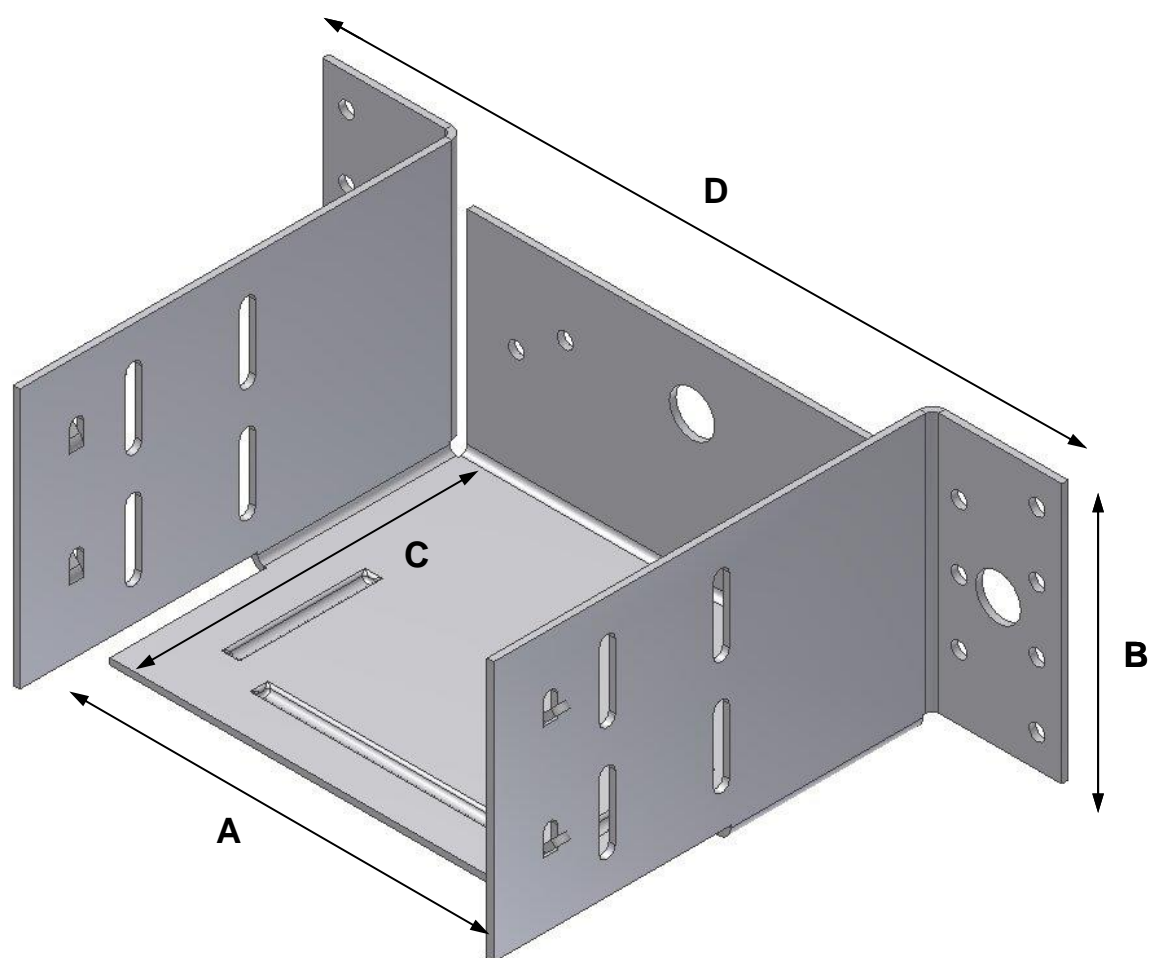


**Table D10-1 : Product dimensions**

| Model number | Dimensions (mm) | | | | | Holes | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Support | | Supported beam |
| | A | B | C | D | t | Rigid | Beam | |
| **ACI 100/80** | 98 | 80 | 112 | 270 | 2.0 | 2 - Ø14 | 14 - Ø5 | 4 Ø4x5 |
| **ACI 140/80** | 138 | 80 | 112 | 270 | 2.0 | 2 - Ø14 | 14 - Ø5 | 4 Ø4x5 |

**Table D10-2 : Fasteners**

| Model number | Fasteners | | Supported beam |
|---|---|---|---|
| | Support | | |
| | Rigid | Beam | |
| ACI 100/80 | 2 - Ø12 | 14 – CNA4.0x35 | 2 or 4 CNA4.0x35 |
| ACI 140/80 | 2 - Ø12 | 14 - CNA4.0x35 | 2 or 4 CNA4.0x35 |

**Table D10-3 : Correspondence with I joists**

| Model number | I joists | |
|---|---|---|
| | Width | Height |
| ACI 100/80 | 45-69 | 200-400 |
| ACI  140/80 | 70-100 | 200-400 |

**Table D10-4 : Characteristic capacities**

| Model number | Characteristic values $R_{1.k}$ (kN) | | | |
|---|---|---|---|---|
| | Beam support | | Rigid support | |
| | 30° to 59° | 60° to 90° | 30° to 59° | 60° to 90° |
| ACI 100/80 | 6.06 | 8.30 | 7.87 | 10.69 |
| ACI 140/80 | 6.91 | 8.25 | 7.60 | 9.51 |

# D11 SDEA

**Product Name:**

| Product Name | Material reference acc. to clause II-1 |
|---|---|
| SDEA 150-part1 | Steel ref. 1 |
| SDEA 150-part2 | Steel ref. 1 |

Table D11-1: Geometrical data for SDEA150

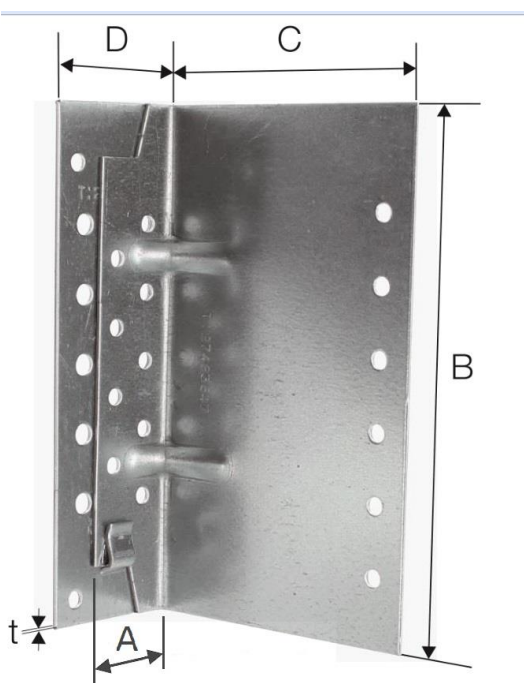| Type | Dimensions [mm] | | | | | Holes | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | joist | | header | |
| | A | B | C | D | t | Qty | size | Qty | size |
| SDEA150 | 29.5 | 150 | 90 | 45 | 1,5 | 12 | Ø5 | 28/26 | Ø6/Ø5 |



**Figure D11-1: Dimensioned drawings of SDEA150-**
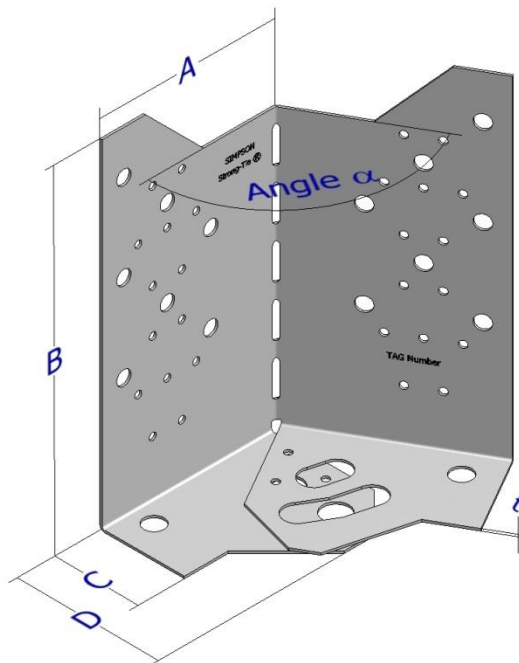
**Characteristic values**

**Table D11-2: Characteristic capacities for SDEA150**

| Model | Number of nails on the header | Number of nails on the joist | Characteristic values $R_{1.k}$ (kN) |
|---|---|---|---|
| SDEA150 | 22 – Ø4.0x50 | 12 – Ø4.0x50 | 12.7 |

## D12 ABF230

**Product Name:**

| Product Name | Material reference acc. to clause II-1 |
|---|---|
| ABF230 | Steel ref. 1 |

Angle bracket for floors



**Table D12-1: Geometrical data for ABF230**

| Model | Dimension [mm] | | | | | Number and diameter of holes | |
|---|---|---|---|---|---|---|---|
| | A | B | C | D | t | Flange B | Flange C |
| ABF230 | 120 | 230 | 60 | 100 | 1.5 | 28 – Ø5 + 14 – Ø10 | 2 Ø14 + 2 Ø18 + 2 oblong Ø18 + 4 Ø5 |

The ABF230 must be fold / adjusted on site. The angle $\alpha$ can vary from 90 to 150 °.
The fasteners to be used on flange C to connect the ABF to the concrete support are depending from the angle $\alpha$ according to the table below. Edge distance for the anchors should be respected.

**Table D12-2: Folding angle range for ABF230**

| Angle $\alpha$ range | Fasteners to use on flange C to connect ABF to concrete |
|---|---|
| From 90 to 134° | 2 Ø12 anchors |
| From 135 to 150° | 2 Ø12 anchors  - or – 1 Ø16 anchor |

**Characteristic capacities**

**Table D12-3: Characteristic capacities for ABF230**

| Model | Fasteners on rigid support | Number of nails on the joists | Characteristic values [kN] | |
|---|---|---|---|---|
| | | | $R_{2.k}$ | $R_{3.k}$ |
| ABF 230 | 1 Ø16 | 28– CNA4.0x50 | 1.63 | 2 |
| | 2 Ø12 | | 13.35 | 2 |