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

European Technical Assessment ETA-06/0270 of 2018-02-13

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 Joist Hangers See type numbers in section II.1 of the ETA
Product family to which the above construction product belongs:	Three-dimensional nailing plate (Joist hanger for wood to wood connections and wood to concrete or steel connections)
Manufacturer:	SIMPSON STRONG-TIE Int. Ltd For local branch refer to www.strongtie.eu
Manufacturing plant:	SIMPSON STRONG-TIE Manufacturing facilities
This European Technical Assessment contains:	183 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:	Guideline for European Technical Approval (ETAG) No. 015 Three Dimensional Nailing Plates, April 2013, used as European Assessment Document (EAD).
This version replaces:	The ETA with the same number issued on 2017-04-27

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
This ETA covers the following joist hangers types: AG703, AG713, BSD, BSDI, BSN, BSNN, BSI, BSIL, BSIN, BSS, ETC, ETC G/D, GBE, GBI, GLE, GLI, GSE, GSE-AL, GSEXL, GSI, GSI-AL, HGUQ, HGUS, JHA270, JHA450, JHR/L, LUP, MF, MH, SAE, SAE250/38/1.5, SAE590, SAE620, SAE690, SAEL, SAI, SAI590, SAI620, SAIL, SAIX, SAMI/4X, SBE, SBE45/168/TF, SBG/SLE, SDED/G, BSN2P, SHT, TFU, THA, THAI.

Simpson Strong-Tie joist hangers type BSD, BSN, BSNN, BSIN, BSS, ETC, GBE, GBI, GLE, GSE, GSE-AL, HGUQ, HGUS, LUP, MF, MH, SAE, SAE590, SAE620, SAE690, SAEL, SBE, SBG/SLE and TFU are one-piece non-welded, face-fixed external flanges joist hangers to be used in timber-to-timber connections as well as connections between a timber joist and a concrete structure or a steel member.

Simpson Strong-Tie joist hangers type GSEXL and SAMI/4X are one-piece non-welded, face-fixed external flanges joist hangers to be used in connections between a timber joist and a concrete structure or a steel member.

Simpson Strong-Tie joist hangers type BSI, BSDI, SAI, SAIL, SAIX, GSI, GSI-AL, GLI and BSIL are one-piece non-welded, face-fixed, internal flanges joist hangers to be used in timber-to-timber connections.

Simpson Strong-Tie joist hangers type JHR, JHL, ETCG and ETCD are one-piece non-welded, face-fixed, both external and internal flanges joist hangers to be used in timber-to-timber connections.

Simpson Strong-Tie joist hangers type BSN2P, SDED and SDEG are two-pieces non-welded, face-fixed external flanges joist hanger to be used in timber to timber connections as well as connection between a timber and a concrete structure or a steel member.

Simpson Strong-Tie AG703, AG713, JHA, SHT, THA and THAI, joist hangers are one-piece, non-welded, face-fixed or wrapped-over timber-to-timber joist hangers. They are connected to a header to support a timber joist with a range of nails.

The materials for headers and joists can be of solid timber, glued laminated timber or engineered timber products such as LVL or I-joist (fitted with backer blocks if used for the header).

The joist hangers are made from pre-galvanized steel Grade S250GD + Z (min Z275) according to EN 10346 or pre-galvanized steel with a minimum characteristic 0.2% yield stress of 250MPa, a minimum ultimate tensile strength of 330MPa and a minimum Elongation of 19%, with tolerances according to EN 10143 except if another material is specified (named “Steel ref 1” in the rest of the document). Material, dimensions and nails positions are detailed in Annex D and typical installations are detailed in Annex B. By default all the products are made out of this material except when specified.

All joist 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 (named “Steel ref 2” in the rest of the document). If no name is clearly specified, product variant made with stainless steel have generally the same name with a S (as Stainless) at the end.

2 Specification of the intended use in accordance with the applicable 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, 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. They are also intended for use in making an end-grain connection between a timber joist and a concrete structure or a steel member.

The joist hangers can be installed as connections between wood based members such as:

- Structural solid timber classified to C14-C40 according to EN 338 / EN 14081,
- Glulam classified to GL24-GL36 according to EN 1194 / EN 14080,
- LVL according to EN 14374,
- Parallam PSL,
- Intrallam LSL,

- Duo- and Triobalken,
- Layered wood plates,
- Kreuzbalken with minimum thickness of 80 mm
- I-beams with backer blocks on both sides of the web in the header and web stiffeners in the joist
- Plywood according to EN 636
- Cross Laminated timber according to EN 16351

However, the calculation methods are only allowed for a characteristic wood density of up to 460 kg/m^3. 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.

When used on CLT only CSA screws shall be used with the connectors. The edge distance and spacing of each CSA screw must be checked according to the specifications given by the manufacturer of the timber. If nothing is specified, edge distance and spacing must be in accordance to the outer layer of the CLT panels.

Annex C defines the directions of forces and also states the formulas for the characteristic load-carrying capacities of the joist hanger connections. The design of the connections shall be in accordance with Eurocode 5 or a similar national Timber Code.

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

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 and in conjunction with the admissible service conditions according to EN 1995-1-1 and the admissible corrosivity category as described and defined in EN ISO 12944-2

The provisions made in this European Technical Assessment are based on an assumed intended working life of the post bases brackets 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 Characteristics of product and assessment

Characteristic	Assessment of characteristic
3.1 Mechanical resistance and stability*) (BWR1)	
Characteristic load-carrying capacity	See Annex D
Stiffness	No performance determined (NPD)
Ductility in cyclic testing	No performance determined (NPD)
3.2 Safety in case of fire (BWR2)	
Reaction to fire	The joist hangers are made from steel classified as Euroclass A1 in accordance with EN 13501-1 and EC decision 96/603/EC, amended by EC Decision 2000/605/EC
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
3.7 Sustainable use of natural resources (BWR7)	No performance determined (NPD)
3.8 General aspects related to the performance of the product	The joist 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 D

*) See additional information in section 3.9 – 3.12.

3.9 Methods of verification

Safety principles and partial factors

The characteristic load-carrying capacities are based on the characteristic values of the nail connections and the joist hangers. To obtain design values the capacities have to be divided by different partial factors for the material properties, the nail connection in addition multiplied with the coefficient k_{mod}.

According to EN 1990 (Eurocode – Basis of design) paragraph 6.3.5 the design value of load-carrying capacity may be determined by reducing the characteristic values of the load-carrying capacity with different partial factors.

Thus, the characteristic values of the load–carrying capacity are determined also for timber failure $F_{Rk,H}$ (obtaining the embedment strength of nails subjected to shear or the withdrawal capacity of the most loaded nail, respectively) as well as for steel plate failure $F_{Rk,S}$. The design value of the load–carrying capacity is the smaller value of both load–carrying capacities.

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

Therefore, for timber failure the load duration class and the service class are included. The different partial factors γ_M for steel or timber, respectively, are also correctly taken into account.

3.10 Mechanical resistance and stability

See Annex C for characteristic load-carrying capacities of the joist hangers.

The characteristic capacities of the joist hangers are determined by calculation assisted by testing or only testing as described in the EOTA Guideline 015 clause 5.1.2. 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 in Annex C3:

The characteristic load-carrying capacities of the products shall be calculated in accordance with the manufacturer's design code, extracts of which are given in Annex C4. The design code has been derived in accordance with ETAG 015 and Eurocode 5 (2008).
The calculated values should be used for designs in accordance with Eurocode 5 or a similar national Timber Code. These values are based on the assumption that there is a maximum gap of 3 mm between the timber members, the members are laterally restrained and wane is not present in the timber at the joint.

The hangers shall be used with the fasteners specified in Annex C3.
Furthermore, the Face mount hangers types BSD, BSN, BSNN, BSIL, BSIN, BSS, JHR/L, SAE, SAEL, SAIX, SDED/G, GSE, GSE-AL, GSEXL, MF, SAMI/4X, GLE, ETC, GBE and TFU, SBE, SBG, SLE can be fastened to a concrete structure or steel member with 8 to 12 mm diameter bolts in holes with a diameter up to 2 mm larger than the bolt.

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

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.

3.11 Aspects related to the performance of the product

3.11.1 Corrosion protection in service class 1 and 2.
In accordance with ETAG 015 the joist hanger have a zinc coating weight of min Z275. The steel employed is S250 GD with min Z275 according to EN 10346:2009.

3.11.2 Corrosion protection in service class 3.
In accordance with Eurocode 5 the joist hangers are made 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. The nails or screws shall be produced from stainless steel. Joist hangers coated with hot dip galvanisation can also be used in service class 3 according to Eurocode 5

3.12 General aspects related to the use of the product

Simpson Strong-Tie joist hangers types AG703, AG713, BSD, BSDI, BSN, BSNN, BSI, BSIL, BSIN, BSS, ETC, ETC G/D, GBE, GBI, GLE, GLI, GSE, GSE-AL, GSEXL, GSI, GSI-AL, HGUQ, HGUS, JHA270, JHA450, JHR/L, LUP, MF, MH, SAE, SAE250/38/1.5, SAE590, SAE620, SAE690, SAEL, SAI, SAI590, SAI620, SAIL, SAIX, SAMI/4X, SBE, SBE45/168/TF, SBG/SLE, SDED/G, BSN2P, SHT,

TFU, THA, THAI 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.

Joist hanger connections

Joist hangers shall be installed on the basis of a specific structural design for each installation, using the load-bearing capacities derived from the formulas and specific factors k_{H1} and k_{H2} given in Annex D, applying the appropriate k_{mod} factor depending on the relevant service class / duration of load and the appropriate National partial safety factor for materials.

The fixing of Joist hangers to the support shall use the appropriate nails or screws or bolts in case of solid wood or wood-based support, appropriate CE marked metal anchors for use in concrete in case of concrete support. The load bearing capacities which can be derived from Annex C are given provided that the fixing device has been appropriately designed and installed.

Joist hangers shall be installed by appropriately qualified personnel, following an installation plan and relevant construction details worked out for each individual building project. The installation plan shall be based on the manufacturers general guide and provisions for installing SIMPSON Strong-Tie connections.

A joist hanger connection is deemed fit for its intended use provided:

Header – support conditions

- The header shall be restrained against rotation and be free from wane under the joist hanger.

  If the header carries joists only on one side the eccentricity moment from the joists M_{ec} = R_{joist} (b_{header}/2+e_{nail}) shall be considered at the strength verification of the header.
  R_{joist} Reaction force from the joists
  b_{header} Width of header
  e_{nail} Distance from nails in the joist to the of the header
- For a header with joists from both sides but with different reaction forces a similar consideration applies.

Wood to wood connections

- Joist hangers can be fastened to wood-based members by nails or screws.
- There shall be nails or screws in all holes or a partial nailing pattern as prescribed in Annex B can be used.
- The characteristic capacity of the joist hanger connection is calculated according to the manufacturer's technical documentation.
- The joist hanger connection 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 joist hangers with outward flaps shall the gap between the surface of the end of the joist and that of the header be maximum 3 mm.
  Joist hangers with inward flaps shall the gap between the surface of the nail heads in the inward flaps and the end of the joist be maximum 8 mm.
- For joist hanger BSN, BSD, BSI, BSDI and SBG the width of the joist shall be at least l_{pen}+2.9d, where l_{pen} is the length of the nails and d is the diameter of the nails in the joist, for full nailing and partial nailing without staggering the nails in the joist. For partial nailing with staggered nails in the joist the width shall be at least the penetration length of the nails. For joist hanger with staggered nails in the joist, the width of the joist shall be at least the penetration length of the nails.
- The cross section of the joist at the joist hanger connection shall have sharp edges at the lower side against the bottom plate, i.e. it shall be without wane.
- The cross section of the header shall have a plane surface against the whole joist hanger.
- The width B_J of the joist shall correspond to that of the joist hanger. B_J shall not be smaller than A-3 mm, where A is the inner width of the joist hanger.
- The depth of the joist shall be so large that the top of the joist is at least 20 mm above the upper nail in the joist.
- Joist hangers made from stainless steel should only be fastened with fasteners made from suitable stainless steel. Zinc-coated joist

hangers shall not be fastened with fasteners of stainless steel.

- Nails or screws to be used shall have a diameter, which fits the holes of the joist hangers. Round nails shall have a diameter which is not smaller than the diameter of the hole minus 1 mm. Nails with square cross section shall have a side length not smaller than the hole diameter minus 1,25 mm.

Straps hangers shall be installed to meet the following requirements:

- The hanger is connected to header using the specified nails in Annex C3. The hanger side and back flanges may have a slight splay from nesting within the packing. It is essential to hold the hanger square to the header before nailing.
- Where it is necessary to wrap the straps over the header, a minimum wrap over of 45 mm is required for the JHA and THA and 65 mm for the THAI, AG703 and AG713 to achieve the minimum nailing specification.
- Header is restrained against rotation before application of full loading.

Wood to concrete or steel

The above mentioned rules for wood-to-wood connections are applicable also for the connections between the joist and the joist hanger.

- The joist hanger shall be in close contact with the concrete or steel over the whole face. There shall be no intermediate layers in between.
- The gap between the end of the joist and the surface, where contact stresses can occur during loading shall be limited. This means that the gap between the surface of the end of the joist and that of the concrete or steel shall be maximum 3 mm.
- The bolt shall have a diameter not less than the hole diameter minus 2 mm.
- The bolts shall be placed symmetrically about the vertical symmetry line. There shall always be bolts in the 2 upper holes.
- For concrete, the bolts shall use washers recommended with the mechanical anchor delivery by the suppliers. For steel, the upper bolts shall have washer Ø18 mm minimum.
- For I-joist headers backer blocks of softwood, OSB or plywood shall be installed (see Annex B).
- The size, material and installation details of the backer blocks shall be in accordance to the joist manufacturer's specifications.
- The joist is installed in the hanger ensuring it is free from wane and the gap between the end of joist and header does not exceed 3 mm.
- The specified joist nails are installed. For instances where double shear nailing is specified, ensure that the correct nail is installed into the joist at an angle of 45°. For the THAI, the specified nail is to be driven downwards at an angle of 45°, into the joist.
- When the supported member is an I-joist it will be necessary to install web stiffeners to the end of the joist if the top flange is not laterally restrained by the hanger side flanges. Refer to joist manufacturer's literature for details of web stiffener installation.

4 Assessment 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 prior to CE marking

Issued in Copenhagen on 2018-02-13 by

Thomas Bruun
Managing Director, ETA-Danmark

ANNEX A
REVISION HISTORY

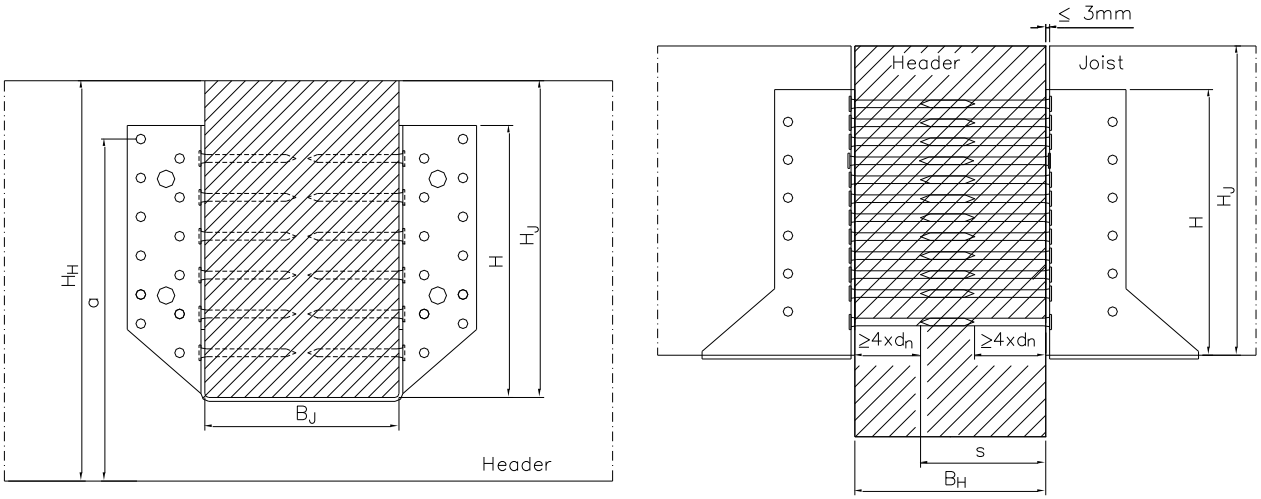
Modifications and additions to the previous versions of ETA-06/0270	
Issue No.	**Update**
1.0	First release
2.0	BSD – Modification of the drawing
	BSDI – Modification of the drawing
	SAE590, SAE620-a and SAE620-b have been added
	SDED/G have been added
	SDED/G – New formula for downward direction, upward direction and lateral direction
	SBE and SBG – Axial force has been added
	SBE – The model of calculation for the SBG is used.
	Square washer 30x30x3 has been deleted and replaced by standard washer Ø18 min
	AI and A joist hanger have been deleted
	New model of calculation for concrete application (excepted for SBE and SBG)
3.0	Modification of the text about material
	BSD/I – Insertion of new blank model in the first two tables
	BSD/I – Modification of the drawing
	SBG – Modification of the minimum width of SBG in both tables
	BSD/I – Modification of the four tables
	SBG – Correction of the value of kh,2 and insertion of a line for 38 mm (Full Nailing)
	SBG – Correction of the value of kh,2 and insertion of a line for 38 mm (Partial Nailing)
	BSD/I – Modification of the table
	BSD/I – Modification of the table
	Update following names: Standard to BSN, I to BSI
	Merging ETA-06/0270 with ETA-07/0150 and ETA-07/0043
4.0	Add SLE variant of SBG
	Correction of the SBG drawing
	Correction of some inversion of letter in the ETA
	Addition of stainless steel types
5.0	Add SAMI/4X
	Add fire resistance for GSE/4 and GLE/4
	Add new values for SAE with square twist nails
	Add HGUQ
	Other updates - Standard correction - BNS2P - BSD drawing - BSN and BSI 440 blank model
6.0	Add GBE – GBI
	Add TFU
	Add SHT
	Values on concrete for SAE250/38/1.5
	Update of dimension of SAMI/4X
	CSA5.0x80 for fire performance
	Update of ETC502 and ETC485R (Download + Uplift)
	Redesign of Product Annex

Modifications and additions to the previous versions of ETA-07/0150	
Issue No.	**Updates**
1.0	First release
2.0	GSE780/120 - New loads on concrete
	HGUS from UK - k_{H1} and k_{H2}
	Calibration factors for GSE and GSI on wood/wood
	GSE/GSI - New model for wood/rigid support application (ID151)
	k_{h1} and k_{h2} are not given for JHL/R. Situation to be clarified. See project F1044
	Add HGUQ product range
	Change product type in HGUS table in annex 48 (currently refers to GSE)
	Change the identity of type IL from blank to width x height (annex 49)
	Add 4.0 nails for HGUS range
	Add widths up to 300mm for HGUS48
	Add axial resistance of GSE/I timber and concrete
3.0	Change the identity of type IL to BSIL and also from blank to width x height
	Add HGUQ product range
	Add widths up to 300mm for HGUS48 and add Spec HGUS
	Change product type in HGUS table in annex 48 (currently refers to GSE)
	Add 4.0 nails for HGUS range
	Calibration factors for GSE and GSI on wood/wood
	GSE/GSI - New model for wood/rigid support application (ID151)
	Add axial resistance of GSE/I on timber and concrete
	Add ranges ETC – ETC G/D – GSEXL – GLE/GLI
	Update following names: IL to BSIL, S to BSS

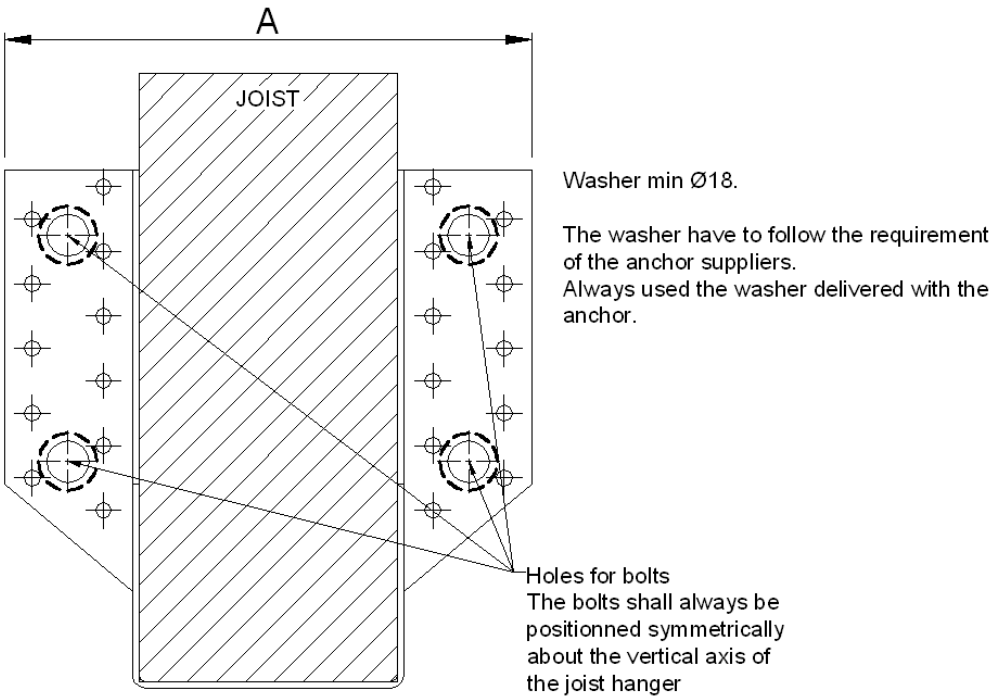
Modifications and additions to the previous versions of ETA-07/0043	
Issue No.	**Updates**
1.0	First Release
2.0	EN 1195-1-1:2004 changed to EN 1995-1-1:2004 + A1:2008
	JHA & THA minimum wrap over changed from 55mm to 45mm
	Figure 1 updated: Table 1 split into two tables: Material reference's updated
	Table A3 was table 2. Table updated - model number changed & material reference updated.
	Figure A3 updated.
	Table A4 was table 3. THAI322 added to table: Material reference updated.
	Table A5 was table 4.
	Table A6 was table 5. Table updated - additional installation configurations added for JHA270, JHA450 & THA
	Formula reference numbers added
	Formula (2) updated; Formula (3) added; Formula (4) updated
	Formula (14) updated; Formula (16) added; Formula (18) updated
	Figure A2.10.1 was Figure A1
	Definition of symbols table updated - B_{eff} and L_{eff} added
	Annex 3. Table 3.1 was table 8; Table 3.2 was table 7; Table 3.3 was table 6; Table 3.4 was table 9
	Annex 4. Table updated - L_{eff}, B_{eff}, C_{Hor} & K_{ef} added to table; B_{min*} removed from table.
	Annex 5 added.
3.0	Add AG703 & AG713
	Merging ETA-06/0270 with ETA-07/0150 and ETA-07/0043

ANNEX B
TYPICAL INSTALLATIONS

B1 Joist hangers on timber

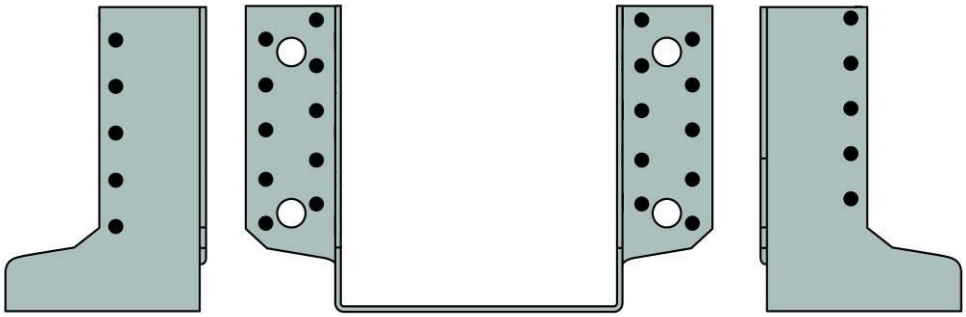


B2 Joist hanger on rigid support



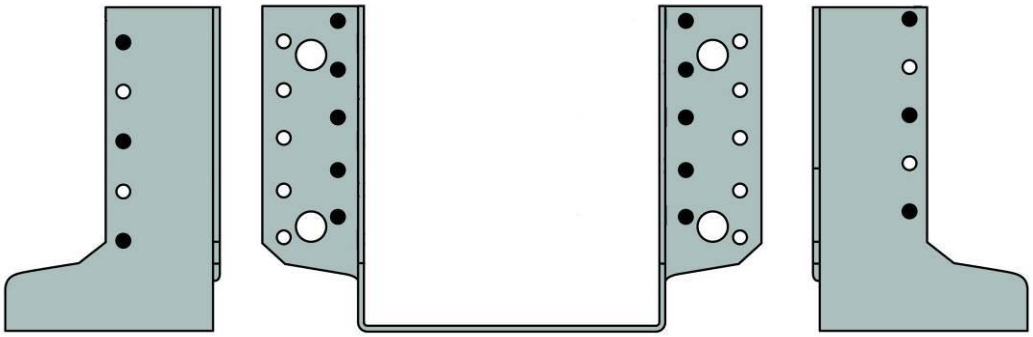
B3 Nail Pattern

Full nail fixing:
General application



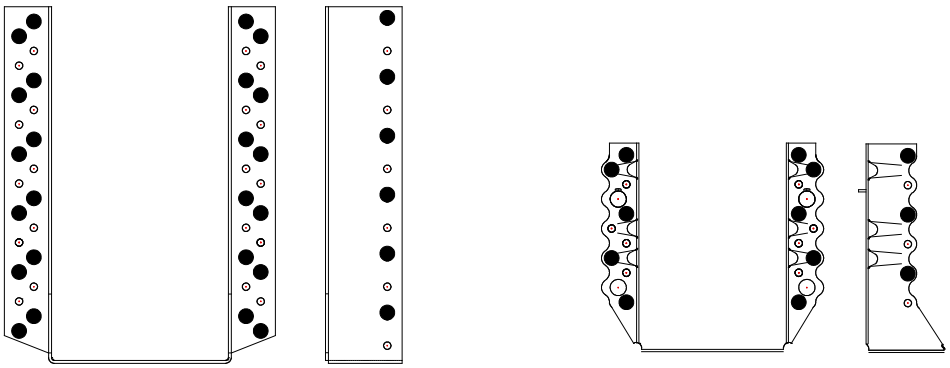
Fill it in all the holes with nails, on the face and the side flanges.

Partial nail fixing:
General application



● *On the side flanges :* Place one nail out of two on each side flange, starting from the first hole on the top of the flange.
● *On the face flanges :* Place the nails on each face flange, on the vertical line next to the folding.

Partial nailing for connection to column
The distance between the nails in the direction of the fibre shall be at least 20 mm.

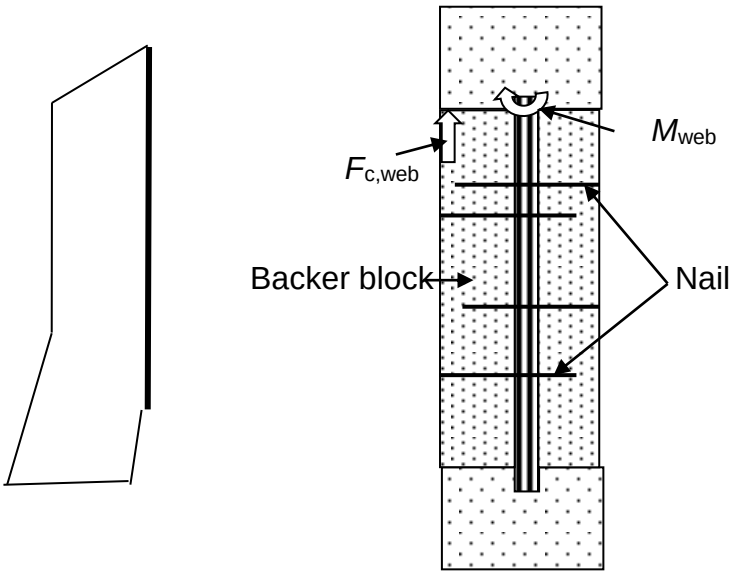


B4 Conditions for using I-beam headers

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:

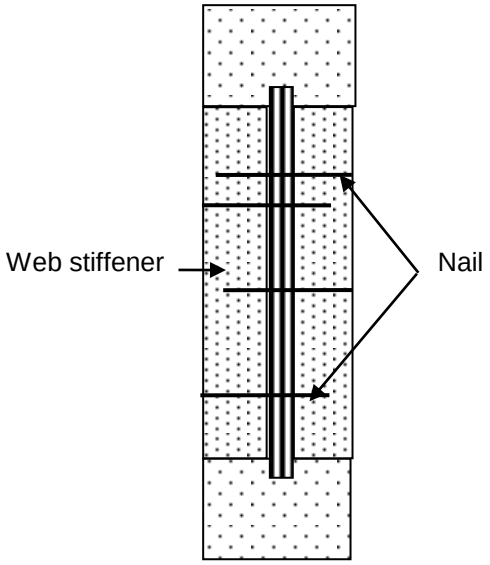
$$n_{nail,backerblcok} = 2 \cdot n_{header}$$

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.

B5 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.

ANNEX C
BASIS OF DESIGN

C0 Symbols used in the ETA-06/0270

For the purpose of ETA-06/0270, the following symbols apply.

a_{bolt}	Bolt spacing
$a\text{-}0.5a_c$	Lever arm of the effective nails (face-fixed hangers)
A	Width of the joist hanger (mm)
Blank	Blank length of the joist hanger
C	Hanger seat depth (mm)
C_{eff}	Effective Compressed depth (mm)
C_{hor}	Horizontal lever arm
c_i	Calibration coefficient
d	Divisor taking the inclination of the tilting force into account
d_{hole}	Diameter of the hole for bolt
e	Eccentricity = distance from the nails in the joist to the surface of the header
$e_{center,x}$	Distance of topmost nails in the joist to the centre of nail group in the joist
$e_{J,F}$	Distance of the lateral force above the centre of gravity of the nails in the joist
$e_{J,nail}$	Distance from the nails in the joist to the surface of the header For the joist hangers: BSN, SBE, I, BSD, BSDI fastened with threaded nails it has been documented by tests that this eccentricity term can be disregarded.
$e_{H,F}$	Distance of the lateral force above the centre of gravity of the nails in the header
$f_{c,90,k}$	Characteristic compression strength perpendicular to the grain of joist or header material (MPa)
$f_{c,90,k*}$	Local compressive strength perpendicular to the grain of joist or header material (MPa)
F_c	Load contributions from contact pressure at top corner of header beam
$F_{Hanger\text{-}Header}$	Load transfer from the joist hanger to the header beam per flange (N)
$F_{Joist\text{-}Hanger}$	Load transfer from the joist to hanger per flange (N)
$F_{Lat,nail}$	Lateral force of the nails per flange (N)
$F_{hanger,Tension}$	Tensile capacity of the lower part of the joist hanger per flange (N)
$f_{u,k}$	Tensile strength of hanger steel (MPa)
$F_{v,RK,header}$	Characteristic lateral load carrying capacity of each of the nails in the header beam (N)
$F_{v,Rk,joist}$	Characteristic lateral load-carrying capacity of each of the nails in the joist member (N)
h	Height of the joist
H^*	Maximum vertical distance between the nails in header
h_e	Effective height = distance from upper nail to the bottom plate
$I_{p,H}$	Polar moment of inertia of the whole nail group in the header
$I_{p,nail}$	Polar moment of inertia of the whole nail group in the joist
$I_{p,fl}$	Polar moment of inertia around the centre of gravity of the nail group in one header flange
$k_{c,90}$	Increase factor from EN 1995-1-1 = 2.5
k_{ef}	Rope effect efficiency factor k_{ef} = 0.8 if b = 100 mm for a larger width, k_{ef} is linearly decreasing : k_{ef} = 1 – 0.002*b with with in mm

k_{Jef} reduction factor

$k_{H,1}$ Form factor

$k_{H,2}$ Form factor

l Top flap width (mm)

l_{eff} Effective compressive width of top flap (mm)

n_b Number of bolts - for joist hangers SBG, SLE and SBE, use: $n_{ef,b}$

n_J Total number of nails in both sides of the joist

n_H Total number of nails in the side of the header

$n_{H,b}$ Number of nails in the header in the first row close to the bending line of the side flange.

$n_{ef,b}$ Effective number of bolts
= 2,0 with 2 bolts in the SBG, SBE and SLE hanger
= 3,2 with 4 bolts in the SBG, SBE and SLE hanger

$n_{J,eff}$ Effective number of nails in the joist $\left[\text{round down}\left(\frac{n_j}{2}\right)\right]\times 2$

$n_{H,eff}$ Effective number of nails in the header

$n_{eff,ax}$ Number of effective nail per flange (face-fixed hangers)

$n_{h,\ side\ nail}$ Number of nails in the side of the header beam per flange

$n_{h,\ top\ nail}$ Number of nails in the top of the header beam per flange

$n_{skew\ nail}$ Number of skew nails in double shear per flange

$n_{top\ flange}$ Number of nails in the header beam top into the top flange of an I-beam

n_{web} Number of nails in the header beam side into the web of an I-beam

$R_{ax,k}$ Characteristic axial load-carrying capacity of the nails in the joist or in the header indicated by the indices J or H

$R_{lat,k}$ Characteristic lateral load-carrying capacity of the nails in the joist or in the header indicated by the indices J or H

$R_{bolt,lat,k}$ Characteristic lateral capacity of the anchor bolt, however, for a thickness till 2,0 mm and an anchor size of:

- M10 maximum 11,0 kN
- M8 maximum 8,8 kN

For larger thicknesses, the capacity shall be the maximum of:
- 11,0 kN / 2,0 mm x thickness for an anchor size of M10 and accordingly
- 8,8 kN / 2,0 mm x thickness for an anchor size of M8
- divergent for type SBE, SBG and SLE:
  for downward and upward force: $R_{bolt,lat,k} \leq 7{,}1$ kN
  for lateral force: $R_{bolt,lat,k} \leq 12{,}0$ kN
- divergent for type SDED/G:
  for downward and upward force: $R_{bolt,lat,k} \leq 9{,}51$ kN
- or the characteristic lateral load-carrying capacity of the anchor bolt in the material to which it is fastened

S Critical width (mm)

t_p Steel plate thickness (mm)

W^* Maximum horizontal distance between the nails in header

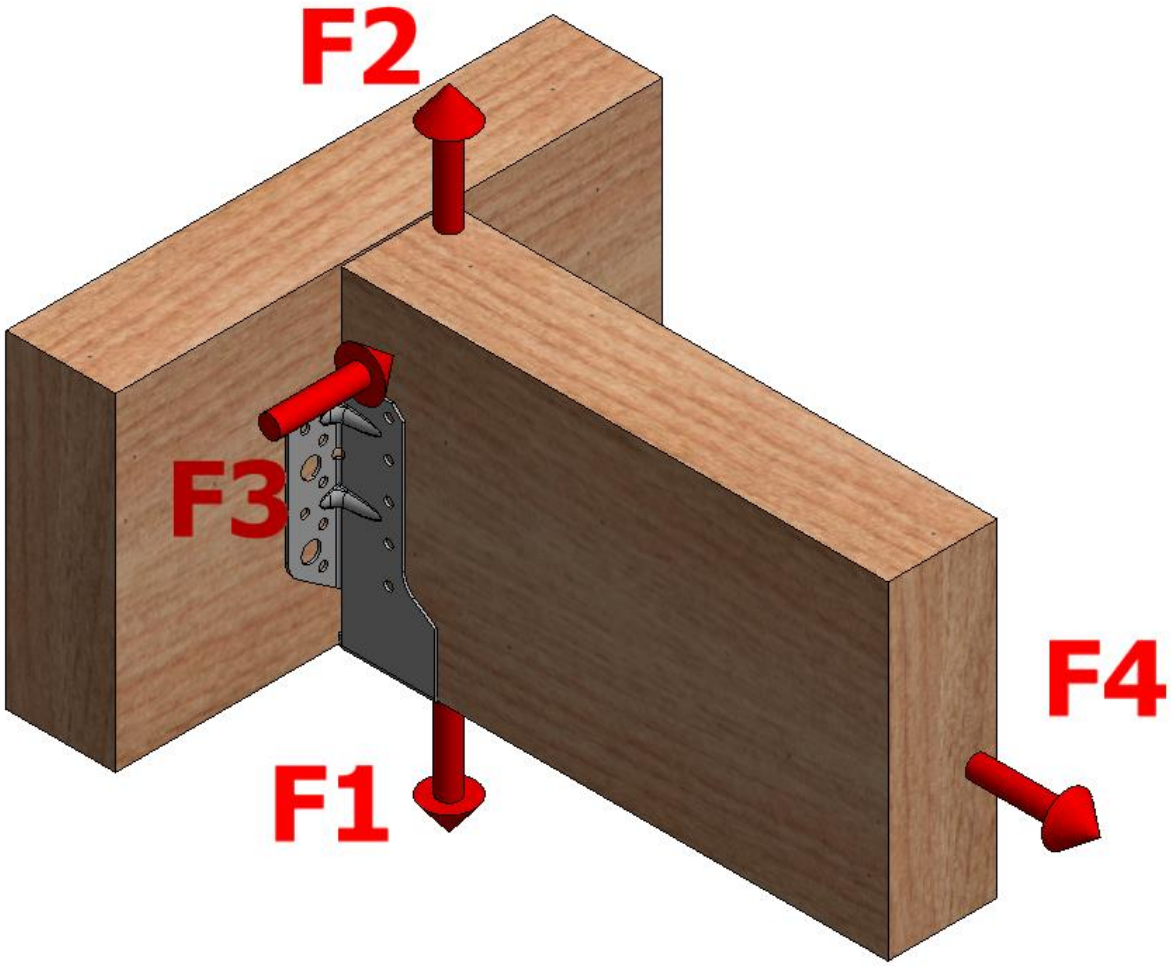
y_{max} Maximum distance from a nail to the centre of gravity

z_{max} Distance from upper bolts to bottom plate or by uplift force the distance from the lower bolt to the top of joist hanger

ρ_k Characteristic density of header or joist material (kg/m^3)

C1 Definition of Force Directions and Eccentricity

It is assumed that the forces acting on the joist hanger connection are the following F_1 , F_2, F_3 and F_4, as shown in the figure below. The forces F_1, F_2 and F_4 shall act in the middle of the joist hanger. The force F_3 is assumed to act $e_{J,F}$ above the centre of gravity of the nails in the joist. It is assumed that the forces are acting right at the end of the joist.



Illustrations showing the position of the centre of gravity:

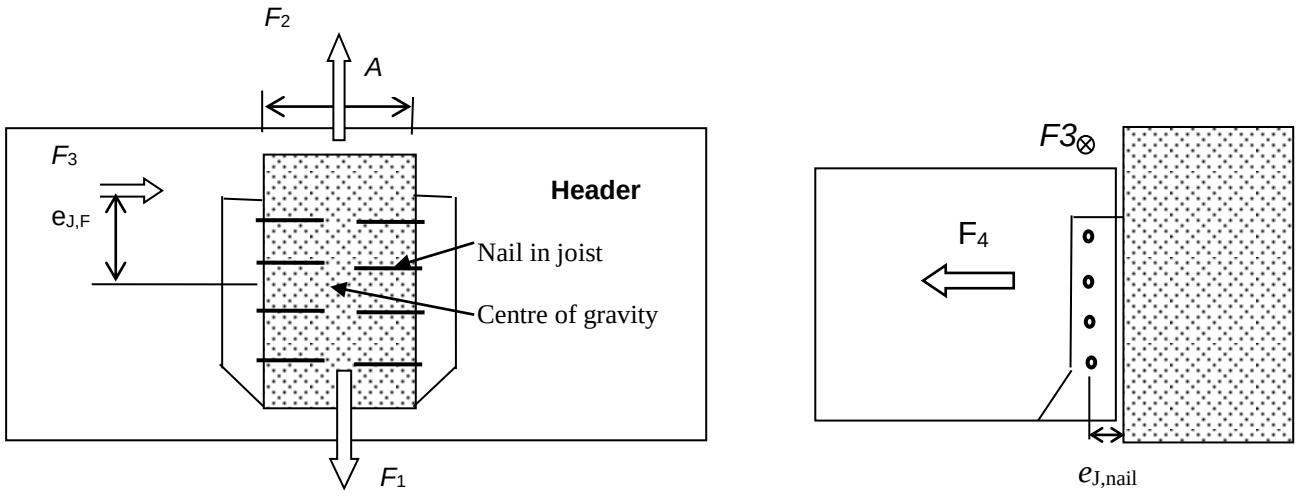


Figure 1: Definition of F_1, F_2, F_3, F_4, $e_{j,F}$ and $e_{j,nail}$

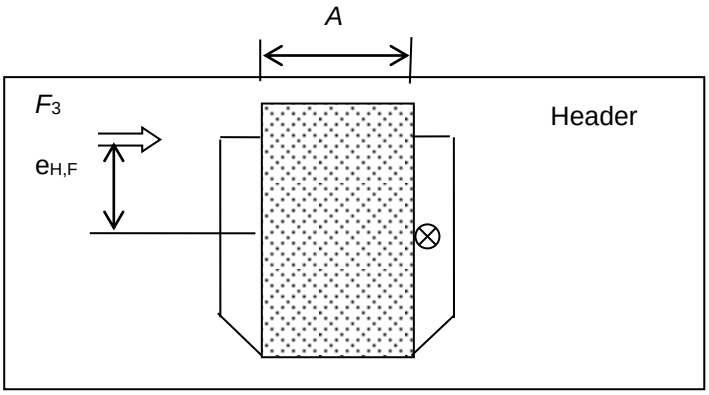


Figure 2: The lateral force F_3 acts with an eccentricity $e_{H,F}$ in relation to the centre of gravity of the header nails in one flange - marked by ⊗ - in the compressed side.

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 $M_v = F_d \cdot (A_H / 2 + 30mm)$ 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%.

C2 Characteristic Capacity Modification Methods

Capacities expressed as numbers (not formulas) e.g. type SAMI and JHR/L are based on a characteristic density of 350 kg/m^3. For timber or wood based material with a lower density than 350 kg/m^3 the load carrying capacities shall be reduced by the K_{dens} factor:

$$K_{dens} = (\rho_k / 350)^2$$

where ρ_k is the characteristic density of the timber

C3 Fastener Specification and Capacities

Fastener types and sizes

NAILS diameter	Length Min – max	Nail type
4.0	35 - 100	Connector nails in accordance with ETA-04/0013
4.2	35 - 60	Connector nails in accordance with ETA-04/0013
3.1	35	Ring shank nails according to EN 14592
4.0	35 - 100	Ring shank nails according to EN 14592
3.75	30 - 32	SST Square Twist nails according to EN 14592
3.75	38 - 75	Round smooth nails according to EN 14592
4.0 – 4.5	35 - 100	Round smooth nails according to EN 14592

SCREW diameter	Length Min – max	Screw type
5.0	35 - 50	Connector screws in accordance with ETA-04/0013
¼	3 ½	Coach screws according to EN 14592
¼	2 ½	Coach screws according to EN 14592

BOLTS diameter	Correspondence Holes diameter	Bolts type
8.0	Max. 2 mm. larger than the bolt diameter	See specification of the manufacturer
10.0		
12.0		
16.0		

Typical Hanger and Nail Type Combinations

Face Mount Hanger	Type	Nails diameter	Length Min - Max	Nailing	Bolt Possible
AG703	ARS*	3.1	35	Other	-
	ST**	3.75	30		
AG713	ARS*	4.0	50	Other	-
BSD, BSDI, BSI, BSIN, BSIL,BSN, BSNN, BSS, JHL/JHR, GSE, GSE-AL, GSI, GSI-AL, MF, GLE, GLI, SAE, SAEL, SAI, SAIL, SAIX, SBE, SBG, SLE, SDED/G, BSN2P	ARS*	4.0	35 - 100	Full / Partial	BSD, BSN, BSIL, BSS, JHL/JHR, GSE, GSE-AL, MF, GLE, SAE, SAEL, SAIX, SBE, SBG, SLE: M8-M12
	ARS*	4.2	35 - 60		
	ST**	3.75	30		
	SS***	4.0 - 4.5	35 - 100		
	Screw	5.0	35 - 50		
ETC, ETCG/D	ARS*	4.0	35 - 100	Other	M12
	Screw	5.0	35 - 50		
GBE, GBI	Bolts	M16	-	Other	M16
	Screws	Ø10	60 - 100		
GSEXL	ARS*	4.0	50	Full	M12
HGUS, Spec HGUS	SS***	3.75	75	Full	-
	SS***	4.0	90 - 100		
	ARS*	4.0	60		
HGUQ	Screw	¼ (inch)	3 ½ (inch)	Full	-
	Screw	¼ (inch)	2 ½ (inch)		
JHA270, JHA450, THA, THAI	ST**	3.75	30	Other	-
	ARS*	4.0	60 – 100		-
LUP	ST**	3.75	30	Full	-
MF	ARS*	4.0	35 – 100	Full	M10
	ARS*	4.2	35 – 60		
	Screw	5.0	35 – 50		
MH	ST**	3.75	30	Full	-
SAMI/4X	ARS*	4.0	35	Full	M10
TFU	ARS*	4.0	35-60	Other	M10
SHT	ARS*	4.0	35	Full	-

*ARS: Annular Ring Shank nail
**ST: Square Twist nail
***SS: Smooth Shank nail

The general model is given here after. It shall be used with the relevant specific form factors $k_{H,1}$ and $k_{H,2}$ given in Annexe D for each type of face mount hangers

The hanger and nail type combinations in the table are typical, but other combinations may also be proven suitable, subject to following the design model in Annex C4 of this document.

Nail Capacity Tables

Capacities of 3.75 x 30 mm Square Twist Nails

Nail Reference	Nail Shape	Side Length or Diameter (mm)	Nail Length (mm)	Wire Tensile Strength (Mpa)	Plate Thickness (mm)	Timber Grade	Timber Char. Density (kg/m3)	$F_{ax,RK}$ (N)	$F_{v,RK}$ (N)
3.75 x 30 ST	S	3.4	30	600	0.9	C16	310	190	882
						C18	320	203	907
						C20	330	215	931
						C22	340	229	956
						C24	350	242	981
						C27	370	271	1031
						C30	380	286	1056
						SCL	420	349	1156
3.75 x 30 ST	S	3.4	30	600	1.2	C16	310	188	876
						C18	320	201	900
						C20	330	213	925
						C22	340	226	949
						C24	350	240	974
						C27	370	268	1023
						C30	380	283	1048
						SCL	420	345	1147
3.75 x 30 ST	S	3.4	30	600	1.5	C16	310	186	870
						C18	320	198	894
						C20	330	211	918
						C22	340	224	942
						C24	350	237	967
						C27	370	265	1015
						C30	380	280	1040
						SCL	420	342	1138
3.75 x 30 ST	S	3.4	30	600	2.0	C16	310	183	860
						C18	320	195	883
						C20	330	207	907
						C22	340	220	931
						C24	350	233	955
						C27	370	261	1003
						C30	380	275	1027
						SCL	420	336	1123

Capacities of 3.75 x 38 mm Round Wire Nails

Nail Reference	Nail Shape	Side Length or Diameter (mm)	Nail Length (mm)	Wire Tensile Strength (Mpa)	Plate Thickness (mm)	Timber Grade	Timber Char. Density (kg/m3)	$F_{ax,RK}$ (N)	$F_{v,RK}$ (N)
3.75 x 38 SS	R	3.75	38	600	0.9	C16	310	267	1105
						C18	320	285	1139
						C20	330	303	1172
						C22	340	322	1206
						C24	350	341	1240
						C27	370	381	1307
						C30	380	402	1341
						SCL	420	491	1461
3.75 x 38 SS	R	3.75	38	600	1.2	C16	310	265	1098
						C18	320	283	1131
						C20	330	301	1165
						C22	340	319	1198
						C24	350	338	1231
						C27	370	378	1299
						C30	380	399	1332
						SCL	420	487	1456
3.75 x 38 SS	R	3.75	38	600	1.5	C16	310	263	1091
						C18	320	280	1124
						C20	330	298	1157
						C22	340	316	1190
						C24	350	335	1223
						C27	370	375	1290
						C30	380	395	1323
						SCL	420	483	1450
3.75 x 38 SS	R	3.75	38	600	2.0	C16	310	259	1079
						C18	320	276	1111
						C20	330	294	1144
						C22	340	312	1176
						C24	350	331	1209
						C27	370	370	1275
						C30	380	390	1308
						SCL	420	476	1440

Capacities of 3.75 x 75 mm Round Wire Nails

Nail Reference	Nail Shape	Side Length or Diameter (mm)	Nail Length (mm)	Wire Tensile Strength (Mpa)	Plate Thickness (mm)	Timber Grade	Timber Char. Density (kg/m3)	$F_{ax,RK}$ (N)	$F_{v,RK}$ (N)
3.75 x 75 SS	R	3.75	75	600	0.9	C16	310	534	1309
						C18	320	569	1337
						C20	330	605	1364
						C22	340	642	1392
						C24	350	681	1420
						C27	370	761	1475
						C30	380	803	1502
						SCL	420	980	1614
3.75 x 75 SS	R	3.75	75	600	1.2	C16	310	532	1309
						C18	320	567	1336
						C20	330	603	1364
						C22	340	640	1391
						C24	350	678	1419
						C27	370	758	1474
						C30	380	799	1502
						SCL	420	976	1613
3.75 x 75 SS	R	3.75	75	600	1.5	C16	310	530	1308
						C18	320	564	1336
						C20	330	600	1363
						C22	340	637	1391
						C24	350	675	1418
						C27	370	755	1473
						C30	380	796	1501
						SCL	420	972	1612
3.75 x 75 SS	R	3.75	75	600	2.0	C16	310	526	1307
						C18	320	561	1335
						C20	330	596	1362
						C22	340	633	1390
						C24	350	671	1417
						C27	370	750	1472
						C30	380	791	1499
						SCL	420	966	1610

Capacities of 3.1 x 35 mm Ring Shank Nails according to Eurocode 5 for AG703 installation

Nail reference	Nail shape	Side length or Diameter (mm)	Nail length (mm)	Wire tensile Strength (Mpa)	Plate thickness (mm)	Timber Grade	Timber Char. Density (kg/m3)	$F_{ax,RK}$ (N)	$F_{v,RK}$ (N)
3.1 x 35 ARS	ARS	3,1	35	600	1,2	C16	310	473	1043
						C18	320	473	1069
						C20	330	473	1094
						C22	340	473	1119
						C24	350	473	1145
						C27	370	473	1196
						C30	380	473	1221
						SCL	420	473	1290

Capacities of 4.00 x 50mm Annular Ring Shank Wire Nails

Nail Reference	Nail Shape	Side Length or Diameter (mm)	Nail Length (mm)	Wire Tensile Strength (Mpa)	Plate Thickness (mm)	Timber Grade	Timber Char. Density (kg/m3)	$F_{ax,RK}$ (N)	$F_{v,RK}$ (N)
4.00 x 50 ARS	ARS	4.00	50	600	0.9	C16	310	924	1315
						C18	320	985	1347
						C20	330	1048	1380
						C22	340	1112	1413
						C24	350	1178	1446
						C27	370	1247	1479
						C30	380	1389	1547
						SCL	420	1697	1685
4.00 x 50 ARS	ARS	4.00	50	600	1.2	C16	310	919	1309
						C18	320	979	1346
						C20	330	1041	1378
						C22	340	1105	1411
						C24	350	1171	1444
						C27	370	1239	1477
						C30	380	1381	1545
						SCL	420	1687	1683
4.00 x 50 ARS	ARS	4.00	50	600	1.5	C16	310	913	1301
						C18	320	973	1343
						C20	330	1035	1377
						C22	340	1098	1409
						C24	350	1164	1442
						C27	370	1231	1475
						C30	380	1372	1543
						SCL	420	1676	1680
4.00 x 50 ARS	ARS	4.00	50	600	2.0	C16	310	904	1288
						C18	320	963	1330
						C20	330	1024	1371
						C22	340	1087	1407
						C24	350	1152	1349
						C27	370	1219	1472
						C30	380	1358	1539
						SCL	420	1659	1676

C4 Design Formula where appropriate

Characteristic capacities of the joist hanger connections with nails or screws only.
F_1 and F_2 are assumed to act in the middle of the joist. The lateral force is assumed to act at an distance $e_{J,F}$ above the centre of gravity of the nails in the joist.

The connection is also allowed for connection to column, where the distance between nails perpendicular to grain is minimum 20mm.

Two nails patterns are specified. See ANNEX B
For joist hanger BSN, BSD, BSI, SBG and BSDI the width of the joist shall be at least l_{pen}+2.9d for nails and l_{pen}+4d for CSA screws, where l_{pen} is the penetration length of the nails and d is the diameter of the nails in the joist, for full nailing and partial nailing without staggering the nails in the joist. For partial nailing with staggered nails in the joist the width shall be at least the penetration length of the nails.

The following table summarizes the formulas to be used for the calculation of the various face mount hangers characteristic load-carrying capacities covered by the present ETA. Where no value is stated, no capacity is declared by formula. Some capacities are determined by tests only, see Annex D

Hanger type	Timber to Timber : Threaded nails, screws and smooth nails*, bolts				Timber to rigid support Bolts, anchor bolts				Smooth and ST 3.75x30	
	F_1	F_2	F_3	F_4	F_1	F_2	F_3	F_4	F_1	F_2
AG703	Eq78	Eq95 & Eq96	-	-	-	-	-	-	-	-
AG713	Eq78	Eq95 & Eq96	-	-	-	-	-	-	-	-
BSD	Eq1	Eq5	Eq11 & Eq12	-	Eq40	Eq56	Eq63 & Eq64 & Eq65	-	Eq18	Eq19
BSDI	Eq1	Eq5	Eq11 & Eq12	-	-	-	-	-	Eq18	Eq19
BSN	Eq1	Eq5	Eq11 & Eq12	-	Eq40	Eq56	Eq63 & Eq64 & Eq65	-	Eq18	Eq19
BSNN	Eq1	Eq6	Eq13	Eq17	Eq40	Eq57	Eq63 & Eq64 & Eq65	Eq69	-	-
BSI	Eq1	Eq5	Eq11 & Eq12	-	-	-	-	-	Eq18	Eq19
BSIN	Eq1	Eq5	Eq11 & Eq12	Eq17	-	-	-	-	Eq18	Eq19
BSIL	Eq1	Eq5	Eq11 & Eq12	-	-	-	-	-	Eq18	Eq19
BSS	Eq1	Eq5	Eq11 & Eq12	-	Eq40	-	-	-	Eq18	Eq19
ETC	v	v	-	-	v	-	-	-	-	-
ETC G/D	v	-	-	-	v	-	-	-	-	-
GBE	Eq24 & Eq26	Eq27 & Eq28	Eq31	Eq35 & Eq39	Eq54 & Eq55	Eq61 & Eq62	Eq31	Eq72 & Eq73	-	-
GBI	Eq24 & Eq26	Eq27 & Eq28	Eq31	Eq35 & Eq39	Eq54 & Eq55	Eq61 & Eq62	Eq31	Eq72 & Eq73	-	-
GLE	Eq2	Eq8	Eq11 & Eq12	Eq17	Eq46	Eq59 & Eq60	Eq66 & Eq67 & Eq68	Eq69 & Eq70	-	-
GLI	Eq2	Eq8	Eq11 & Eq12	Eq17	-	-	-	-	-	-
GSE	Eq1	Eq5	Eq11 & Eq12	Eq17	Eq42 & Eq46	Eq56 & Eq59 & Eq60	Eq66 & Eq67 & Eq68	Eq69 & Eq70	Eq18	Eq19
GSE-AL	Eq1	Eq5	Eq11 & Eq12	Eq17	Eq42 & Eq46	Eq56 & Eq59 & Eq60	Eq66 & Eq67 & Eq68	Eq69 & Eq70	Eq18	Eq19
GSEXL	-	-	-	-	Eq46	Eq59	Eq67 & Eq68	Eq70		
GSI	Eq1	Eq5	Eq11 & Eq12	Eq17	-	-	-	-	Eq18	Eq19
GSI-AL	Eq1	Eq5	Eq11 & Eq12	Eq17	-	-	-	-	Eq18	Eq19
HGUQ	Eq1	Eq5	Eq11 & Eq12	-	-	-	-	-	-	-
HGUS	Eq3 + v	Eq9	-	-	-	-	-	-	-	-
JHA270	Eq78	Eq95 & Eq96	-	-	-	-	-	-	-	-
JHA450	Eq78	Eq95 & Eq96	-	-	-	-	-	-	-	-
JHR/L	v	v	-	-	-	-	-	-	-	-
LUP	Eq1	Eq5	Eq11 & Eq12	-	-	-	-	-	v	-
MF	Eq4	Eq10	-	Eq40	-	-	-	-	-	-
MH	-	-	-	-	-	-	-	-	v	-
SAE	Eq1	Eq5	Eq11 & Eq12	Eq17	Eq40	Eq56	Eq63 & Eq64 & Eq65	Eq69	Eq18	Eq19
SAE250/38/1.5	v	v	v	-	v	v	v	-	-	-
SAE590,620,690	Eq1 + v	Eq5	Eq11 & Eq12	Eq17	Eq40	Eq56	Eq63 & Eq64 & Eq65	Eq69	Eq18	Eq19

SAEL	Eq1	Eq5	Eq11 & Eq12	Eq17	Eq40	Eq56	Eq63 & Eq64 & Eq65	Eq69	Eq18	Eq19
SAI	Eq1	Eq5	Eq11 & Eq12	Eq17	-	-	-	-	Eq18	Eq19
SAI590,620	Eq1 + v	Eq5	Eq11 & Eq12	Eq17	-	-	-	-	Eq18	Eq19
SAIL	Eq1	Eq5	Eq11 & Eq12	Eq17	-	-	-	-	Eq18	Eq19
SAIX	Eq1	Eq5	Eq11 & Eq12	Eq17	Eq40	Eq56	Eq63 & Eq64 & Eq65	Eq69	-	-
SAMI/4X	v	-	-	-	-	-	-	-	-	-
SBE	Eq1	Eq6	Eq13	Eq17	Eq40	Eq57	Eq63 & Eq64 & Eq65	Eq69	-	-
SBE45/168/TF	v	v	-	-	-	-	-	-	-	-
SBG/SLE	Eq1	Eq6	Eq13	Eq17	Eq40	Eq57	Eq63 & Eq64 & Eq65	Eq69	-	-
SDED/G, BNS2P	Eq2	Eq7	Eq16	-	Eq41	Eq58	-	-	-	-
SHT	v	v	-	-	-	-	-	-	-	-
TFU	v	v	v	-	v	v	v	-	-	-
THA	Eq78	Eq95 & Eq96	-	-	-	-	-	-	-	-
THAI	Eq78	Eq95 & Eq96	-	-	-	-	-	-	-	-

* *Smooth nails should be longer than 75 mm*
v: characteristic values given in the product annex
-: no value

C4.1 Joist hangers on timber

C4.1.1 Threaded nails or connector screws

This clause covers both the use of threaded nails and screws.

C4.1.1.1 F_1 load direction:

- **For All Joist Hangers except SDED/G, BSN2P, GLE, GLI HGUS and MF**

$$R_{1,k} = \min\left\{(n_J + 2)\cdot c_1 \cdot R_{lat,J,k}; c_1 \times \frac{1}{\sqrt{\left(\frac{1}{n_H R_{lat,H,k}}\right)^2 + \left(\frac{1}{k_{H,1} R_{ax,H,k}}\right)^2}}\right\} \quad \textbf{Eq 1.}$$

For GSE, GSI, GSE-AL and GSI-AL : $c_1 = 0.9$
For others: $c_1 = 1$

- **For SDED/G, BSN2P, GLE and GLI**

$$R_{1,k} = \min\left\{n_J \cdot R_{lat,J,k}; \frac{1}{\sqrt{\left(\frac{1}{n_H R_{lat,H,k}}\right)^2 + \left(\frac{1}{k_{H,1} R_{ax,H,k}}\right)^2}}\right\} \quad \textbf{Eq 2.}$$

- **For HGUS**

$$R_{1,k} = \min\left[k_{ef} \cdot A \cdot C \cdot k_{c,90} \cdot f_{c,90,k} + n_J \cdot k_{J,ef} \cdot R_{lat,J,k}; \frac{1}{\sqrt{\left(\frac{1}{n_H \cdot R_{lat,H,k}}\right)^2 + \left(\frac{1}{k_{H1} \cdot R_{ax,H,k}}\right)^2}}\right] \quad \textbf{Eq 3.}$$

$k_{J,ef}$ are given in the following table:

Nail type and dimension	Reduction factor $k_{J,ef}$
Round smooth 3,75 x 75	0,6
Round smooth 4,0 x 90	0,6
ETA annular ring shank 4,0 x 60 according to ETA-04/0013	0,4

- **For MF**

$$R_{1,k} = \min\left[4{,}2 \cdot R_{lat,J,k}; \frac{1}{\sqrt{\left(\frac{1}{n_H \cdot R_{lat,H,k}}\right)^2 + \left(\frac{1}{k_{H1} \cdot R_{ax,H,k}}\right)^2}}\right] \quad \textbf{Eq 4.}$$

C4.1.1.2 F_2 load direction:

- **For the most joist hangers excepted for BSNN, SBG, SLE, SBE, SDED/G, BSN2P, GLE/I, HGUS and MF**

$$R_{2,k} = \min\left\{ c_2.n_J \cdot R_{lat,J,k}; c_2 \cdot \frac{1}{\sqrt{\left(\frac{1}{n_H R_{lat,H,k}}\right)^2 + \left(\frac{1}{k_{H,2} R_{ax,H,k}}\right)^2}} \right\} \quad \textbf{Eq 5.}$$

For GSE, GSI, GSE-AL and GSI-AL : $c_2 = 0.8$
For others: $c_2 = 1$

- **For BSNN, SBG, SLE and SBE:**

$$R_{2,k} = \min\left\{ n_J \cdot R_{lat,J,k}; \frac{1}{\sqrt{\left(\frac{1}{n_H R_{lat,H,k}}\right)^2 + \left(\frac{1}{k_{H,2} R_{ax,H,k}}\right)^2}}; 7A\sqrt{\frac{h_e}{1-\frac{h_e}{h}}} \right\} \quad \textbf{Eq 6.}$$

- **For SDED/G, BSN2P**

$$R_{2,k} = \min\left\{ n_J \cdot R_{lat,J,k}; \frac{1}{\sqrt{\left(\frac{1}{n_H R_{lat,H,k}}\right)^2 + \left(\frac{1}{k_{H,2} R_{ax,H,k}}\right)^2}}; 14 \times 0{,}75 \times A\sqrt{\frac{h_e}{1-\frac{h_e}{h}}} \right\} \quad \textbf{Eq 7.}$$

- **For GLE/I**

$$R_{2,k} = \min\left\{ c_3 \cdot n_J \cdot R_{lat,J,k}; \frac{1}{\sqrt{\left(\frac{1}{n_H R_{lat,H,k}}\right)^2 + \left(\frac{1}{k_{H,2} R_{ax,H,k}}\right)^2}} \right\} \quad \textbf{Eq 8.}$$

With: $c_3 = 0.9$

- **For HGUS**

$$R_{2,k} = \min\left[n_J \cdot k_{J,ef} \cdot R_{lat,J,k}; \frac{1}{\sqrt{\left(\frac{1}{n_H \cdot R_{lat,H,k}}\right)^2 + \left(\frac{1}{k_{H2} \cdot R_{ax,H,k}}\right)^2}} \right] \quad \textbf{Eq 9.}$$

Refer to Eq 3. for values of $k_{J,ef}$

- **For MF**

$$R_{2,k} = \min\left[2{,}2 \cdot R_{lat,J,k}; \frac{1}{\sqrt{\left(\frac{1}{n_H \cdot R_{lat,H,k}}\right)^2 + \left(\frac{1}{k_{H2} \cdot R_{ax,H,k}}\right)^2}}\right] \qquad \textbf{Eq 10.}$$

C4.1.1.3 F_3 load direction:

- **For all joist hangers except BSNN, SBG, SLE, SBE and SDED/G:**

The capacity from the nails in the joist

$$R_{3,k} = \frac{n_J \cdot R_{lat,J,k}}{\sqrt{\left(\frac{2\sqrt{e_{J,F}^2 + e_{J,nail}^2}}{A}\right)^2 + \left(\frac{R_{lat,J,k}}{R_{ax,J,k}}\right)^2}} \qquad \textbf{Eq 11.}$$

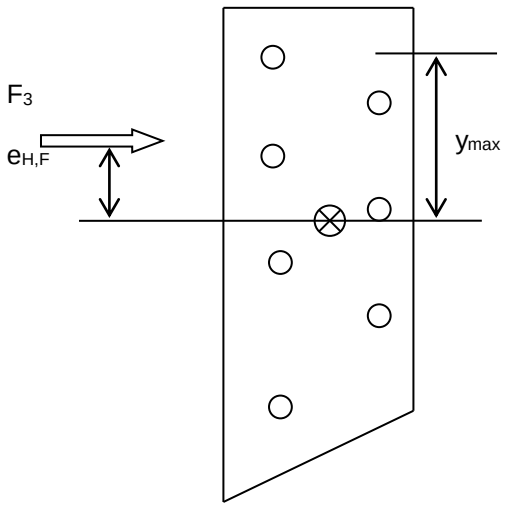
The capacity from the nails in the header

$$R_{3,k} = \frac{R_{lat,H,k}}{\sqrt{\left(\frac{1}{n_H} + \frac{e_{H,F} \cdot H^*}{2I_{p,H}}\right)^2 + \left(\frac{e_{H,F} \cdot W^*}{2I_{p,H}}\right)^2}} \qquad \textbf{Eq 12.}$$

The lateral capacity of the joist hanger is the minor of the capacity of the nails in the joist and the nails in the header.

- **For BSNN, SBG, SLE and SBE:**

$$R_{3,k} = \frac{½ n_H R_{lat,H,k}}{1 + \frac{n_H e_{H,F} y_{\max}}{2I_{p,fl}}} = k_{lat} R_{lat,H,k} \qquad \textbf{Eq 13.}$$



$$k_{lat} = \frac{n_H}{2 \times \left(1 + \frac{n_H \times e_{H,F} \times y_{\max}}{2 \times I_{p,fl}}\right)} \qquad \textbf{Eq 14.}$$

If full nailing of all holes in the header flange is applied a contribution from the nails in the other flange can be added to the value of the above formula. This term is:

$$R_{3,k} = ½ n_J R_{ax,J,k}$$ **Eq 15.**

- **For SDED/G, BSN2P**

The capacity of the SDED/G is given by the formula:

$$R_{3,k} = ½ \times \left(n_H \times R_{lat,H,K} + n_J \times R_{ax,H,K} \right) \times \left(-\frac{22}{9} \times 10^{-3} \times \text{Blank} + 1{,}636 \right) \times 0{,}65$$ **Eq 16.**

C4.1.1.4 F_4 load direction:

In some cases, a solicitation of the joist can be applied in the F_4 direction. We can estimate the resistant capacity of the joist hanger by R_{ax}.

- **For BSIN, SAE, SAIX, SAI, SBE, SBG, SLE, GSE, GSE-AL, GSI, GSI-AL, GLE, GLI**

$$R_{4,k} = \min \begin{cases} n_{J,eff} \times R_{lat,J,k} \times c_4 \\ n_{H,eff} \times R_{ax,H} \end{cases} \quad \textbf{Eq 17.}$$

For BSIN, SAE, SAIX, SAI, SBE, SBG, SLE, GLE and GLI c_4=0.85
For others: c_4 = 1

C4.1.2 Square twist nails or smooth round nails

C4.1.2.1 F_1 Load direction:

$$R_{1,k} = \min \left\{ n_{J,ef,1} \cdot R_{lat,J,k}; n_H \cdot R_{lat,H,k} \right\} \quad \textbf{Eq 18.}$$

where the following symbols, which have not been defined Annex C0 are:

$n_{J,ef,1}$ effective number of nails in the side of the joist

C4.1.2.2 F_2 Load direction:

$$R_{2,k} = \min \left\{ n_{J,ef,2} \cdot R_{lat,J,k}; n_H \cdot R_{lat,H,k} \right\} \quad \textbf{Eq 19.}$$

where the following symbols, which have not been defined in Annex C0 are:

$n_{J,ef,2}$ effective number of nails in the side of the joist

C4.1.3 Bolts

C4.1.3.1 F_1 load direction:

- **For GBE and GBI (with bolts in sides and flanges)**

$$F_{j.k} = F_{c.90.k} + \gamma \times n_j \times F_{b.k.j} \quad \textbf{Eq 20.}$$

With:
$F_{c.90.k}$ the capacity of the seat of the joist hanger depending of the timber used.
γ the eccentricity factor
n_j the number of bolt in the joist
$F_{b.k.j}$ the lateral capacity of one bolt of the joist (according to EN 1995-1-1)

$$F_{tot.j.bear.k} = 2 \times n_j \times \gamma \times F_{bear.j.k} \quad \textbf{Eq 21.}$$

With:
$F_{bear.j.k}$ the bearing resistance of the steel around the bolt in the joist

$$F_{h.k} = 2 \times k_{b.h} \times n_h \times F_{b.k.h} \quad \textbf{Eq 22.}$$

With:
$k_{b.h}$ the calibration factor
n_h the number of bolt in the header
$F_{b.k.h}$ the lateral capacity of one bolt on the header. (according to EN 1995-1-1)

$$F_{tot.h.bear.k} = 2 \times n_h \times F_{bear.h.k} \quad \textbf{Eq 23.}$$

With:
$F_{bear.h.k}$ the bearing resistance of the steel around the bolt in the header

The download capacity is defined as the minimum of this four failure mode:

$R_{1.k} = \min(F_{j.k} , F_{h.k} , F_{tot.h.bear.k} , F_{tot.j.bear.k})$ **Eq 24.**

- **For GBE and GBI (with wood screws in sides and bolts in flanges)**

$F_{j.screw.k} = F_{c.90.k} + 2 \times \gamma_s \times n_{s.j} \times F_{screw.k.j}$ **Eq 25.**

With:

γ_s the eccentricity factor for screws

$n_{s.j}$ the number of screws in the joist

$F_{screw.k.j}$ the lateral capacity of one screw in the joist (according to EN 1995-1-1)

$R_{1.k.scr} = \min(F_{j.screw.k} , F_{h.k} , F_{tot.h.bear.k} , 2 \times n_{s.j} \times F_{bear.sc.k})$ **Eq 26.**

With:

$F_{bear.sc.k}$ the bearing resistance of the steel around the screws on the joist

For $F_{h.k}$ and $F_{tot.h.bear.k}$ see “For GBE and GBI (with bolts in sides and flanges)”

C4.1.3.2 F_2 load direction:

- **For GBE and GBI (with bolts in sides and flanges)**

The uplift capacity is defined as the minimum of this four failure mode:

$R_{2.k} = \min(\gamma \times n_j \times F_{b.k.j} , F_{h.k} , F_{tot.h.bear.k} , F_{tot.j.bear.k})$ **Eq 27.**

- **For GBE and GBI (with wood screws in sides and bolts in flanges)**

$R_{2.k.scr} = \min(2 \times \gamma_s \times n_{s.j} \times F_{screw.k.j} , F_{h.k} , F_{tot.h.bear.k} , 2 \times n_{s.j} \times F_{bear.sc.k})$ **Eq 28.**

C4.1.3.3 F3 load direction:

- **For GBE and GBI (with bolts in sides and flanges)**

Capacity of the steel around the load application point:

$F_{area.A} = 2 \times m_y \times a / e_{JH}$ **Eq 29.**

With:

m_y the moment capacity of the steel

a the distance found by test

e_{JH} the distance between the header and the bolt in the joist

$F_{area.B} = 2 \times a \times C \times F_{90}$ **Eq 30.**

With:

C the contact length (=depth of the joist hanger) between the timber and the joist hangers

F_{90} the compressive capacity of the timber joist

The lateral capacity is defined as :

$R_{3.k} = F_{area.A} + F_{area.B}$ **Eq 31.**

- **For GBE and GBI (with wood screws in sides and bolts in flanges)**

Same as bolted connection

C4.1.3.4 F_4 load direction:

- **For GBE and GBI (with bolts in sides and flanges)**

$$F_{j.lat.k} = n_j \times F_{b.lat.k.j} \quad \textbf{Eq 32.}$$

With:
n_j the number of bolt in the joist
$F_{b.lat.k.j}$ the lateral capacity of the bolt on the joist

$$F_{h.ax.k} = 2 \times n_h \times F_{ax.h.k} \quad \textbf{Eq 33.}$$

With:
n_h the number of bolt on the header
$F_{ax.h.k}$ the axial capacity of the bolt on the header

$$F_{k.ax.fl} = 2 \times M_{fl} /(d_{b.fl} - d_h/2) \quad \textbf{Eq 34.}$$

With:
M_{fl} the moment capacity of the flange of the joist hangers
$d_{b.fl}$ the distance between the side of the Joist hanger and the bolt in the header
d_h the diameter of the bolt used on the header

Axial capacity is defined as the minimum of the three previous failure mode

$$R_{4.k} = \min(F_{j.lat.k} , F_{h.ax.k} , F_{k.ax.fl}) \quad \textbf{Eq 35.}$$

- **For GBE and GBI (with wood screws in sides and bolts in flanges)**

$$F_{j.lat.k} = 2 \times n_{s.j} \times F_{screw.k.j} \quad \textbf{Eq 36.}$$

$$F_{h.ax.k} = 2 \times n_h \times F_{ax.h.k} \quad \textbf{Eq 37.}$$

$$F_{k.ax.fl} = 2 \times M_{fl} /(d_{b.fl} - d_h/2) \quad \textbf{Eq 38.}$$

Axial capacity is defined as the minimum of the three previous failure mode

$$R_{4.k} = \min(F_{j.lat.k} , F_{h.ax.k} , F_{k.ax.fl}) \quad \textbf{Eq 39.}$$

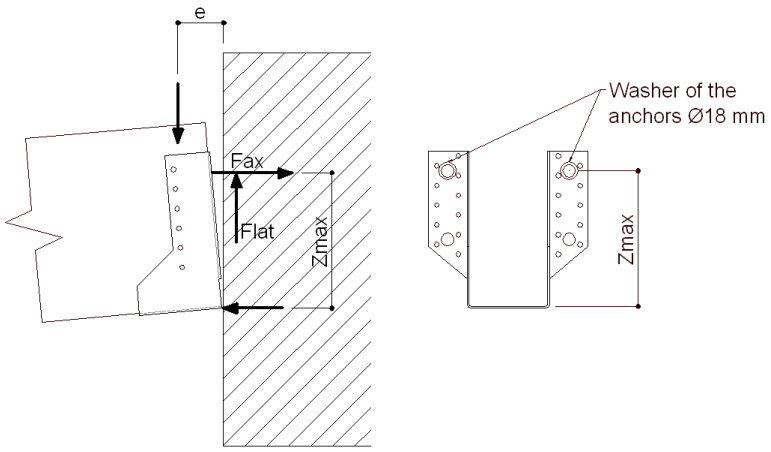
C4.2 Joist hangers on Rigid support

C4.2.1 General requirement

For joist hangers connected to a wall of concrete, lightweight concrete or to a steel member the assumptions for the calculation of the load-carrying capacity of the connection are:

- The Transfer of force from the joist to the joist hanger is as for a wood-wood connection.
- The bolts shall always be positioned symmetrically about the vertical axis of the joist hanger.
- For concrete, the bolts shall use washers recommended with the mechanical anchor delivery by the suppliers. Check it is a CE marked product with an ETA.
- For bolted application, washer ≥ Ø18 mm shall be installed under the upper bolt heads or nuts.

C4.2.2 Characteristic capacities of a bolted joist hanger connection



C4.2.2.1 F_1 load direction

For a **F1 load** the formulas for the characteristic load-carrying capacity of the joist hanger connection are:

- **For all joist hangers except SDED/G, BSN2P, GSE, GSE-AL, GLE and GSEXL**

$$R_{1,k} = \min\left[(n_j + 2) \times R_{lat,j,k}; n_b \times R_{lat,b,k}\right] \quad \textbf{Eq 40.}$$

For type SBE, SBG and SLE, $n_b = n_{ef.b}$

- **For SDED/G and BSN2P**

$$R_{1,k} = \min\left[n_j \times R_{lat,j,k}, n_b \times R_{lat,b,k}\right] \quad \text{for SDED/G} \quad \textbf{Eq 41.}$$

- **For GSE and GSE-AL with a blank model from 300 to 500**

$$R_{1,k} = \min\left[c_5 \times (n_j + 2) \times R_{lat,j,k}; R_{bear,k}\right] \quad \textbf{Eq 42.}$$

For GSE and GSE-AL with a blank model from 300 to 500, $c_5 = 0.9$
It must be checked that the combination of lateral and axial forces in the anchor bolt can be carried by these forces.
The maximum withdrawal force in a upper bolt can be calculated as follows :

$$F_{ax,bolt} = \frac{F_1 \cdot e}{2 \cdot z_{\max}} \quad \textbf{Eq 43.}$$

The upper two bolts are subjected to a combination of lateral and withdrawal forces. The lateral force is determined assuming an even distribution of the downward force F:

$$F_{lat,bolt} = F_1 / n_{bolt} \quad \textbf{Eq 44.}$$

- This case is for face mount hangers connected to a wall of concrete or to a steel member.
- The bolts shall be positioned symmetrically about the vertical axis of the Face mount hanger.
- The nails in the joists are subjected to a lateral force, which is equally distributed over all nails or screws in the joist.
- The rotation point can be assumed to be positioned at the top of the bottom plate.
- The forces in the bolts are partly lateral forces, partly withdrawal forces.
- The lateral forces are distributed evenly over all bolts.
- The withdrawal forces are assumed to be taken by the 2 upper bolts with washers (30 x 30 x 3)

The bearing resistance between the bolt and the plate of the face mount hanger is given by the following equation :

$$R_{bear,k} = n_{bolt} \cdot f_{u,k} \cdot d_{hole} \cdot t_p \qquad \textbf{Eq 45.}$$

- **For GSEXL, GSE and GSE-AL with blank model from 540 to 1020, and GLE**

In order to calculate value of GSE and GSEXL on concrete we compared 4 failure modes and take the most disadvantageous one.

$$F_{1,k} = \min\left\{F_{v,StT,Rk}; F_{Anet,Rk}; F_{v,sp,Rk}; F_{anchor,Rk}\right\} \qquad \textbf{Eq 46.}$$

Where:
$F_{v,StT,Rk}$ is the resistance of the steel to timber connection
$F_{Anet,Rk}$ is the resistance of the cross section in tension.
$F_{v,sp,Rk}$ is the resistance of the bolt to steel connection
$F_{anchor,Rk}$ is the resistance of the anchor group

To find the design value, k_{mod} and γ_M must be applied on $F_{down,Rk}$ even if the failure is due to a steel failure. Indeed, it will always be on the safe side.

Failure mode: Steel to timber connection

The support reaction of the joist causes lateral loading of the fasteners in the joist connection and compression perpendicular to the grain in the contact area between bottom plate and joist. By taking into account the contribution of the bottom plate and the plastic behaviour of the fasteners, the characteristic steel-to-timber load capacity is:

$$F_{v,StT,Rk} = n_J \cdot F_{v,f,Rk} + F_{c,Rk} \qquad \textbf{Eq 47.}$$

Where:
$F_{v,f,Rk}$ is the characteristic load-carrying capacity of the fasteners in the joist
$F_{c,Rk}$ is the load-carrying capacity of the bottom plate taking into account the compression of the timber perpendicular to the grain and expressed as follows:

$$F_{c,Rk} = 4\sqrt{M_{y,Rk} \cdot A \cdot k_{c,90} \cdot f_{c,90,k}} \text{ with } M_{y,Rk} = \frac{f_{u,k} . A . t_p{}^2}{4} \qquad \textbf{Eq 48.}$$

Failure mode: Steel plate

Depending on the thickness of the steel plate, the characteristic load capacity $F_{v,sp,Rk}$ of the bolt-to-steel connection is designed according to EN 1993-1-8 (§3 table 3.4) for the 4 mm hanger and EN 1993-1-3 (§8.3 table 8.4) for the 2.5 mm hanger with the following modifications:

The tensile strength $F_{Anet,Rk}$ of the area A_{net} is calculated assuming a contribution of an effective width which is the actual width + 60 mm for each side of the hanger. According to Eurocode 3, the total effective area is then:

$$A_{net,ef} = 2 \cdot (2.e_2 - d_0 + 60) \cdot t_{cor} \qquad \textbf{Eq 49.}$$

Then, the load bearing capacity of the joist hanger is then:

$$F_{v,Rk} = \min\left\{F_{v,StT,Rk}; F_{v,sp,Rk}\right\}$$ **Eq 50.**

Failure mode: Anchor failure

The last failure mode is the failure of anchor in shear. For this failure mode, it must be checked that the group of anchor can resist to the load. To check the group anchor, the ETAG001 Annex C must be used.

The forces in the anchors will be partly lateral forces, partly withdrawal forces. The lateral forces are distributed equally over all anchors:

$$F_{anchor,lat,Rk} = \frac{F_{v,Ed}}{n_b}$$ **Eq 51.**

Where:
$F_{v,Ed}$ is downward directed force toward the bottom plate
The centre of rotation is assumed at the bottom plate of the joist hanger. The withdrawal forces are on the safe side assumed to be taken by the 2 upper anchors with washers. The maximum withdrawal force in an upper anchor can be calculated from:

$$F_{anchor,ax,Rk} = \frac{F_{vEd} \cdot e}{2.z_{max}}$$ **Eq 52.**

- **For GBE and GBI (with bolts in sides and flanges)**

$F_{h.anch.k} = 2 \times k_{b.h} \times n_h \times F_{lat.anch.d}$ **Eq 53.**

With:
$F_{lat.anch.d}$ the lateral capacity of the anchor

$R_{1.k} = \min(F_{j.k}, F_{h.anch.k}, F_{tot.h.bear.k}, F_{tot.j.bear.k})$ **Eq 54.**

For the definition of the different value, see see “F1 load direction: For GBE and GBI (with bolts in sides and flanges)”

- **For GBE and GBI (with wood screws in sides and bolts in flanges)**

$R_{1.k.sc} = \min(F_{j.screw.k}, F_{h.anch.k}, F_{tot.h.bear.k}, 2 \times n_{s.j} \times F_{bear.sc.k})$ **Eq 55.**

C4.2.2.2 F_2 Load direction

For an F_2 Load direction, the formula for the characteristic load-carrying capacity of the joist hanger connection is:

- **For all the joist hangers excepted BSNN, SDED/G, BSN2P, SBE, SBG and SLE and GSE (Blank>500), GSE-AL (Blank>500), GLE and GSEXL**

$$R_{2,k} = \min\left[n_j \times R_{lat,j,k}; n_b \times R_{bolt,lat,k}\right] \quad \textbf{Eq 56.}$$

- **For BSNN, SBG, SBE and SLE**
  the minimum of following formulas (Eq37 + Eq38)

If there is no reinforcing for splittering, the following formula is applied:

$$R_{2,k} = 7 \times A_{eff} \times \sqrt{\frac{h_e}{1-\frac{h_e}{h}}} \quad \textbf{Eq 57.}$$

The result of this calculation is in N.

- **For SDED/G and BSN2P:**

$$R_{2,k} = \min\left\{n_J \cdot R_{lat,J,k}; n_{ef,b} R_{bolt,lat,k}\right\} \quad \textbf{Eq 58.}$$

- **For GSE (Blank>500), GSE-AL (Blank>500), GLE and GSEXL**

$$R_{2,k} = \min\left\{c_6.F_{anchor,Rk}; c_6 \cdot n_H \cdot F_{v,f,Rk}; c_6 \cdot F_{v,Rk}; F_{Anet,Rk}\right\} \quad \textbf{Eq 59.}$$

c_6 = 0.8

- **For connection with 2 bolts for all joist hangers:**

$$R_{2,k} = \frac{1}{\sqrt{\left(\frac{1}{n_J}\right)^2 + \left(\frac{\frac{2}{3} e_{J,nail} \times e_{center,x}}{I_{p,nail}}\right)^2}} \times R_{lat,nail,k} \quad \textbf{Eq 60.}$$

The force in the anchor bolts are calculated analogous from formula (Eq 27) and (Eq 28.).

- **For GBE and GBI (with bolts in sides and flanges)**

$R_{2.k} = \min(\gamma \times n_j \times F_{b.k.j}, F_{h.anch.k}, F_{tot.h.bear.k}, F_{tot.j.bear.k})$ **Eq 61.**

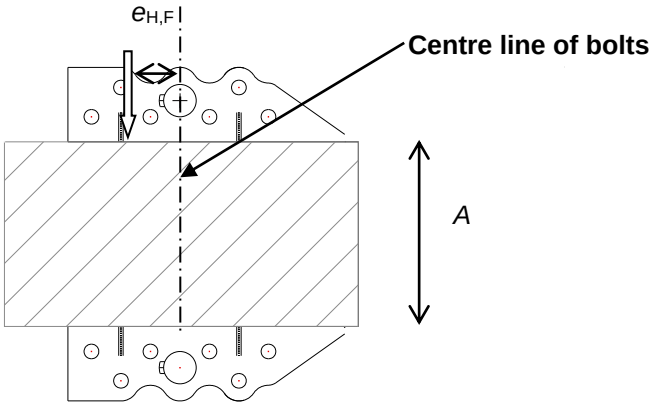
- **For GBE and GBI (with wood screws in sides and bolts in flanges)**

$R_{2.k.sc} = \min(2 \times \gamma_s \times n_{s.j} \times F_{screw.k.j}, F_{h.anch.k}, F_{tot.h.bear.k}, 2 \times n_{s.j} \times F_{bear.sc.k})$ **Eq 62.**

C4.2.2.3 F_3 load direction

Different formulas are used for joist hangers with 2 or 4 anchor bolts into the supporting structure of for example concrete or steel.

- **For all Joist hangers with 2 bolts except GSE, GSE-AL, GLE and GSEXL**



The minimum value of the following formulas and also formula [Eq.6] for the characteristic lateral load-carrying capacity of the joist hanger connection applies to a joist hanger with 2 bolts.

For small eccentricities $e_{H,F}$:

$$R_{3,k} = \frac{\frac{2R_{bolt,lat,k}}{R^2_{ax,J,k}} + \sqrt{\frac{4R^2_{bolt,lat,k}}{R^4_{ax,J,k}} - \left(4\frac{R^2_{bolt,lat,k}}{R^2_{ax,J,k}} - n_J^2\right)\left[\left(\frac{e_{H,F}}{AR_{lat,J,k}}\right)^2 + 1/R^2_{ax,J,k}\right]}}{2\left[\left(\frac{e_{H,F}}{AR_{lat,j,k}}\right)^2 + 1/R^2_{ax,J,k}\right]} \qquad \textbf{Eq 63.}$$

For larger eccentricities $e_{H,F}$:

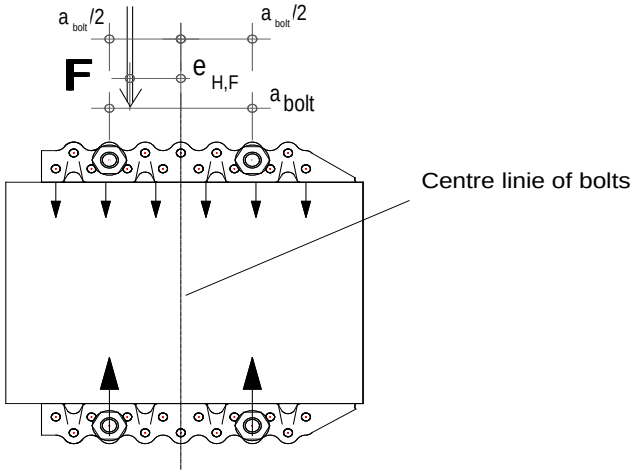
$$R_{3,k} = \frac{½An_J R_{lat,J,k}}{e_{H,F}} \qquad \textbf{Eq 64.}$$

where the symbols previously not defined are:

$e_{H,F}$ is the eccentricity of the lateral force in relation to the centre of the bolts in each flange. It shall be taken as the numerical value of the eccentricity

$R_{bolt,lat,k}$ See page 20

- **For all Joist hangers with 4 bolts except GSE, GSE-AL, GLE and GSEXL**

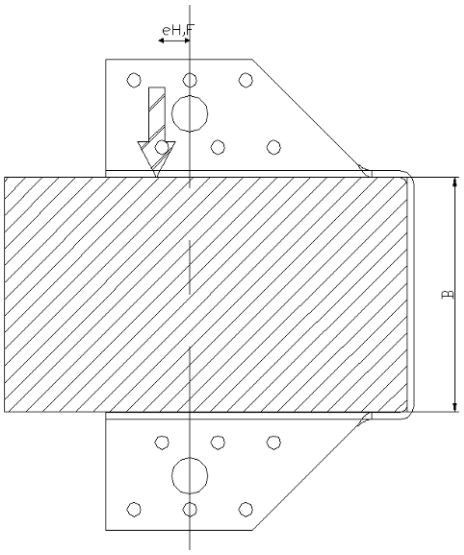


For a lateral force the formula for the characteristic load-carrying capacity of the joist hanger connection with 4 Ø10 mm bolts is:

$$R_{3,k} = \frac{a_{bolt} \times R_{bolt,lat,k}}{e_{H,F} + \frac{1}{2} a_{bolt}} + \frac{1}{2} n_J \times R_{ax,J,k} \qquad \textbf{Eq 65.}$$

where the symbols are defined in the previous text, also the limitation on the characteristic lateral capacity of a 10 mm bolt.

- **For GSE, GSE-AL and GLE with 2 bolts**

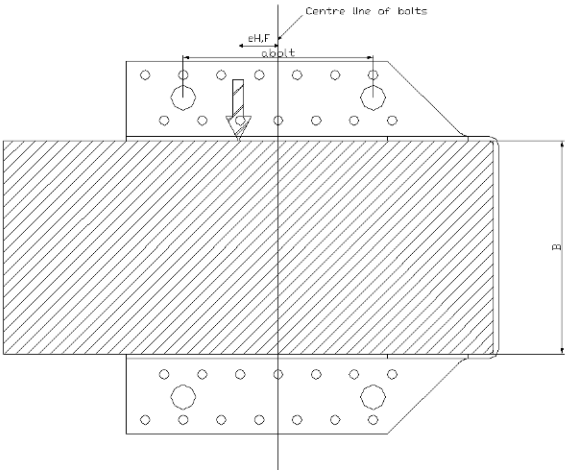


Provided the joist is prevented from rotation around its own axis, i.e. the force is acting right at the anchor bolts with $e_{H,F}$ = 0 mm the characteristic lateral load-carrying capacity of the joist hanger connection with 2 Ø12 mm bolts is:

$R_{3,k} = R_{bolt,lat,k}$ **Eq 66.**

Where $R_{bolt,lat,k}$ is the resistance of one anchor in shear

- **For GSE, GSE-AL, GLE and GSEXL with 4 bolts:**

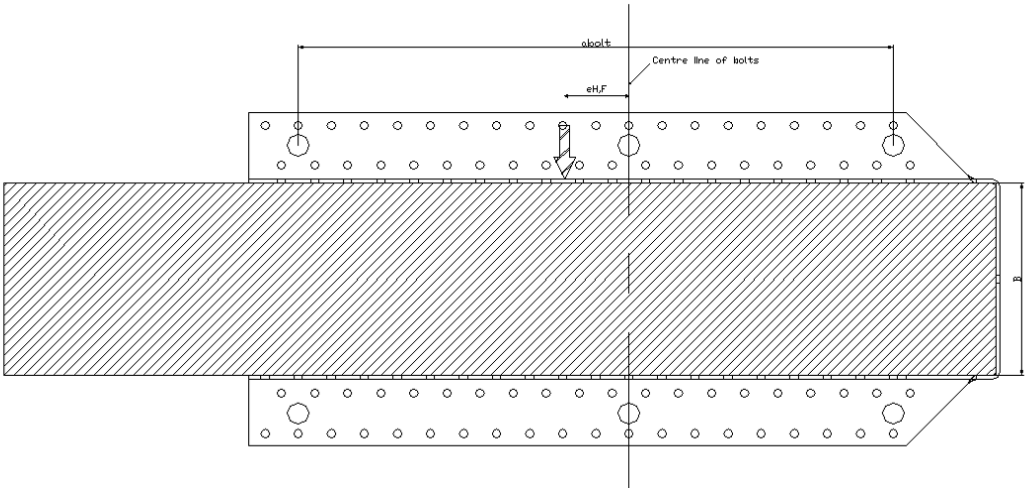


Provided the force is acting between the anchors bolts the characteristic lateral load-carrying capacity of the joist hanger connection with 4 Ø12 mm bolts is:

$$R_{3,k} = \frac{a_{bolt}}{e_{H,F} + \frac{1}{2} a_{bolt}} R_{bolt,lat,k} \qquad \textbf{Eq 67.}$$

Where:
a_{bolt} is the distance between the two extreme bolts
$e_{H,F}$ is the distance between application load and the centre line of the bolts

- **For GSE, GSE-AL, GLE and GSEXL with 6 bolts:**



Provided the force is acting between the outer anchor bolts and the force is acting $e_{H,F}$ from the middle anchor bolt the characteristic lateral load-carrying capacity of the joist hanger connection with 6 12 mm bolts is:

$$R_{3,k} = \frac{R_{bolt,lat,k}}{\frac{1}{3} + e_{H,F} / a_{bolt}} \qquad \textbf{Eq 68.}$$

- **For GBE and GBI (with bolts in sides and flanges)**

Same as “F3 load direction: For GBE and GBI (with bolts in sides and flanges)”

- **For GBE and GBI (with wood screws in sides and bolts in flanges)**

Same as “F3 load direction: For GBE and GBI (with bolts in sides and flanges)”

C4.2.2.4 F_4 load direction

In some cases, a solicitation of the joist can be applied in the F_4 direction. We can estimate the resistant capacity of the joist hanger by R_{ax}.

- **For BSNN, SAE, SAIX, SBE, SBG, SLE, GSE (2.5mm thick), GSE-AL (2.5mm thick) and GLE (2.5mm thick)**

$$R_{4,k} = \min \begin{cases} n_J \times R_{lat,J,k} \\ 2.5 \times n_b \text{ kN} \end{cases} \quad \textbf{Eq 69.}$$

For the type BSNN, SBE and SBG and SLE: $n_j = n_{J,ef}$

- **GSE (4mm thick), GSE-AL (4mm thick), GLE (4mm thick) and GSEXL**

$$R_{4,k} = \min \begin{cases} n_J \times R_{lat,J,k} \\ 6.5 \times n_b \times c_7 \text{ kN} \end{cases} \quad \textbf{Eq 70.}$$

c_7=0.8

It must be checked that the external diameter of the washer is at least twice the diameter of the anchor or the bolt.

- **For GBE and GBI (with bolts in sides and flanges)**

$F_{h.anch.ax.k} = 2 \times n_h \times F_{ax.anch.d}$ **Eq 71.**

With:
$F_{ax.anch.d}$ the axial capacity of the anchor

$R_{4.k} = \min(F_{j.lat.k}, F_{h.anch.ax.k}, F_{k.ax.fl})$ **Eq 72.**

- **For GBE and GBI (with wood screws in sides and bolts in flanges)**

$R_{4.k.sc} = \min(2 \times n_{s.j} \times F_{screw.ax.j}, F_{h.anch.ax.k}, F_{k.ax.fl})$ **Eq 73.**

C4.3 Load combination

For a combination of forces in the vertical direction and in the lateral direction the following inequalities shall be fulfilled.

C4.3.1 – F_1 load direction and F_3 load direction

$$\left(\frac{F_{1,d}}{R_{1,d}}\right)^2+\left(\frac{F_{3,d}}{R_{3,d}}\right)^2\le 1{,}0 \qquad \textbf{Eq 74.}$$

C4.3.2 – F_2 load direction and F_3 load direction

$$\left(\frac{F_{2,d}}{R_{2,d}}\right)^2+\left(\frac{F_{3,d}}{R_{3,d}}\right)^2\le 1{,}0 \qquad \textbf{Eq 75.}$$

C4.3.3 – F_1 load direction, F_3 load direction and F_4 load direction

$$\left(\frac{F_{1,d}}{R_{1,d}}\right)^2+\left(\frac{F_{3,d}}{R_{3,d}}\right)^2+\left(\frac{F_{4,d}}{R_{4,d}}\right)^2\le 1{,}0 \qquad \textbf{Eq 76.}$$

C4.3.4 – F_2 load direction, F_3 load direction and F_4 load direction

$$\left(\frac{F_{2,d}}{R_{2,d}}\right)^2+\left(\frac{F_{3,d}}{R_{3,d}}\right)^2+\left(\frac{F_{4,d}}{R_{4,d}}\right)^2\le 1{,}0 \qquad \textbf{Eq 77.}$$

Factors $k_{H,1}$,$k_{H,2}$,$n_{J,ef,1}$ and $n_{J,ef,2}$ will be detailed in Annex D for each reference.

Effective number of nails $n_{J,ef,1}$ and $n_{J,ef,2}$ for joist hangers nailed with smooth round nails or square twist nails

The effective number of nails $n_{J,ef,1}$ and $n_{J,ef,2}$ shall be used for calculation of the load-carrying capacity of a wood-wood connection with smooth round nails or square twist nails subjected to a downward force towards the bottom plate, respectively an upward force away from the bottom plate.

C4.4 Straps hanger on timber

C4.4.1 Basis of Design

The design method detailed below for the JHA, THA, THAI, AG703 and AG713 joist hangers has been validated by calculation assisted by testing method as defined in ETAG 015 and substantiated by BM TRADA Certification as part of the ETA assessment process.

The hanger characteristics needed to apply this method can be found in Annex D.

The designation of symbol is in Annex C0.

C4.4.2 Nail Capacities

The nail capacities are given in Annex C3 and have been validated against hanger test data.

They have had an efficiency factor applied as part of the design method validation and are only for use in conjunction with this ETA and the hangers listed in it.

C4.4.3 Hanger Characteristics

Hanger characteristics are given in Annex C4.

For hanger models not included in Annex C4, but within the scope of the ETA, reference should be made to the ETA holder for further information regarding the hanger characteristics.

C4.4.4 F_1 load direction

The load is transferred from the supported member (joist) to the supporting member (header) by:

1) Load transfer from the supported member to the hanger

2) Tension in the lower part of the hanger

3) Load transfer from the hanger to the supporting member.

Therefore, the capacity of the system is the minimum of the above three mechanisms:

$$R_{1.k} = \text{Min}\begin{cases} F_{\text{Joist-Hanger}} \\ F_{Hanger,Tension} \\ F_{\text{Hanger-Header}} \end{cases} \qquad \textbf{Eq 78.}$$

C4.4.5 Load Transfer from Joist to Hanger (FJoist-Hanger)

The force between joist and hanger per flange ($F_{\text{Joist-Hanger}}$) is:

$$F_{Joist-Hanger} = \frac{C_{eff} \times A \times f_{c,90,k^*}}{2} \qquad \textbf{Eq 79.}$$

Where from Eurocode 5

$$f_{c,90,k^*} = k_{c,90,joist} \times f_{c,90,joist} \qquad (k_{c,90,joist} = 1.5) \qquad \textbf{Eq 80.}$$

When joists are installed with 75mm long skewed nails, a contribution from these nails can be added to $F_{\text{Joist-Hanger}}$ to give:

$$F_{Joist-Hanger} = \frac{C_{eff} \times A \times f_{c,90,*}}{2} + \frac{n_{skewnail} \times F_{v,RK,joist}}{3} \qquad \textbf{Eq 81.}$$

C4.4.6 Characteristic tensile capacity of the lower part of the joist hanger (FHanger,Tension)

The tensile capacity per flange $F_{Hanger,\ Tension}$ is:

$$F_{Hanger,Tension} = \frac{S \times t_p \times f_{u,k}}{d} \quad \textbf{Eq 82.}$$

When joists are installed with 75mm long skewed nails, a contribution from the skewed nails can be added to $F_{Hanger,\ Tension}$ to give:

$$F_{Hanger,Tension} = \frac{S \times t_p \times f_{u,k}}{d} + \frac{n_{skewnail} \times F_{v,RK,joist}}{3} \quad \textbf{Eq 83.}$$

$F_{Hanger,\ Tension}$ shall be reduced by 25% if the joist hanger is installed in an under slung installation.

C4.4.7 Load transfer from the hanger to the header – Face Fix Installation

When face-fixed, the force between header and hanger per flange is:

$$F_{Hanger\text{-}Header} = Min\begin{Bmatrix} F_{Lat,nail} \\ F_{Ax,nail} \end{Bmatrix} \quad \textbf{Eq 84.}$$

The vertical load is shared between the total numbers of nails per flange:

$$F_{Lat,nail} = n_{h,sidenail} \times F_{v,Rk,header} \quad \textbf{Eq 85.}$$

The axial force per flange in the nails is:

$$F_{Ax,nail} = \frac{F_{Ax,Rk,header} \times (a - 0.5a_c) \times n_{eff,ax}}{e} \quad \textbf{Eq 86.}$$

When joists are installed with 75mm long skewed nails, a contribution from the skewed nails can be added, hence
$F_{hanger\text{-}Header}$ becomes:

$$F_{Header-Hanger} = Min\begin{Bmatrix} F_{Lat,nail} \\ F_{Ax,nail} \end{Bmatrix} + \frac{n_{skewnail} \times F_{v,RK,joist}}{3} \quad \textbf{Eq 87.}$$

Smooth nails (round or square) shall fulfil the following criterion:

$$\left(\frac{F_{Lat,nail}}{F_{v,Rk,header}}\right) \le 1 \ \text{ and } \ \left(\frac{F_{Ax,nail}}{F_{ax,Rk,header}}\right) \le 1 \quad \textbf{Eq 88.}$$

Ring shank nails shall fulfil the following criterion:

$$\left(\frac{F_{Lat,nail}}{F_{v,Rk,header}}\right)^2 + \left(\frac{F_{Ax,nail}}{F_{ax,Rk,header}}\right)^2 \le 1 \quad \textbf{Eq 89.}$$

C4.4.8 Load transfer from the hanger to the header – Wrap over Installation

When wrapped-over, the force between header and hanger per flange is:

$$F_{Hanger\text{-}Header} = k_{ef}(F_c + F_r) + n_{h,sidenail} \times F_{v,Rk,header} \quad \textbf{Eq 90.}$$

Where

$$F_c = t_p \sqrt{\frac{f_{u,k} \times f_{c,90,k*} \times l \times l_{eff}}{3}} \quad \textbf{Eq 91.}$$

$$F_r = n_{h,top\ nail} \times F_{v,Rk,header} - \frac{f_{u,k} \times l \times t_p^{\ 2}}{6 \times C_{hor}} \quad \textbf{Eq 92.}$$

From Eurocode 5

$$f_{c,90,*} = k_{c,90,header} \times f_{c,90,header} \qquad (k_{c,90,header} = 1.0) \quad \textbf{Eq 93.}$$

For instance where 75mm joist nails are used, a contribution from the skewed nails can be added, hence, $F_{hanger\text{-}Header}$ becomes:

$$F_{Hanger\text{-}Header} = k_{ef}(F_c + F_r) + n_{h,sidenail} \times F_{v,Rk,header} + \frac{n_{skewnail} \times F_{v,RK,joist}}{3} \quad \textbf{Eq 94.}$$

C4.4.9 F_2 load direction

For uplift force, the load is transferred from the joist into the hanger by the nails in the side of the joist.

For skew nails with a length of 75 mm or greater, the load may also be transferred directly from the joist into the header.

For instances where nails with a length of 30 to 38 mm are inserted perpendicular to the joist the uplift capacity is:

$$F_{2.k} = 0{,}6 \times n_J \times F_{Lat,RK,Joist} \quad \textbf{Eq 95.}$$

When nails with a length of 75 mm are inserted skew to the joist the uplift capacity is:

$$F_{2.k} = \frac{n_{skewnail} \times F_{Lat,RK,Joist}}{3} \quad \textbf{Eq 96.}$$

Where

$F_{Lat,RK,Joist}$ is the characteristic lateral capacity of the nails in the joist

C4.4.10 I-beam as headers

If an I-beam is used as a header, a backer block must be installed between the joist hanger and the web. The backer shall fulfill the following criteria:

- The block shall fit tight to the underside of the top flange (Annex B4)
- The surface of the block shall be flush with the side of the flange
- The nails in the backer block shall be of sufficient length so that they go through the web and clinched.
- It is required that the number of nails in the backer block shall be determined from:

$$n_{nail,backer} = 2(n_{web} \times 2n_{topflange})$$

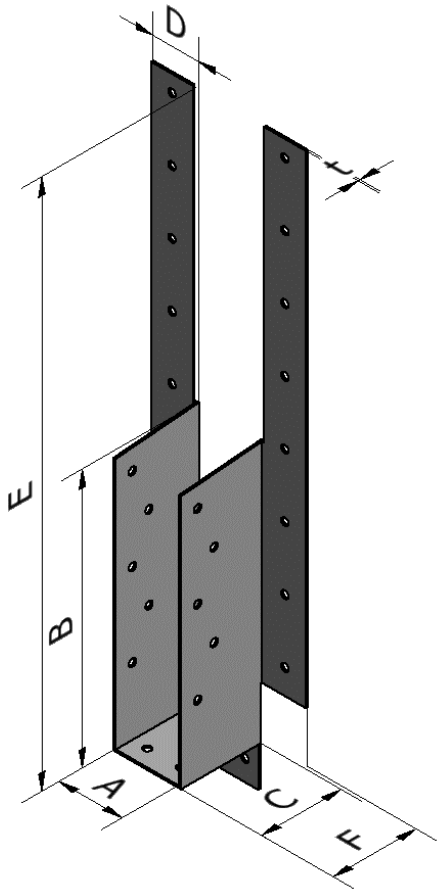
ANNEX D
PRODUCT DEFINITION AND CAPACITIES

D1 AG703 Straps hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
AG703	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]							Holes			
								Header		Joist	
	A	B	C	D	E	F	t	Qty	Size	Qty	Size
AG703	36-98	(344-A)/2	48	26.2	(680-A)/2	49.2	1.2	16	Ø4.5	10	Ø4.5
Permitted deviation	-	-	±1.0	±1.0		±1.0	-	-	-	-	-



Parameters have to be used with equation in Annex C

Parameters for AG703 - F1 - timber to timber

Model	l	l_{ef}	S	B_{eff}	a-0.5a_c	e	c_{hor}	k_{ef}	d	n_{eff} (per flange)
AG703/38	25	74	25	78	143	26	10	1.04	1	6
AG703/45	25	78	25	78	143	26	10	1.04	1	6
AG703/58	25	84	25	76.1	143	26	10	1.04	1	6
AG703/64	25	85	25	74.6	143	26	10	1.04	1	6
AG703/76	25	85	25	71.8	143	26	10	1.04	1	6
AG703/89	25	85	25	68.6	143	26	10	1.04	1	6
AG703/98	25	85	25	66.5	143	26	10	1.04	1	6

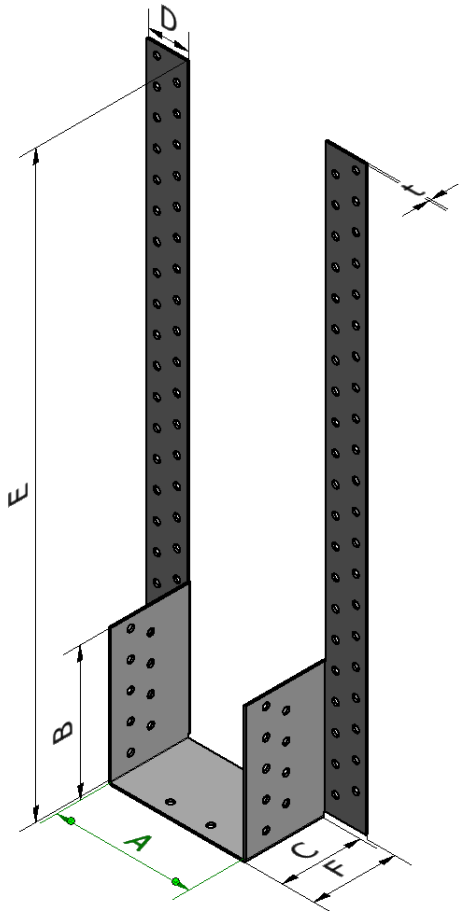
Hanger Type	Installation Configuration	Supporting Timber Fasteners		Supported Timber Fasteners
		ARS 3.1 x 35		ARS 3.1x35
		Top	Face	
AG703	Face Fix	-	16	4
	Wrap Over	4	2	4

D2 AG713 Straps hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
AG713	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]							Holes			
								Header		Joist	
	A	B	C	D	E	F	t	Qty	size	Qty	size
AG713	80-100	(300-A)/2	58	30	(970-A)/2	61.5	1.5	84	Ø5	18	Ø5
Permitted deviation	-	-	±1.0	±1.0		±1.0	-	-	-	-	-



Parameters have to be used with equation in Annex C

Parameters for AG713 - F1 - timber to timber

Model	l	l_{ef}	S	B_{eff}	a-0.5a_c	e	c_{hor}	k_{ef}	d	n_{eff} (per flange)
AG713/80	30	90	30	81	232.5	33.5	10	0.65	1	4
AG713/90	30	90	30	78	232.5	33.5	10	0.65	1	4
AG713/100	30	90	30	75	232.5	33.5	10	0.65	1	4

Hanger Type	Installation Configuration	Supporting Timber Fasteners		Supported Timber Fasteners
		ARS 4.0x50		ARS 4.0x50
		Top	Face	
AG713	Face Fix	-	20	4
	Wrap Over	4	2	4

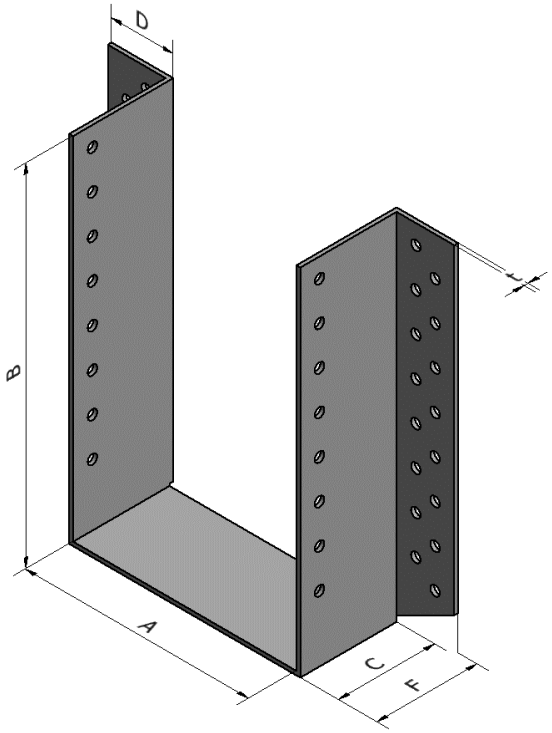
D3 BSD Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
BSD	Steel ref 1 - Steel ref 2	-

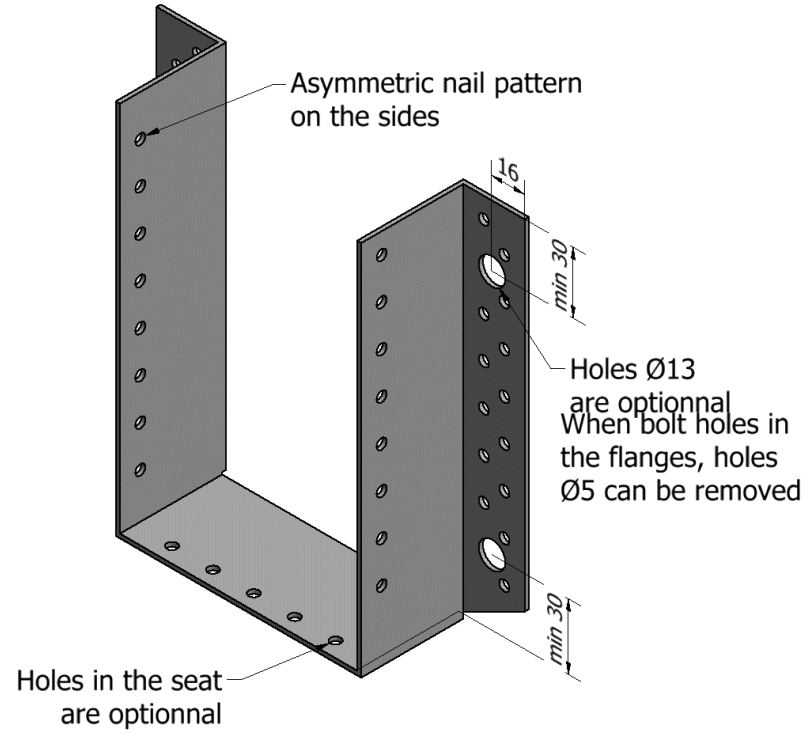
Dimensions

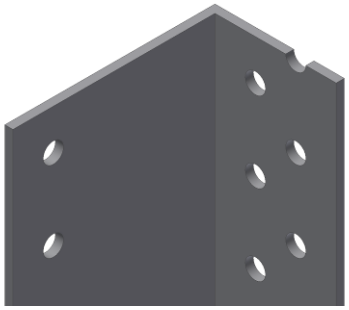
	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	T	Qty	size	Qty	size	Qty	size
BSD A/100	34 - 250	100	50	30 + t	50 + t	2,0 - 2.5 - 3,0	16	Ø5	special	up to Ø13	8	Ø5
BSD A/120	34 - 250	120	50	30 + t	50 + t	2,0 - 2.5 - 3,0	20	Ø5			10	Ø5
BSD A/140	34 - 250	140	50	30 + t	50 + t	2,0 - 2.5 - 3,0	24	Ø5			12	Ø5
BSD A/160	34 - 250	160	50	30 + t	50 + t	2,0 - 2.5 - 3,0	28	Ø5			14	Ø5
BSD A/180	34 - 250	180	50	30 + t	50 + t	2,0 - 2.5 - 3,0	32	Ø5			16	Ø5
BSD A/200	34 - 250	200	50	30 + t	50 + t	2,0 - 2.5 - 3,0	36	Ø5			18	Ø5
BSD A/220	34 - 250	220	50	30 + t	50 + t	2,0 - 2.5 - 3,0	40	Ø5			20	Ø5
BSD A/240	34 - 250	240	50	30 + t	50 + t	2,0 - 2.5 - 3,0	44	Ø5			22	Ø5
BSD A/260	34 - 250	260	50	30 + t	50 + t	2,0 - 2.5 - 3,0	48	Ø5			24	Ø5
BSD A/280	34 - 250	280	50	30 + t	50 + t	2,0 - 2.5 - 3,0	52	Ø5			26	Ø5
BSD A/300	34 - 250	300	50	30 + t	50 + t	2,0 - 2.5 - 3,0	56	Ø5			28	Ø5
BSD A/320	34 - 250	320	50	30 + t	50 + t	2,0 - 2.5 - 3,0	60	Ø5			30	Ø5
Permitted deviation	±1.5	±1.5	±1.5	±1.5	±1.5	-	-	-	-	-	-	-

Standard version



Special version - bolt holes, holes in the seat, asymmetric holes in the sides





Some cutted holes may appear at the bottom and top of the flanges. They are not used for fasteners

Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger BSD and BSDI - Full nailing - F1

B	50 mm≤ A ≤ 250mm symmetric nail pattern			
	$k_{H,1}$	n_H	n_J	R^1
100	14.2	16	8	40
120	20.8	20	10	50
140	28.6	24	12	60
160	37.7	28	14	70
180	48.1	32	16	80
200	59.7	36	18	90
220	72.6	40	20	100
240	86.7	44	22	110
260	102.1	48	24	120
280	118.7	52	26	130
300	136.6	56	28	140
320	155.8	60	30	150

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.
$k_{H,1}$ value can be used both for column and beam

	34 mm≤ A ≤ 250mm asymmetric nail pattern			
B	$k_{H,1}$	n_H	n_J	R^1
100	14.5	4	7	40
120	21.0	6	9	50
140	28.9	8	11	60
160	38.0	10	13	70
180	48.3	12	15	80
200	60.0	14	17	90
220	72.8	16	19	100
240	87.0	18	21	110
260	102.3	20	23	120
280	119.0	22	25	130
300	136.9	24	27	140
320	156.0	26	29	150

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.
$k_{H,1}$ value can be used both for column and beam

$k_{H,1}$ for Joist Hanger BSD and BSDI - partial nailing - F1

	50 mm≤ A ≤ 250mm symmetric nail pattern			
B	$k_{H,1}$	n_H	n_J	R^1
100	9.5	8	4	30
120	12.8	10	6	50
140	17.6	12	6	50
160	22.2	14	8	70
180	28.3	16	8	70
200	34.2	18	10	90
220	41.5	20	10	90
240	48.6	22	12	110
260	57.2	24	12	110
280	65.6	26	14	130
300	75.4	28	14	130
320	85.0	30	16	150

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.
$k_{H,1}$ value can be used both for column and beam

	34 mm≤ A ≤ 250mm asymmetric nail pattern			
B	$k_{H,1}$	n_H	n_J	R^1
100	9.5	8	4	35
120	13.2	10	5	46
140	17.6	12	6	55
160	22.7	14	7	66
180	28.3	16	8	75
200	34.6	18	9	86
220	41.5	20	10	95

240	49.1	22	11	105
260	57.2	24	12	115
280	66.0	26	13	125
300	75.4	28	14	135
320	85.5	30	15	145

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.
$k_{H,1}$ value can be used both for column and beam

$k_{H,2}$ for BSD and BSDI - 34 mm≤ A ≤ 250mm - Full or partial nailing - F2

Blank	Total number of nails in the header		k_{H2}	
	Full nailing	Partial nailing	Full nailing	Partial nailing
BSD A/100	16	8	14,8	7,1
BSD A/120	20	10	21,6	10,4
BSD A/140	24	12	29,6	14,3
BSD A/160	28	14	38,9	18,8
BSD A/180	32	16	49,4	24,0
BSD A/200	36	18	61,2	29,8
BSD A/220	40	20	74,2	36,2
BSD A/240	44	22	88,5	43,3
BSD A/260	48	24	104,0	51,0
BSD A/280	52	26	120,8	59,3
BSD A/300	56	28	138,8	68,2
BSD A/320	60	30	158,1	77,8

$k_{H,2}$ value can be used both for column and beam

$n_{j,ef,1}$ and $n_{j,ef,2}$ for BSD and BSDI - 34 mm≤ A ≤ 250mm - Full or partial nailing - F1 or F2

Blank	Total number of nails in the joist		F1		F2	
	Full nailing	Partial nailing	Full nailing	Partial nailing	Full nailing	Partial nailing
			$n_{J,ef,1}$	$n_{J,ef,1}$	$n_{J,ef,2}$	$n_{J,ef,2}$
BSD A/100	7	4	2,8	0,95	2,69	0,93
BSD A/120	9	5	4,56	3,35	4,3	3,02
BSD A/140	11	6	6,83	4,04	6,29	3,49
BSD A/160	13	7	9,41	6,16	8,48	5,21
BSD A/180	15	8	12,17	6,58	10,79	5,46
BSD A/200	17	9	14,98	9,37	13,13	7,56
BSD A/220	19	10	17,79	9,55	15,47	7,66
BSD A/240	21	11	20,55	12,57	17,8	9,91
BSD A/260	23	12	23,24	12,59	20,1	9,92
BSD A/280	25	13	25,86	15,58	22,37	12,2
BSD A/300	27	14	28,4	15,52	24,62	12,17
BSD A/320	29	15	30,88	18,37	26,84	14,43

D4 BSDI Joist hanger

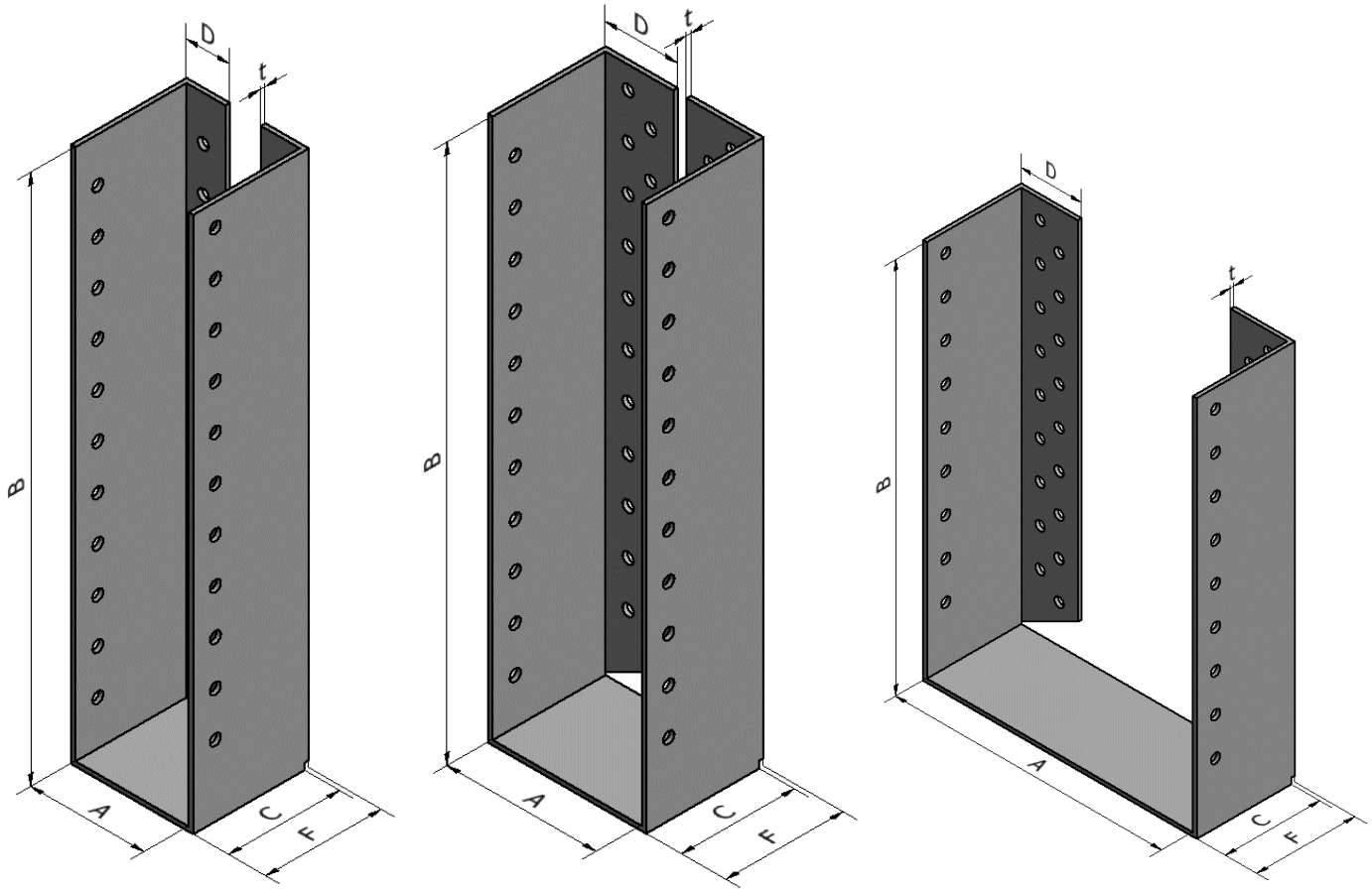
Product Name	Material reference acc. to clause II-1	Alternative Names
BSDI	Steel ref 1 - Steel ref 2	-

Dimensions

	Dimensions [mm]						Holes			
							Header		Joist	
	A	B	C	D	F	t	Qty	size	Qty *	size
BSDI A/100	34 - 59	100	50	17.5 + t	50 + t	2.0 - 2.5 - 3.0	8	Ø5	7	Ø5
BSDI A/120	34 - 59	120	50	17.5 + t	50 + t	2.0 - 2.5 - 3.0	10	Ø5	9	Ø5
BSDI A/140	34 - 59	140	50	17.5 + t	50 + t	2.0 - 2.5 - 3.0	12	Ø5	11	Ø5
BSDI A/160	34 - 59	160	50	17.5 + t	50 + t	2.0 - 2.5 - 3.0	14	Ø5	13	Ø5
BSDI A/180	34 - 59	180	50	17.5 + t	50 + t	2.0 - 2.5 - 3.0	16	Ø5	15	Ø5
BSDI A/200	34 - 59	200	50	17.5 + t	50 + t	2.0 - 2.5 - 3.0	18	Ø5	17	Ø5
BSDI A/220	34 - 59	220	50	17.5 + t	50 + t	2.0 - 2.5 - 3.0	20	Ø5	19	Ø5
BSDI A/240	34 - 59	240	50	17.5 + t	50 + t	2.0 - 2.5 - 3.0	22	Ø5	21	Ø5
BSDI A/260	34 - 59	260	50	17.5 + t	50 + t	2.0 - 2.5 - 3.0	24	Ø5	23	Ø5
BSDI A/280	34 - 59	280	50	17.5 + t	50 + t	2.0 - 2.5 - 3.0	26	Ø5	25	Ø5
BSDI A/300	34 - 59	300	50	17.5 + t	50 + t	2.0 - 2.5 - 3.0	28	Ø5	27	Ø5
BSDI A/320	34 - 59	320	50	17.5 + t	50 + t	2.0 - 2.5 - 3.0	30	Ø5	29	Ø5
BSDI A/100	60 - 250	100	50	30 + t	50 + t	2.0 - 2.5 - 3.0	16	Ø5	8	Ø5
BSDI A/120	60 - 250	120	50	30 + t	50 + t	2.0 - 2.5 - 3.0	20	Ø5	10	Ø5
BSDI A/140	60 - 250	140	50	30 + t	50 + t	2.0 - 2.5 - 3.0	24	Ø5	12	Ø5
BSDI A/160	60 - 250	160	50	30 + t	50 + t	2.0 - 2.5 - 3.0	28	Ø5	14	Ø5
BSDI A/180	60 - 250	180	50	30 + t	50 + t	2.0 - 2.5 - 3.0	32	Ø5	16	Ø5
BSDI A/200	60 - 250	200	50	30 + t	50 + t	2.0 - 2.5 - 3.0	36	Ø5	18	Ø5
BSDI A/220	60 - 250	220	50	30 + t	50 + t	2.0 - 2.5 - 3.0	40	Ø5	20	Ø5
BSDI A/240	60 - 250	240	50	30 + t	50 + t	2.0 - 2.5 - 3.0	44	Ø5	22	Ø5
BSDI A/260	60 - 250	260	50	30 + t	50 + t	2.0 - 2.5 - 3.0	48	Ø5	24	Ø5
BSDI A/280	60 - 250	280	50	30 + t	50 + t	2.0 - 2.5 - 3.0	52	Ø5	26	Ø5
BSDI A/300	60 - 250	300	50	30 + t	50 + t	2.0 - 2.5 - 3.0	56	Ø5	28	Ø5
BSDI A/320	60 - 250	320	50	30 + t	50 + t	2.0 - 2.5 - 3.0	60	Ø5	30	Ø5
Permitted deviation	±1.5	±1.5	±1.5	±1.5		-	-	-	-	-

*optional holes can be made on the seat.

34 mm ≤ A ≤ 59 mm - B ≤ 320 mm 60 mm ≤ A ≤ 250 mm - B ≤ 320 mm 70 mm ≤ A ≤ 250 mm - B ≤ 320 mm



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger BSDI - Full nailing - F1

See Annex D3 BSD Joist Hanger

$k_{H,1}$ for Joist Hanger BSDI - partial nailing - F1

See Annex D3 BSD Joist Hanger

BSD Joist hanger

$k_{H,2}$ for BSDI - Full or partial nailing - F2

See Annex D3 BSD Joist Hanger

BSD Joist hanger

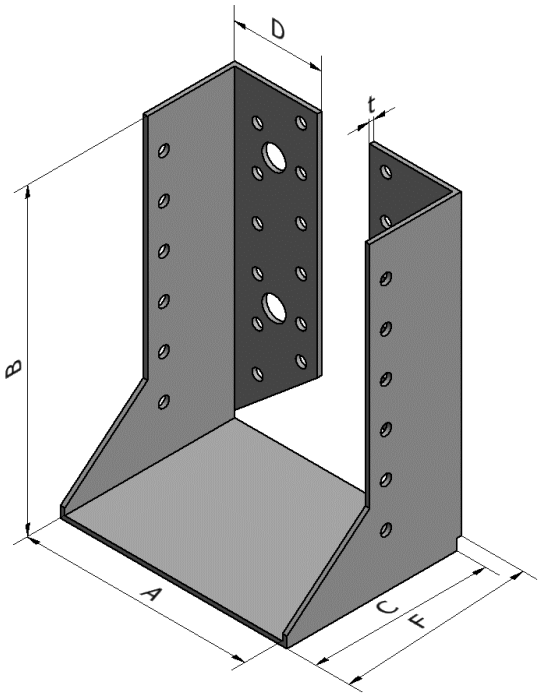
D5 BSI Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
BSI	Steel ref 1 - Steel ref 2	-

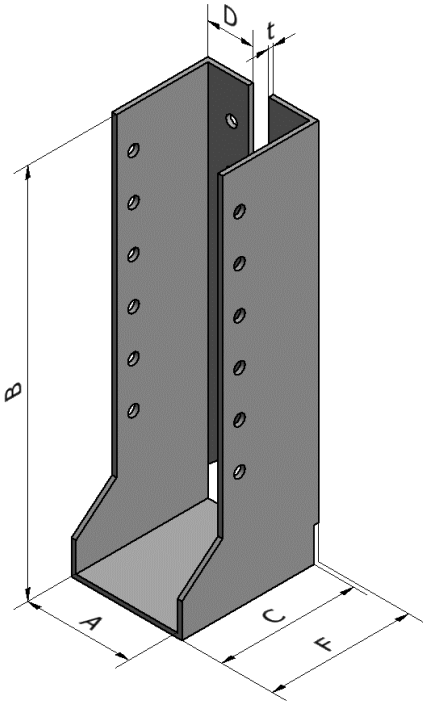
Dimensions

	Blank	Dimensions [mm]								Holes					
										Header				Joist	
		A	B	C	C '	D	F	F '	T	Qty	size	Qty	size	Qty	size
1st Blank Form	280	100	90	78	45.5	40	80	47.5	2 - 2.5 - 3	14	Ø5	2	Ø11	8	Ø5
	320	76 – 80	(320-A)/2	78	45.5	40	80	47.5	2 - 2.5 - 3	20	Ø5	4	Ø11	10	Ø5
	358	120	119	85	45.5	42	87	47.5	2 - 2.5 - 3	18	Ø5	4	Ø11	10	Ø5
	380	76 – 101	(380-A)/2	78	45.5	40	80	47.5	2 - 2.5 - 3	24	Ø5	4	Ø11	12	Ø5
	418	140	139	82.5	45.5	39	84.5	47.5	2 - 2.5 - 3	22	Ø5	4	Ø11	12	Ø5
	435	80 – 120	(435-A)/2	85	45.5	42	87	47.5	2 - 2.5 - 3	26	Ø5	6	Ø11	14	Ø5
	500	74 - 140	(500-A)/2	82.5	45.5	39	84.5	47.5	2 - 2.5 - 3	30	Ø5	6	Ø11	16	Ø5
2nd Blank Form	238	38 – 60	(238-A)/2	53.5	45.5	20	55.5	47.5	2 - 2.5 - 3	8	Ø5	-	-	4	Ø5
	260	38 – 64	(260-A)/2	53.5	45.5	20	55.5	47.5	2 - 2.5 - 3	8	Ø5	-	-	4	Ø5
	320	38 – 81	(320-A)/2	58.5	45.5	20	60.5	47.5	2 - 2.5 - 3	10	Ø5	-	-	10	Ø5
	380	38 – 101	(380-A)/2	58.5	45.5	20	60.5	47.5	2 - 2.5 - 3	12	Ø5	-	-	12	Ø5
	435	38 – 120	(435-A)/2	85	45.5	22	87	47.5	2 - 2.5 - 3	14	Ø5	-	-	14	Ø5
	500	38 – 140	(500-A)/2	82.5	45.5	19	84.5	47.5	2 - 2.5 - 3	16	Ø5	-	-	16	Ø5
	Permitted deviation	-	-	±1.0	±1.0	±1.0	±1.0	±1.0	-	-	-	-	-	-	-

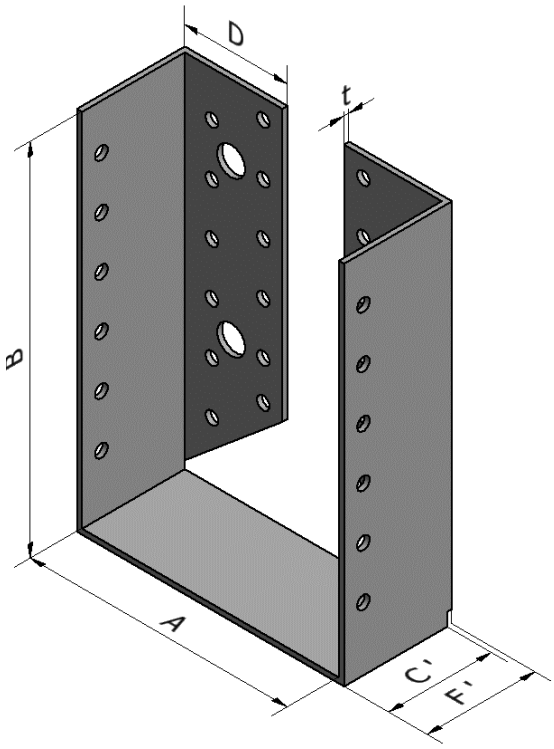
1st Blank Form



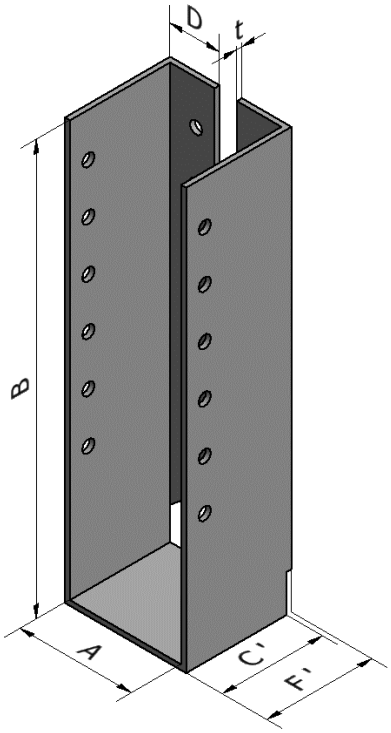
2nd Blank Form



1st Alternative Blank Form



2nd Alternative Blank Form



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hangers type BSI - Full nailing - F1

See BSN Joist hanger

$k_{H,1}$ for Joist Hangers type BSI – Partial nailing - F1

See BSN Joist hanger

$k_{H,2}$ for BSI - Full or partial nailing - F2

	Blank	Total number of nails in the header		k_{H2}	
		Full nailing	Partial nailing	Full nailing	Partial nailing
1st Blank Form	380	20	10	25.5	14.6
	380	24	12	35	19.7
	435	26	14	36.7	20.3
	500	30	16	44.9	25
2nd Blank Form	238	8	-	10	-
	260	8	-	10	-
	320	10	-	12.8	-
	380	12	-	17.6	-
	435	14	-	20.3	-
	500	16	-	25.5	-

$n_{j,ef,1}$ and $n_{j,ef,2}$ for BSI - Full or partial nailing - F1 or F2

	Blank	Total number of nails in the joist		F1		F2	
		Full nailing	Partial nailing	Full nailing	Partial nailing	Full nailing	Partial nailing
				$n_{J,ef,1}$	$n_{J,ef,1}$	$n_{J,ef,2}$	$n_{J,ef,2}$
1st Blank Form	380	10	6	5.45	4.01	5.02	3.47
	380	12	6	8.04	5.43	7.19	4.27
	435	14	8	9.87	6.47	8.81	5.39
	500	16	8	12.58	6.84	11.07	5.6
2nd Blank Form	238	8	-	3.91	-	3.63	-
	260	8	-	3.91	-	3.63	-
	320	10	-	5.45	-	5.02	-
	380	12	-	8.04	-	7.19	-
	435	14	-	9.87	-	8.81	-
	500	16	-	12.58	-	11.07	-

D6 BSIN Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
BSIN	Steel ref 1 - Steel ref 2	-

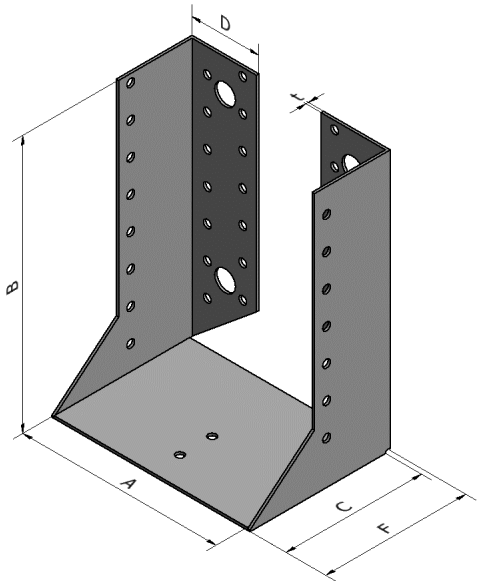
Dimensions – table a

Blank sizes for BSIN A/B are equal to A + 2 * B

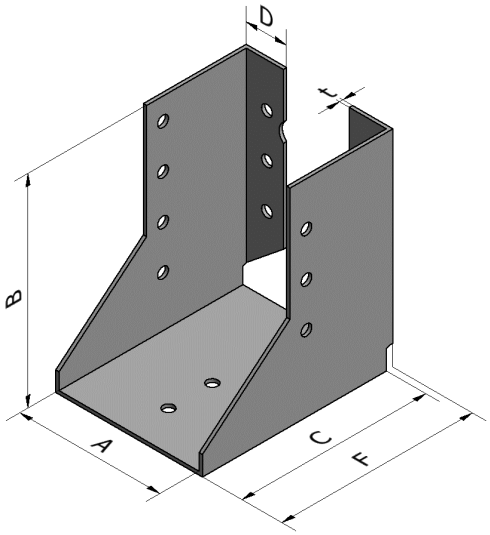
The table below is valid for all BSIN except for the specific sizes listed in table b

	Blank	Dimensions [mm]						Holes					
								Header				Joist	
		A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
1st Blank model	200	64-80	(200-A)/2	76	33.5	82	2	6	Ø5	2	Ø12	4	Ø5
	250	64-80	(250-A)/2	76	33.5	82	2	10	Ø5	2	Ø12	6	Ø5
	300	64-80	(300-A)/2	76	33.5	82	2	16	Ø5	4	Ø12	9	Ø5
	340	64-120	(340-A)/2	76	33.5	82	2	16	Ø5	4	Ø12	10	Ø5
	380	64-120	(380-A)/2	76	33.5	82	2	20	Ø5	4	Ø12	12	Ø5
	440	64-120	(440-A)/2	76	33.5	82	2	26	Ø5	4	Ø12	15	Ø5
	500	64-120	(500-A)/2	76	33.5	82	2	32	Ø5	6	Ø12	18	Ø5
2nd blank model	200	38-63	(200-A)/2	76	17.5	82	2	4	Ø5	-	-	4	Ø5
	250	38-63	(250-A)/2	76	17.5	82	2	6	Ø5	-	-	6	Ø5
	Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-

1st blank model



2nd blank model

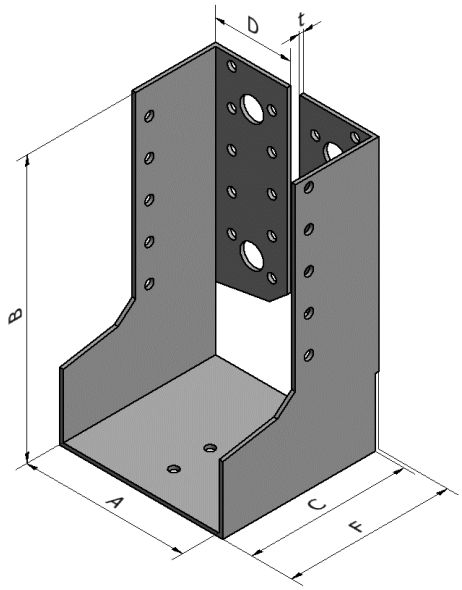


Dimensions – table b

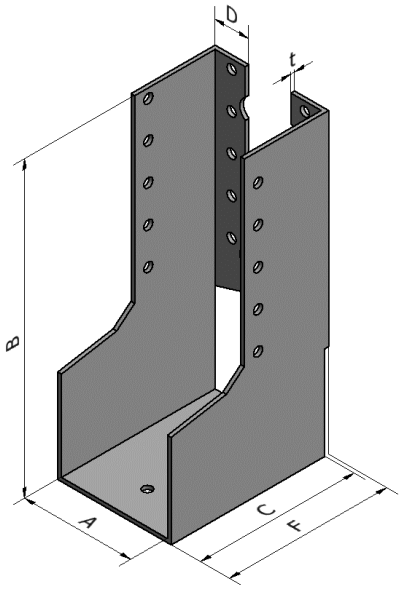
The table below is only valid for specific sizes listed in first column

Type	Blank model	Dimension [mm]						Holes					
								Header				Joist	
		A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
BSIN45/127	4th blank model	45	127	84	18.5	86	2	8	Ø5			8	Ø5
BSIN48/126	4th blank model	48	126	84	18.5	86	2	8	Ø5			8	Ø5
BSIN100/100	3rd blank model	100	100	84	41.5	86	2	16	Ø5	4	Ø13	8	Ø5
BSIN48/166	4th blank model	48	166	84	18.5	86	2	10	Ø5			10	Ø5
BSIN60/160	4th blank model	60	160	84	18.5	86	2	10	Ø5			10	Ø5
BSIN140/120	3rd blank model	140	120	84	41.5	86	2	20	Ø5	4	Ø13	10	Ø5
BSIN140/180	3rd blank model	140	180	84	41.5	86	2	32	Ø5	6	Ø13	16	Ø5

3rd blank model



4th blank model



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger BSIN 1st blank model - Full nailing - F_1

	200		**250**		**300**		**340**		**380**		**440**		**500**	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	6	4	10	6	16	9	16	10	20	12	26	15	32	18
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
64	68	6.3	93	11.8	118	21.5	138	29.1	158	39.1	188	58.1	218	77.3
66	67	6.1	92	11.5	117	21.1	137	28.7	157	38.6	187	57.5	217	76.6
68	66	5.9	91	11.2	116	20.7	136	28.3	156	38.2	186	56.9	216	75.8
70	65	5.7	90	10.9	115	20.3	135	27.9	155	37.7	185	56.3	215	75.1
72	64	5.5	89	10.7	114	20.0	134	27.5	154	37.2	184	55.7	214	74.4
74	63	5.3	88	10.4	113	19.6	133	27.1	153	36.7	183	55.1	213	73.7
76	62	5.2	87	10.1	112	19.2	132	26.7	152	36.2	182	54.5	212	73.0
78	61	5.0	86	9.9	111	18.9	131	26.3	151	35.8	181	53.9	211	72.3
80	60	4.8	85	9.6	110	18.5	130	25.9	150	35.3	180	53.3	210	71.6
82	-	-	-	-	-	-	129	25.5	149	34.8	179	52.7	209	70.9
84	-	-	-	-	-	-	128	25.1	148	34.3	178	52.1	208	70.2
86	-	-	-	-	-	-	127	24.7	147	33.9	177	51.5	207	69.5
88	-	-	-	-	-	-	126	24.3	146	33.4	176	50.9	206	68.8
90	-	-	-	-	-	-	125	23.9	145	32.9	175	50.3	205	68.2
92	-	-	-	-	-	-	124	23.5	144	32.5	174	49.7	204	67.5
94	-	-	-	-	-	-	123	23.1	143	32.0	173	49.1	203	66.8
96	-	-	-	-	-	-	122	22.7	142	31.5	172	48.6	202	66.1
98	-	-	-	-	-	-	121	22.4	141	31.1	171	48.0	201	65.4
100	-	-	-	-	-	-	120	22.0	140	30.6	170	47.4	200	64.8
102	-	-	-	-	-	-	119	21.6	139	30.2	169	46.8	199	64.1
104	-	-	-	-	-	-	118	21.2	138	29.7	168	46.3	198	63.4
106	-	-	-	-	-	-	117	20.8	137	29.3	167	45.7	197	62.7
108	-	-	-	-	-	-	116	20.5	136	28.8	166	45.1	196	62.1
110	-	-	-	-	-	-	115	20.1	135	28.4	165	44.6	195	61.4
112	-	-	-	-	-	-	114	19.7	134	27.9	164	44.0	194	60.7
114	-	-	-	-	-	-	113	19.3	133	27.5	163	43.4	193	60.1
116	-	-	-	-	-	-	112	19.0	132	27.0	162	42.9	192	59.4
118	-	-	-	-	-	-	111	18.6	131	26.6	161	42.3	191	58.8
120	-	-	-	-	-	-	110	18.3	130	26.2	160	41.8	190	58.1

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,1}$ for Joist Hanger BSIN 2nd blank model - Full nailing - F_1

	200		**250**	
	n_H	n_J	n_H	n_J
	4	4	6	6
A	B	$k_{H,1}$	B	$k_{H,1}$
38	81	5,1	106	8,1
40	80	5,0	105	8,0
42	79	4,9	104	7,8
44	78	4,8	103	7,6
46	77	4,6	102	7,5
48	76	4,5	101	7,3
50	75	4,4	100	7,1
52	74	4,2	99	7,0
54	73	4,1	98	6,8
56	72	4,0	97	6,7
58	71	3,9	96	6,5
60	70	3,8	95	6,3
62	69	3,6	94	6,2
63	69	3,6	94	6,1

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,1}$ for Joist Hanger BSIN 1st blank model - Partial nailing - F_1

	250		**300**		**340**		**380**		**440**		**500**	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	6	4	10	6	10	6	12	6	14	8	18	10
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
64	93	6.5	118	14.1	138	19.3	158	25.5	188	31.1	218	45.7
66	92	6.4	117	13.9	137	19.0	157	25.2	187	30.8	217	45.3
68	91	6.2	116	13.7	136	18.7	156	24.9	186	30.4	216	44.9
70	90	6.0	115	13.4	135	18.5	155	24.5	185	30.1	215	44.5
72	89	5.9	114	13.2	134	18.2	154	24.2	184	29.8	214	44.1
74	88	5.7	113	13.0	133	17.9	153	23.9	183	29.4	213	43.7
76	87	5.5	112	12.7	132	17.7	152	23.6	182	29.1	212	43.3
78	86	5.4	111	12.5	131	17.4	151	23.3	181	28.8	211	42.9
80	85	5.2	110	12.3	130	17.2	150	23.0	180	28.4	210	42.5
82	-	-	-	-	129	16.9	149	22.7	179	28.1	209	42.1
84	-	-	-	-	128	16.6	148	22.4	178	27.8	208	41.7
86	-	-	-	-	127	16.4	147	22.1	177	27.4	207	41.3
88	-	-	-	-	126	16.1	146	21.8	176	27.1	206	40.9
90	-	-	-	-	125	15.9	145	21.5	175	26.8	205	40.5
92	-	-	-	-	124	15.6	144	21.2	174	26.5	204	40.1
94	-	-	-	-	123	15.4	143	20.9	173	26.1	203	39.7
96	-	-	-	-	122	15.1	142	20.6	172	25.8	202	39.3
98	-	-	-	-	121	14.9	141	20.3	171	25.5	201	38.9
100	-	-	-	-	120	14.6	140	20.1	170	25.2	200	38.5
102	-	-	-	-	119	14.4	139	19.8	169	24.9	199	38.1
104	-	-	-	-	118	14.1	138	19.5	168	24.5	198	37.7
106	-	-	-	-	117	13.9	137	19.2	167	24.2	197	37.3
108	-	-	-	-	116	13.7	136	18.9	166	23.9	196	37.0
110	-	-	-	-	115	13.4	135	18.6	165	23.6	195	36.6
112	-	-	-	-	114	13.2	134	18.3	164	23.3	194	36.2
114	-	-	-	-	113	13.0	133	18.1	163	23.0	193	35.8
116	-	-	-	-	112	12.7	132	17.8	162	22.7	192	35.4
118	-	-	-	-	111	12.5	131	17.5	161	22.4	191	35.1
120	-	-	-	-	110	12.3	130	17.2	160	22.1	190	34.7

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,2}$ for BSIN - Full or partial nailing - F_2

	Blank	Total number of nails in the header		k_{H2}	
		Full nailing	Partial nailing	Full nailing	Partial nailing
1st Blank model	200	6	4	3.5	2.6
	250	10	6	7.1	4.8
	300	16	10	16.6	11.4
	340	16	10	16.6	11.4
	380	20	12	23.9	15.8
	440	26	14	35.2	20.8
	500	32	18	54.4	32.9
2nd blank model	200	4	-	2.6	-
	250	6	-	4.8	-

$k_{H,1}$ and $k_{H,2}$ for BSIN for specific sizes listed in table b

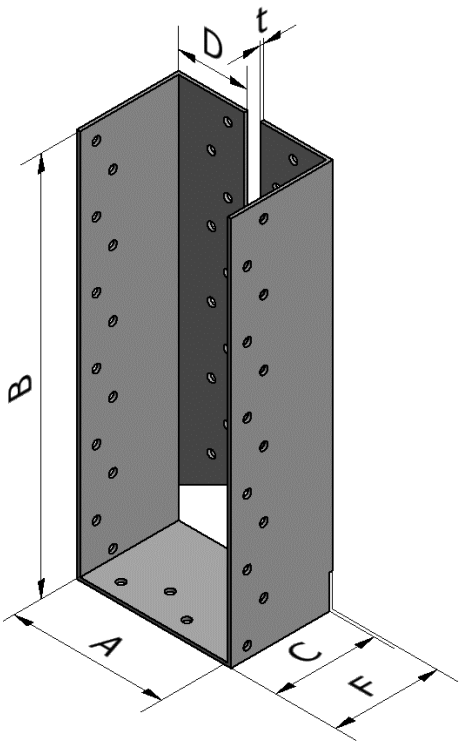
	$k_{H,1}$		$k_{H,2}$		n_H		n_J	
Type	full nailing	partial nailing	full nailing	partial nailing	full nailing	partial nailing	full nailing	partial nailing
BSIN45/127	17.3	-	7.8		8		8	
BSIN48/126	17	-	7.8		8		8	
BSIN100/100	17.4	11.1	16.4	7.9	16	8	8	4
BSIN48/166	27.2	-	11.4		10		10	
BSIN60/160	25.6	-	11.4		10		10	
BSIN140/120	25	15.4	23.8	11.4	20	10	10	6
BSIN140/180	56.1	36.5	54.5	25.9	32	16	16	8

D7 BSIL Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
BSIL	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes			
							Header		Joist	
	A	B	C	D	F	T	Qty	size	Qty	size
90/195	90	195	60	42	62	2	18	Ø5	20	Ø5
90/235	90	235	60	42	62	2	24	Ø5	22	Ø5
100/190	100	190	60	42	62	2	18	Ø5	16	Ø5
100/230	100	230	60	42	62	2	22	Ø5	20	Ø5
115/223	115	223	60	42	62	2	22	Ø5	20	Ø5
120/180	120	180	60	42	62	2	18	Ø5	16	Ø5
120/220	120	220	60	42	62	2	22	Ø5	20	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger BSIL - Full nailing - F1

Model	Number of nails		$k_{H,1}$
	n_H	n_J	
90/195	18	18	27.8
90/235	22	22	40.1
100/190	16	18	26.6
100/230	20	22	38.6
115/223	20	20	36.1
120/180	16	16	23.8
120/220	20	20	35.3

$k_{H,1}$ for Joist Hanger BSIL - Partial nailing - F1

Model	Number of nails		$k_{H,1}$
	n_H	n_J	
90/195	9	10	15.2
90/235	11	11	21.3
100/190	8	9	14.4
100/230	10	11	20.7
115/223	10	10	19.3
120/180	8	8	12.9
120/220	10	10	18.9

$k_{H,2}$ for BSIL - Full or partial nailing - F2

Blank	Total number of nails in the header		k_{H2}	
	Full nailing	Partial nailing	Full nailing	Partial nailing
90/195	18	9	27	13.48
90/235	22	11	39.1	19.57
100/190	16	9	27	13.48
100/230	20	11	39.1	19.57
115/223	20	10	32.8	16.38
120/180	16	8	21.7	10.85
120/220	20	10	32.8	16.38

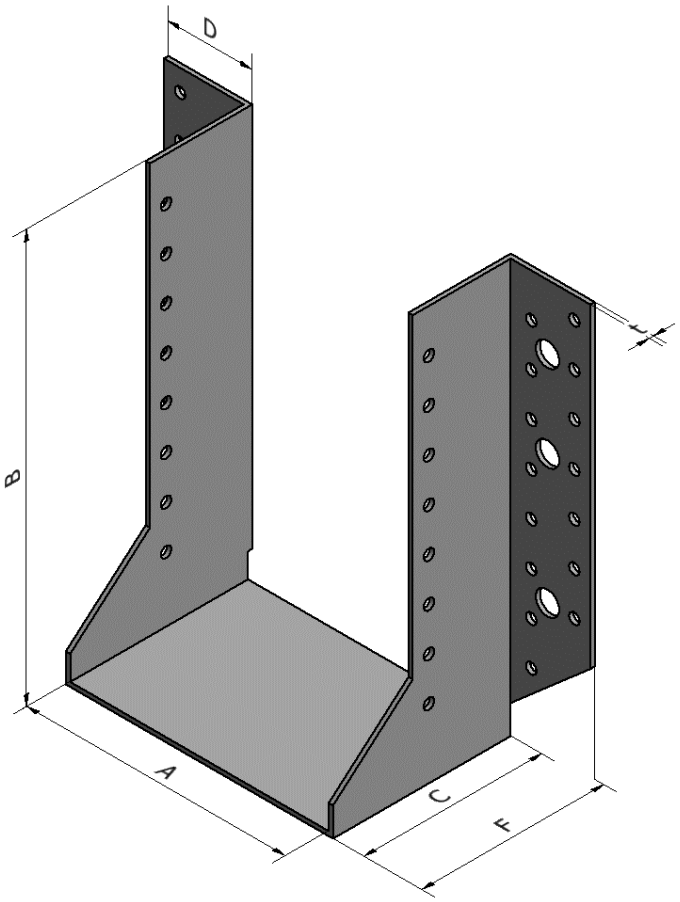
D8 BSN Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
BSN	Steel ref 1 - Steel ref 2	-

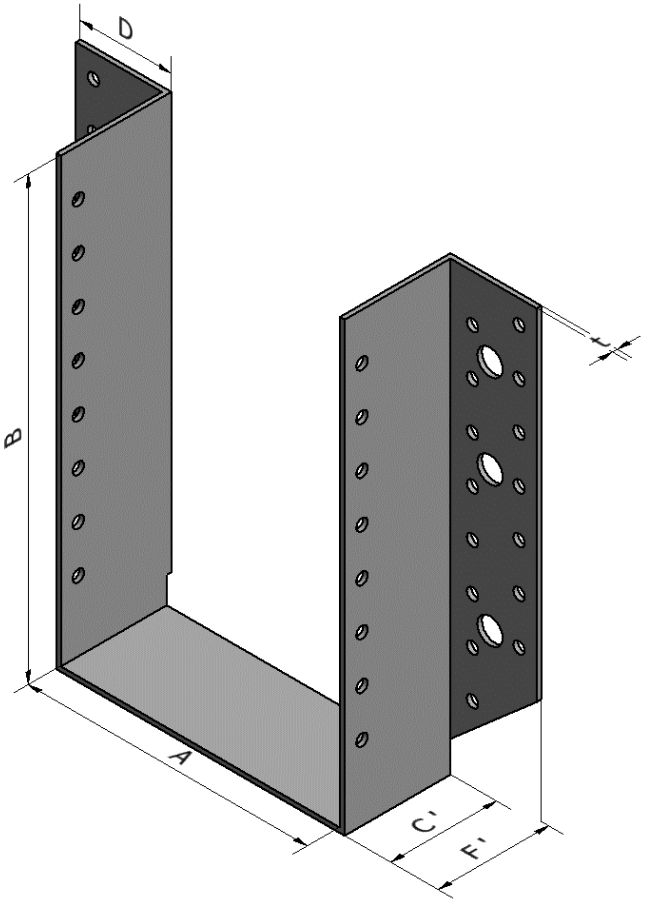
Dimensions

Blank	Dimensions								Holes					
									Header				Joist	
	A	B	C	C '	D	F	F '	T	Qty	size	Qty	size	Qty	size
238	34- 60	(238-A)/2	70.5	45.5	37.5	72.5	47.5	2 -2.5 - 3	14	Ø5	2	Ø9	8	Ø5
260	34- 64	(260-A)/2	70.5	45.5	37.5	72.5	47.5	2 - 2.5 - 3	16	Ø5	4	Ø9	8	Ø5
280	100	140	78	45.5	40	80	47.5	2 - 2.5 - 3	14	Ø5	4	Ø11	8	Ø5
320	34- 80	(320-A)/2	78	45.5	40	80	47.5	2 - 2.5 - 3	20	Ø5	4	Ø11	10	Ø5
358	120	119	85	45.5	42	87	47.5	2 - 2.5 - 3	18	Ø5	4	Ø11	10	Ø5
380	34-101	(380-A)/2	78	45.5	40	80	47.5	2 - 2.5 - 3	24	Ø5	4	Ø11	12	Ø5
380	127	126.5	78	45.5	40	80	47.5	2 - 2.5 - 3	22	Ø5	4	Ø11	6	Ø5
418	140	139	82.5	45.5	39	84,5	47.5	2 - 2.5 - 3	22	Ø5	4	Ø11	12	Ø5
435	34-120	(435-A)/2	85	45.5	42	87	47.5	2 - 2.5 - 3	26	Ø5	6	Ø11	14	Ø5
435	150	142.5	85	45.5	42	87	47.5	2 - 2.5 - 3	26	Ø5	6	Ø11	14	Ø5
500	34-140	(500-A)/2	82.5	45.5	39	84.5	47.5	2 - 2.5 - 3	30	Ø5	6	Ø11	16	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	±1.0	±1.0	-	-	-	-	-	-	-

Standard BSN



Alternative BSN



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hangers type BSN and BSI - Full nailing - F1

	238		260		280		320		358		380		380/127		418		435		435/150		500	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	14	8	16	8	14	8	20	10	18	10	24	12	24	12	24	12	26	14	26	14	30	16
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
50	94	19.0	105	23.7	-	-	135	34.3	-	-	165	51.4	-	-	-	-	190.0	59.2	-	-	225	79.9
52	93	18.6	104	23.2	-	-	134	33.7	-	-	164	50.8	-	-	-	-	189.0	58.6	-	-	224	79.2
54	92	18.2	103	22.7	-	-	133	33.2	-	-	163	50.1	-	-	-	-	188.0	58.0	-	-	223	78.5
56	91	17.8	102	22.3	-	-	132	32.7	-	-	162	49.5	-	-	-	-	187.0	57.4	-	-	222	77.8
60	89	16.9	100	21.3	-	-	130	31.7	-	-	160	48.3	-	-	-	-	185.0	56.2	-	-	220	76.5
64	-	-	98	20.4	-	-	128	30.6	-	-	158	47.0	-	-	-	-	183.0	55.0	-	-	218	75.1
65	-	-	-	-	-	-	128	30.4	-	-	158	46.7	-	-	-	-	182.5	54.7	-	-	218	74.8
68	-	-	-	-	-	-	126	29.6	-	-	156	45.8	-	-	-	-	181.0	53.8	-	-	216	73.8
71	-	-	-	-	-	-	125	28.9	-	-	155	44.9	-	-	-	-	179.5	52.9	-	-	215	72.8
75	-	-	-	-	-	-	123	27.9	-	-	153	43.7	-	-	-	-	177.5	51.7	-	-	213	71.4
76	-	-	-	-	-	-	122	27.6	-	-	152	43.4	-	-	-	-	177.0	51.4	-	-	212	71.1
80	-	-	-	-	-	-	120	26.7	-	-	150	42.2	-	-	-	-	175.0	50.3	-	-	210	69.8
81	-	-	-	-	-	-	-	-	-	-	150	41.9	-	-	-	-	174.5	50.0	-	-	210	69.5
85	-	-	-	-	-	-	-	-	-	-	148	40.8	-	-	-	-	172.5	48.8	-	-	208	68.1
89	-	-	-	-	-	-	-	-	-	-	146	39.6	-	-	-	-	170.5	47.7	-	-	206	66.8
93	-	-	-	-	-	-	-	-	-	-	144	38.4	-	-	-	-	168.5	46.5	-	-	204	65.5
97	-	-	-	-	-	-	-	-	-	-	142	37.3	-	-	-	-	166.5	45.4	-	-	202	64.2
100	-	-	-	-	90	17.9	-	-	-	-	140	36.5	-	-	-	-	165.0	44.6	-	-	200	63.3
101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	164.5	44.3	-	-	200	63.0
105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	162.5	43.2	-	-	198	61.7
109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	160.5	42.1	-	-	196	60.4
113	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	158.5	41.0	-	-	194	59.1
117	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	156.5	39.9	-	-	192	57.9
120	-	-	-	-	-	-	-	-	119	22.2	-	-	-	-	-	-	155.0	39.1	-	-	190	57.0
124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	188	55.7
127	-	-	-	-	-	-	-	-	-	-	-	-	126.5	29.7	-	-	-	-	-	-	187	54.8
128	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	186	54.5
132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	184	53.3
136	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	182	52.1
140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	139	30.1	-	-	-	-	180	50.9
150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	140	24.2	-	-

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,1}$ for Joist Hangers type BSN and BSI - Partial nailing - F1

	238		260		280		320		358		380		380/127		418		435		435/150		500	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	8	4	8	4	8	4	10	6	10	6	12	6	10	6	12	6	14	8	12	6	16	8
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
34	102	14.6	113	14.6	-	-	143	21.4	-	-	173	29.9	-	-	-	-	198	38.9	-	-	233	45.9
36	101	14.3	112	14.3	-	-	142	21.1	-	-	172	29.6	-	-	-	-	197	38.6	-	-	232	45.5
40	99	13.7	110	13.7	-	-	140	20.4	-	-	170	28.9	-	-	-	-	195	37.8	-	-	230	44.7
44	97	13.2	108	13.2	-	-	138	19.8	-	-	168	28.2	-	-	-	-	193	37.1	-	-	228	43.9
48	95	12.6	106	12.6	-	-	136	19.2	-	-	166	27.5	-	-	-	-	191	36.4	-	-	226	43.2
52	93	12.1	104	12.1	-	-	134	18.6	-	-	164	26.8	-	-	-	-	189	35.7	-	-	224	42.4
56	91	11.6	102	11.6	-	-	132	18.0	-	-	162	26.1	-	-	-	-	187	34.9	-	-	222	41.6
60	89	11.1	100	11.1	-	-	130	17.4	-	-	160	25.4	-	-	-	-	185	34.2	-	-	220	40.9
64	-	-	98	10.6	-	-	128	16.9	-	-	158	24.8	-	-	-	-	183	33.5	-	-	218	40.1
65	-	-	-	-	-	-	127.5	16.7	-	-	157.5	24.6	-	-	-	-	182.5	33.3	-	-	217.5	39.9
68	-	-	-	-	-	-	126	16.3	-	-	156	24.1	-	-	-	-	181	32.8	-	-	216	39.4
71	-	-	-	-	-	-	124.5	15.9	-	-	154.5	23.6	-	-	-	-	179.5	32.3	-	-	214.5	38.8
75	-	-	-	-	-	-	122.5	15.3	-	-	152.5	23.0	-	-	-	-	177.5	31.6	-	-	212.5	38.0
76	-	-	-	-	-	-	122	15.2	-	-	152	22.8	-	-	-	-	177	31.4	-	-	212	37.9
80	-	-	-	-	-	-	120	14.6	-	-	150	22.2	-	-	-	-	175	30.7	-	-	210	37.1
81	-	-	-	-	-	-	-	-	-	-	149.5	22.0	-	-	-	-	174.5	30.6	-	-	209.5	36.9
85	-	-	-	-	-	-	-	-	-	-	147.5	21.4	-	-	-	-	172.5	29.9	-	-	207.5	36.2
89	-	-	-	-	-	-	-	-	-	-	145.5	20.8	-	-	-	-	170.5	29.2	-	-	205.5	35.5
93	-	-	-	-	-	-	-	-	-	-	143.5	20.1	-	-	-	-	168.5	28.5	-	-	203.5	34.8
97	-	-	-	-	-	-	-	-	-	-	141.5	19.5	-	-	-	-	166.5	27.8	-	-	201.5	34.0
100	-	-	-	-	90	9.7	-	-	-	-	140	19.1	-	-	-	-	165	27.3	-	-	200	33.5
101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	164.5	27.2	-	-	199.5	33.3
105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	162.5	26.5	-	-	197.5	32.6
109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	160.5	25.9	-	-	195.5	31.9
113	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	158.5	25.2	-	-	193.5	31.2
117	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	156.5	24.6	-	-	191.5	30.5
120	-	-	-	-	-	-	-	-	119	13.7	-	-	-	-	-	-	155	24.1	-	-	190	30.0
124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	188	29.3
127	-	-	-	-	-	-	-	-	-	-	-	-	126.5	15.2	-	-	-	-	-	-	186.5	28.8
128	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	186	28.6
132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	184	28.0
136	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	182	27.3
140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	139	18.8	-	-	-	-	180	26.7
150																			140	17.6		

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,2}$ for BSN - Full or partial nailing - F2

Blank	Total number of nails in the header		k_{H2}	
	Full nailing	Partial nailing	Full nailing	Partial nailing
238	14	8	17,2	10,2
260	16	8	21,4	10,3
280	14	8	14,9	8,7
320	20	10	26,6	14,8
358	18	10	19,4	11,1
380	24	12	35,0	19,7
380/127	22	10	31,4	13,8
418	22	12	31,1	14,0
435	26	14	36,7	20,3
435/150	26	14	36,7	20,3
500	30	16	46,7	25,5

$n_{j,ef,1}$ and $n_{j,ef,2}$ for BSN - Full or partial nailing - F1 or F2

Blank	Total number of nails in the joist		F1		F2	
	Full nailing	Partial nailing	Full nailing	Partial nailing	Full nailing	Partial nailing
			$n_{J,ef,1}$	$n_{J,ef,1}$	$n_{J,ef,2}$	$n_{J,ef,2}$
238	8	4	3,91	3,21	3,63	2,59
260	8	4	3,91	3,21	3,63	2,59
280	8	4	3,38	2,78	3,19	2,35
320	10	6	5,45	4,01	5,02	3,47
358	10	6	4,83	3,55	4,52	3,16
380	12	6	8,04	5,43	7,19	4,27
380/127	10	6	5,45	4,01	5,02	3,47
418	12	6	7,12	4,21	6,51	3,6
435	14	8	9,87	6,47	8,81	5,39
435/150	12	6	7,19	4,26	6,57	3,63
500	16	8	12,58	6,84	11,07	5,6

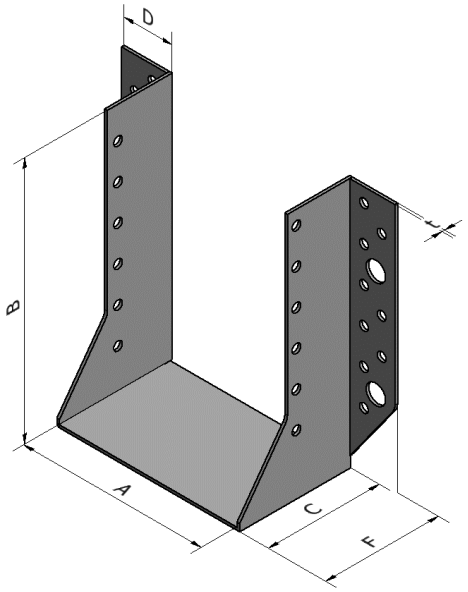
D9 BSNN Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
BSNN	Steel ref 1 - Steel ref 2	-

Dimensions

	Blank	Dimensions [mm]						Holes					
								Header				Joist	
		A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
BSNN	230	38-76	(230-A)/2	60	27	64	2	8	Ø5	2	Ø11	6	Ø5
	260	38-76	(260-A)/2	60	27	64	2	12	Ø5	2	Ø11	6	Ø5
	320	38-100	(320-A)/2	60	27	64	2	16	Ø5	2	Ø11	10	Ø5
	380	38-106	(380-A)/2	60	27	64	2	18	Ø5	4	Ø11	12	Ø5
	440	38-140	(440-A)/2	60	27	64	2	22	Ø5	4	Ø11	14	Ø5
	500	38-140	(500-A)/2	60	27	64	2	26	Ø5	4	Ø11	16	Ø5
	Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-

BSNN



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger BSNN - Full nailing - F1

	230		260		320		380		440		500	
	nH	nJ	nH	nJ	nH	nJ	nH	nJ	nH	nJ	nH	nJ
	8	6	12	6	16	10	18	12	22	14	26	16
A	B	kH,1	B	kH,1	B	kH,1	B	kH,1	B	kH,1	B	kH,1
36	97	15.7	112	24.8	142	39.1	172	56.4	202	78.3	232	105.8
40	95	15.1	110	23.9	140	38.1	170	55.2	200	76.9	230	104.1
44	93	14.4	108	23.1	138	37.0	168	54.0	198	75.4	228	102.4
48	91	13.8	106	22.2	136	35.9	166	52.8	196	74.0	226	100.7
52	89	13.2	104	21.4	134	34.9	164	51.6	194	72.6	224	99.0
56	87	12.5	102	20.6	132	33.8	162	50.4	192	71.1	222	97.4
60	85	11.9	100	19.7	130	32.8	160	49.2	190	69.7	220	95.7
64	83	11.3	98	18.9	128	31.8	158	48.0	188	68.3	218	94.0
68	81	10.7	96	18.1	126	30.8	156	46.9	186	66.9	216	92.4
72	79	10.1	94	17.4	124	29.8	154	45.7	184	65.5	214	90.7
76	77	9.6	92	16.6	122	28.8	152	44.5	182	64.1	212	89.1
80					120	27.8	150	43.4	180	62.7	210	87.5
90					115	25,4	145	40.5	175	59.3	205	83.4
100					110	23,0	140	37.7	170	56.0	200	79.4
110									165	52.7	195	75.5
120									160	49.4	190	71.6
130									155	46.3	185	67.8
140									150	43,2	180	64.0

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.
$k_{H,1}$ value can be used both for column and beam

$k_{H,1}$ for Joist Hanger BSNN- Partial nailing - F1

	230		260		320		380		440		500	
	nH	nJ	nH	nJ	nH	nJ	nH	nJ	nH	nJ	nH	nJ
	6	3	8	4	10	6	12	6	14	8	16	8
A	B	kH,1	B	kH,1	B	kH,1	B	kH,1	B	kH,1	H	kH,1
36	97	15.1	112	19.0	142	27.9	172	39.9	202	54.1	232	70.3
40	95	14.6	110	18.3	140	27.2	170	39.1	200	53.1	230	69.1
44	93	14.0	108	17.7	138	26.4	168	38.2	198	52.1	228	68.0
48	91	13.4	106	17.0	136	25.7	166	37.4	196	51.1	226	66.9
52	89	12.9	104	16.4	134	25.0	164	36.5	194	50.1	224	65.8
56	87	12.3	102	15.8	132	24.3	162	35.7	192	49.2	222	64.7
60	85	11.8	100	15.2	130	23.6	160	34.8	190	48.2	220	63.7
64	83	11.3	98	14.6	128	22.8	158	34.0	188	47.2	218	62.6
68	81	10.7	96	14.0	126	22.1	156	33.2	186	46.3	216	61.5
72	79	10.2	94	13.4	124	21.5	154	32.4	184	45.3	214	60.4
76	77	9.7	92	12.8	122	20.8	152	31.5	182	44.4	212	59.3
80					120	20.1	150	30.7	180	43.5	210	58.3
90					115	18,4	145	28.7	175	41.1	205	55.6
100					110	16,8	140	26.8	170	38.8	200	53.0
110									165	36.6	195	50.5
120									160	34.4	190	47.9
130									155	32.3	185	45.4
140									150	30.2	180	43.0

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.
$k_{H,1}$ value can be used both for column and beam

$k_{H,2}$ for BSNN - Full or partial nailing - F2

Blank	Total number of nails in the header		k_{H2}	
	Full nailing	Partial nailing	Full nailing	Partial nailing
230	8	6	9.6	6.7
260	12	8	15.9	10.7
320	16	10	25.6	15.7
380	18	12	29.9	21.7
440	22	14	44.3	28.6
500	26	16	58.1	36.4

$k_{H,2}$ value can be used both for column and beam

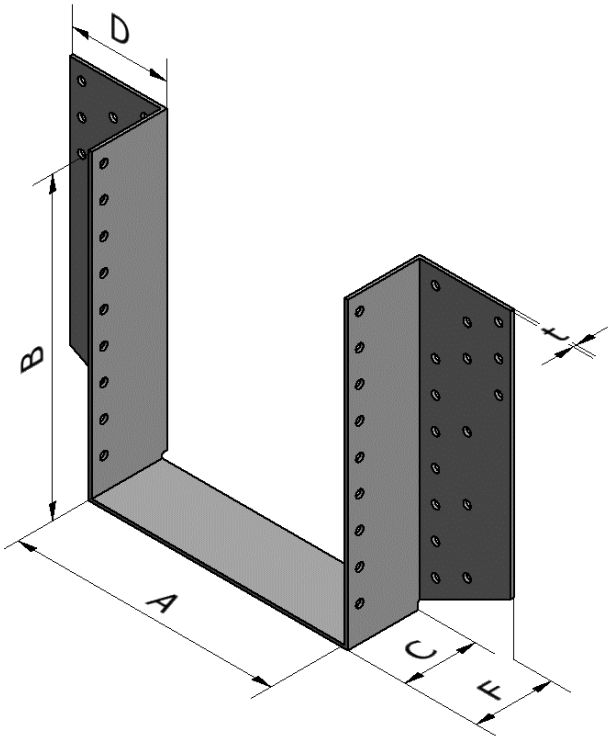
D10 BSS Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
BSS	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes			
							Header		Joist	
	A	B	C	D	F	t	Qty	size	Qty	size
240	40-60	(240-A)/2	45.5	59.5	47.5	2	16	Ø5	8	Ø5
280	40-60	(280-A)/2	45.5	59.5	47.5	2	20	Ø5	10	Ø5
300	40-80	(300-A)/2	45.5	59.5	47.5	2	20	Ø5	10	Ø5
340	40-80	(340-A)/2	45.5	59.5	47.5	2	22	Ø5	12	Ø5
360	40-100	(360-A)/2	45.5	59.5	47.5	2	22	Ø5	12	Ø5
380	40-100	(380-A)/2	45.5	59.5	47.5	2	26	Ø5	14	Ø5
400	40-100	(400-A)/2	45.5	59.5	47.5	2	26	Ø5	14	Ø5
440	40-100	(440-A)/2	45.5	59.5	47.5	2	28	Ø5	16	Ø5
440*	40-140	(440*-A)/2	45.5	59.5	47.5	2	26	Ø5	14	Ø5
460	40-120	(460-A)/2	45.5	59.5	47.5	2	28	Ø5	16	Ø5
480	40-100	(480-A)/2	45.5	59.5	47.5	2	32	Ø5	18	Ø5
500	40-120	(500-A)/2	45.5	59.5	47.5	2	32	Ø5	18	Ø5
540	40-120	(540-A)/2	45.5	59.5	47.5	2	34	Ø5	20	Ø5
540*	40-160	(540*-A)/2	45.5	59.5	47.5	2	32	Ø5	18	Ø5
580	40-120	(580-A)/2	45.5	59.5	47.5	2	32	Ø5	18	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-

*alternative blank model



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger BSS - Full nailing - F1

	240		280		300		340		360		380		400		440		440*		460		480		500		540		540*		580	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	16	8	20	10	20	10	22	12	22	12	26	14	26	14	28	16	26	14	28	16	32	18	32	18	34	20	32	18	32	18
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
40	100	14.4	120	22.5	130	26.4	150	34	160	37.5	170	42.3	180	47.2	200	56.8	200	57.5	210	62.2	220	67.3	230	73.2	250	84.8	250	85.4	270	119.3
42	99	14.1	119	22.1	129	26	149	33.5	159	37	169	41.8	179	46.7	199	56.3	199	57	209	61.7	219	66.7	229	72.6	249	84.2	249	84.8	269	118.5
44	98	13.8	118	21.7	128	25.6	148	33.1	158	36.6	168	41.3	178	46.2	198	55.8	198	56.5	208	61.1	218	66.1	228	72	248	83.6	248	84.2	268	117.8
46	97	13.5	117	21.3	127	25.2	147	32.7	157	36.1	167	40.8	177	45.7	197	55.2	197	56	207	60.6	217	65.5	227	71.4	247	83	247	83.6	267	117
48	96	13.2	116	20.9	126	24.8	146	32.2	156	35.7	166	40.4	176	45.3	196	54.7	196	55.4	206	60.1	216	65	226	70.8	246	82.3	246	82.9	266	116.3
50	95	12.9	115	20.5	125	24.4	145	31.8	155	35.2	165	39.9	175	44.8	195	54.2	195	54.9	205	59.5	215	64.4	225	70.2	245	81.7	245	82.3	265	115.5
52	94	12.6	114	20.2	124	24	144	31.4	154	34.7	164	39.4	174	44.3	194	53.6	194	54.4	204	59	214	63.8	224	69.6	244	81.1	244	81.7	264	114.8
54	93	12.3	113	19.8	123	23.6	143	30.9	153	34.3	163	38.9	173	43.8	193	53.1	193	53.9	203	58.4	213	63.2	223	69	243	80.4	243	81.1	263	114
56	92	12.1	112	19.4	122	23.2	142	30.5	152	33.8	162	38.5	172	43.3	192	52.6	192	53.4	202	57.9	212	62.7	222	68.5	242	79.8	242	80.5	262	113
58	91	11.8	111	19	121	22.8	141	30.1	151	33.4	161	38	171	42.8	191	52.1	191	52.8	201	57.4	211	62.1	221	67.9	241	79.2	241	79.9	261	112.5
60	90	11.5	110	18.7	120	22.5	140	29.7	150	32.9	160	37.5	170	42.3	190	51.5	190	52.3	200	56.8	210	61.5	220	67.3	240	78.6	240	79.3	260	111.8
62	-	-	-	-	119	22.1	139	29.3	149	32.5	159	37	169	41.8	189	51	189	51.8	199	56.3	209	60.9	219	66.7	239	78	239	78.6	259	111
64	-	-	-	-	118	21.7	138	28.8	148	32	158	36.6	168	41.3	188	50.5	188	51.3	198	55.8	208	60.4	218	66.1	238	77.3	238	78	258	110.3
66	-	-	-	-	117	21.3	137	28.4	147	31.6	157	36.1	167	40.8	187	50	187	50.8	197	55.2	207	59.8	217	65.5	237	76.7	237	77.4	257	109.5
68	-	-	-	-	116	20.9	136	28	146	31.2	156	35.7	166	40.4	186	49.5	186	50.3	196	54.7	206	59.2	216	65	236	76.1	236	76.8	256	108.8
70	-	-	-	-	115	20.5	135	27.6	145	30.7	155	35.2	165	39.9	185	49	185	49.8	195	54.2	205	58.7	215	64.4	235	75.5	235	76.2	255	108.1
72	-	-	-	-	114	20.2	134	27.2	144	30.3	154	34.7	164	39.4	184	48.4	184	49.3	194	53.6	204	58.1	214	63.8	234	74.9	234	75.6	254	107.3
74	-	-	-	-	113	19.8	133	26.8	143	29.9	153	34.3	163	38.9	183	47.9	183	48.8	193	53.1	203	57.6	213	63.2	233	74.3	233	75	253	106.6
76	-	-	-	-	112	19.4	132	26.3	142	29.4	152	33.8	162	38.5	182	47.4	182	48.3	192	52.6	202	57	212	62.7	232	73.7	232	74.4	252	105.9
78	-	-	-	-	111	19	131	25.9	141	29	151	33.4	161	38	181	46.9	181	47.8	191	52.1	201	56.5	211	62.1	231	73.1	231	73.8	251	105.1
80	-	-	-	-	110	18.7	130	25.5	140	28.6	150	32.9	160	37.5	180	46.4	180	47.2	190	51.5	200	55.9	210	61.5	230	72.5	230	73.2	250	104.4
82	-	-	-	-	-	-	-	-	139	28.2	149	32.5	159	37	179	45.9	179	46.7	189	51	199	55.4	209	60.9	229	71.9	229	72.6	249	103.7
84	-	-	-	-	-	-	-	-	138	27.8	148	32	158	36.6	178	45.4	178	46.2	188	50.5	198	54.8	208	60.4	228	71.2	228	72	248	103
86	-	-	-	-	-	-	-	-	137	27.3	147	31.6	157	36.1	177	44.9	177	45.7	187	50	197	54.3	207	59.8	227	70.6	227	71.4	247	102.2
88	-	-	-	-	-	-	-	-	136	26.9	146	31.2	156	35.7	176	44.4	176	45.3	186	49.5	196	53.7	206	59.2	226	70	226	70.8	246	101.5
90	-	-	-	-	-	-	-	-	135	26.5	145	30.7	155	35.2	175	43.9	175	44.8	185	49	195	53.2	205	58.7	225	69.5	225	70.2	245	100.8
92	-	-	-	-	-	-	-	-	134	26.1	144	30.3	154	34.7	174	43.4	174	44.3	184	48.4	194	52.6	204	58.1	224	68.9	224	69.6	244	100.1
94	-	-	-	-	-	-	-	-	133	25.7	143	29.9	153	34.3	173	42.9	173	43.8	183	47.9	193	52.1	203	57.6	223	68.3	223	69	243	99.3
96	-	-	-	-	-	-	-	-	132	25.3	142	29.4	152	33.8	172	42.4	172	43.3	182	47.4	192	51.6	202	57	222	67.7	222	68.5	242	98.6

98	-	-	-	-	-	-	-	-	131	24.9	141	29	151	33.4	171	41.9	171	42.8	181	46.9	191	51	201	56.5	221	67.1	221	67.9	241	97.9
100	-	-	-	-	-	-	-	-	130	24.6	140	28.6	150	32.9	170	41.5	170	42.3	180	46.4	190	50.5	200	55.9	220	66.5	220	67.3	240	97.2
102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	169	41.8	179	45.9	-	-	199	55.4	219	65.9	219	66.7	239	96.5
104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	41.3	178	45.4	-	-	198	54.8	218	65.3	218	66.1	238	95.8
106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	167	40.8	177	44.9	-	-	197	54.3	217	64.7	217	65.5	237	95.1
108	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	166	40.4	176	44.4	-	-	196	53.7	216	64.2	216	65	236	94.4
110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	165	39.9	175	43.9	-	-	195	53.2	215	63.6	215	64.4	235	93.7
112	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	164	39.4	174	43.4	-	-	194	52.6	214	63	214	63.8	234	93
114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	163	38.9	173	42.9	-	-	193	52.1	213	62.4	213	63.2	233	92.3
116	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	162	38.5	172	42.4	-	-	192	51.6	212	61.8	212	62.7	232	91.6
118	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	161	38	171	41.9	-	-	191	51	211	61.3	211	62.1	231	90.9
120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	160	37.5	170	41.5	-	-	190	50.5	210	60.7	210	61.5	230	90.2
122	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	159	37	-	-	-	-	-	-	-	-	209	60.9	-	-
124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	158	36.6	-	-	-	-	-	-	-	-	208	60.4	-	-
126	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	157	36.1	-	-	-	-	-	-	-	-	207	59.8	-	-
128	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	156	35.7	-	-	-	-	-	-	-	-	206	59.2	-	-
130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	155	35.2	-	-	-	-	-	-	-	-	205	58.7	-	-
132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	154	34.7	-	-	-	-	-	-	-	-	204	58.1	-	-
134	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	153	34.3	-	-	-	-	-	-	-	-	203	57.6	-	-
136	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	152	33.8	-	-	-	-	-	-	-	-	202	57	-	-
138	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	151	33.4	-	-	-	-	-	-	-	-	201	56.5	-	-
140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	150	32.9	-	-	-	-	-	-	-	-	200	55.9	-	-
142	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	199	55.4	-	-
144	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	198	54.8	-	-
146	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	197	54.3	-	-
148	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	196	53.7	-	-
150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	195	53.2	-	-
152	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	194	52.6	-	-
154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	193	52.1	-	-
156	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	192	51.6	-	-
158	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	191	51	-	-
160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	190	50.5	-	-

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,2}$ for BSS - Full nailing - F2

Blank	Total number of nails in the header	k_{H2}
	Full nailing	Full nailing
240	16	11
280	20	18.2
300	20	18.2
340	22	21.4
360	22	21.4
380	26	31.9
400	26	31.9
440	28	36.2
440*	26	31.9
460	28	36.2
480	32	49.9
500	32	49.9
540	34	57.1
540*	32	49.9
580	32	72.1

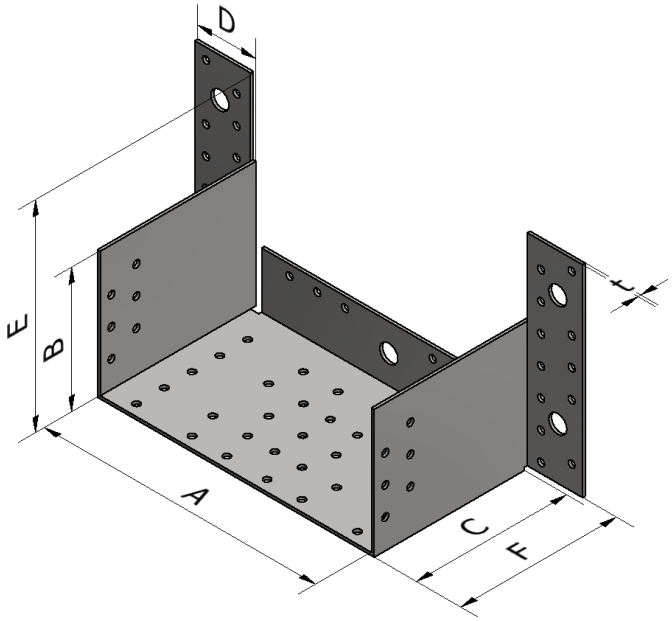
D11 ETC Truss connector

Product Name	Material reference acc. to clause II-1	Alternative Names
ETC	Steel ref 1 - Steel ref 2	-

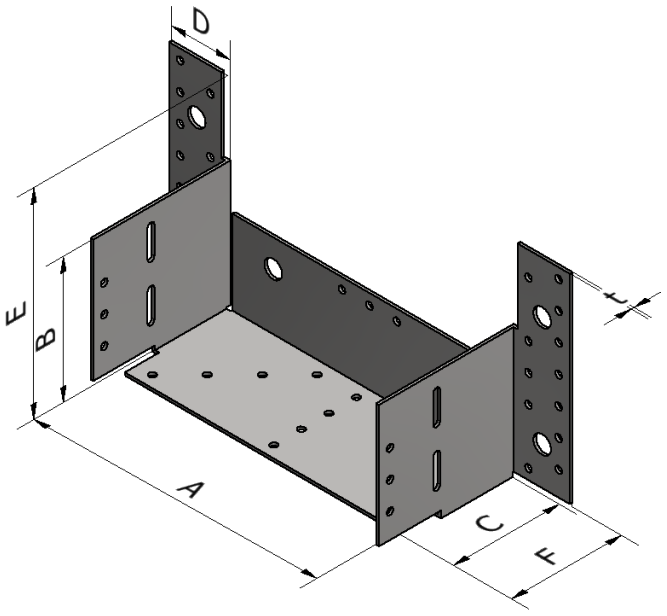
Dimensions

Model	Dimensions [mm]							Holes					
								Header				Supported member	
	A	B	C	D	E	F	t	Qty	size	Qty	size	Qty	size
ETC485R	195	90	110	42	145	112	2	30	Ø5	5	Ø13	43	Ø5
ETC502	206	93	78	41	148	80	2	27	Ø5	6	Ø13	18	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	±1.0	-	-	-			-	-

ETC485R



ETC502



Characteristic capacity for ETC - Full nailing - F1, F2 - timber to timber

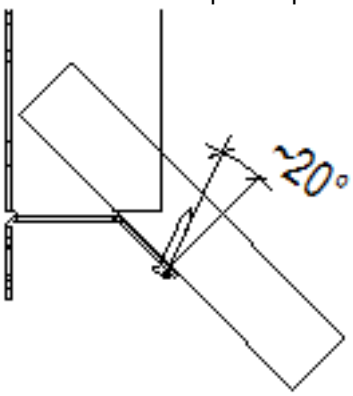
Model	Fasteners - CNA4.0x35							Characteristic capacity [kN] - C24					
	Header		Hip			Jack		$R_{1,k}$			$R_{2,k}$		
	Timber	Rigid support	Type	Side	Bottom	Side	Bottom	Hip	Jack	Total	Hip	Jack	Max
ETC485R[2]	30	4 Ø12	2 Plys	3	7	6	5	16.8	5.6	22.4	5.7	5.9	3.8
ETC485R[1]	20	-	2 Plys	3	7	6	5	-	-	-	5.7	5.9	3.8
ETC502[a]	15	-	1 Ply	3	4	0	4	4.92	6.56	16.4	5.6	1.2	4.4
ETC502[b]	23	-	1 Ply	3	4	0	4	4.32	5.76	14.4	5.6	1.2	3.3
ETC502[c]	25	-	1 Ply	3	4	0	4	3.42	4.52	11.4	5.6	1.2	3.3
ETC502[d]	27	4 Ø12	1 Ply	3	4	0	4	9.28	4.64	23.2	5.6	1.2	4.4

[2] Header and Joist allow full nailing so Header >147mm and joist >95mm
[1] Header and Joist ≥97mm
[a] Header and Joist allow full nailing so Header >195mm and joist >95mm
[b] Header and Joist allow full nailing so Header >145mm and joist >95mm
[c] Header and Joist allow full nailing so Header ≥97mm and joist >95mm
[d] Header and Joist allow full nailing so Header >200mm and joist >95mm

For uplift value : F_k = min (Hip+Jack;Max)

It has to be checked, that the header has a sufficient stiffness, especially the torsion and the resistance for *tension perpendicular to the grain*. The width of the header has to be fullfill the need.

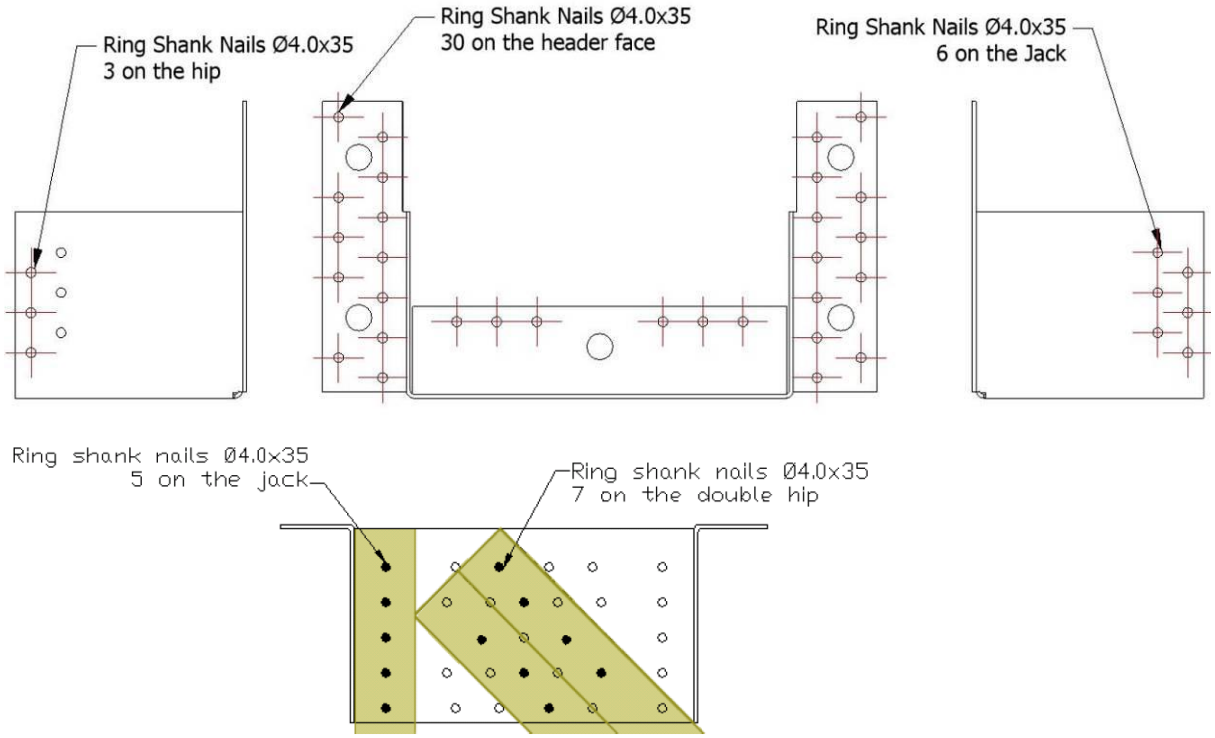
The nails in the hips are placed between 0° and ~ 20° - see picture:



Nail pattern

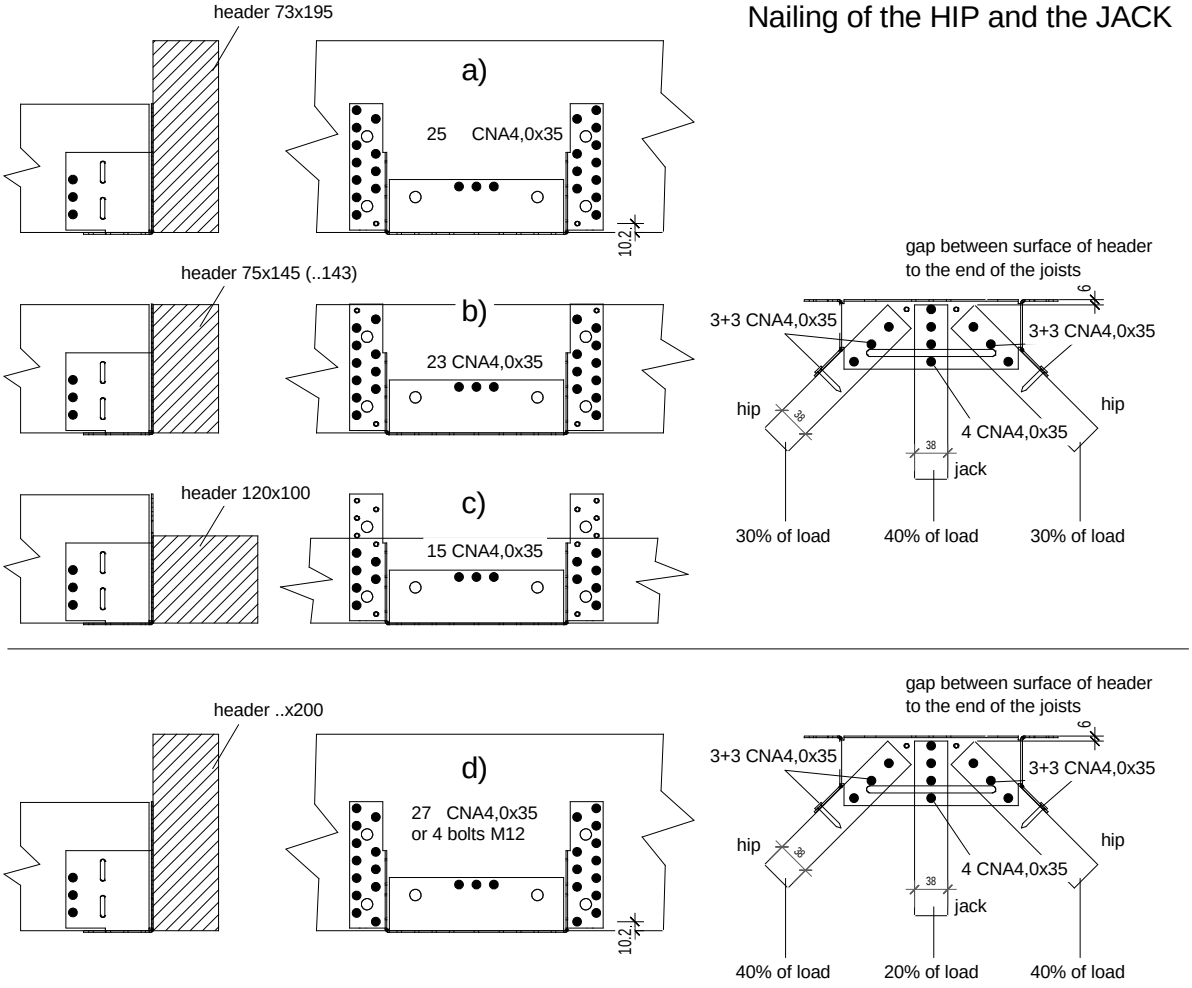
ETC485R Hangers

Single Jack and double hips



ETC 502 Hanger

Single jack and double hip



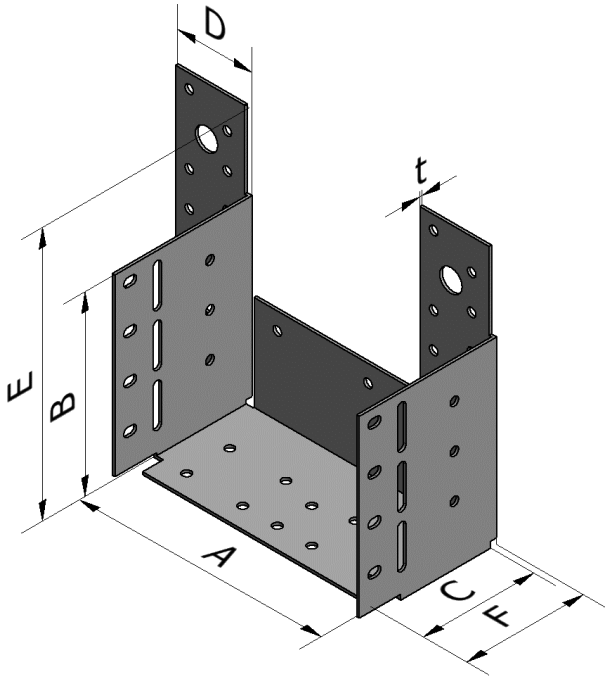
D12 ETC G/D Truss Connector

Product Name	Material reference acc. to clause II-1	Alternative Names
ETC G/D	Steel ref 1 - Steel ref 2	-

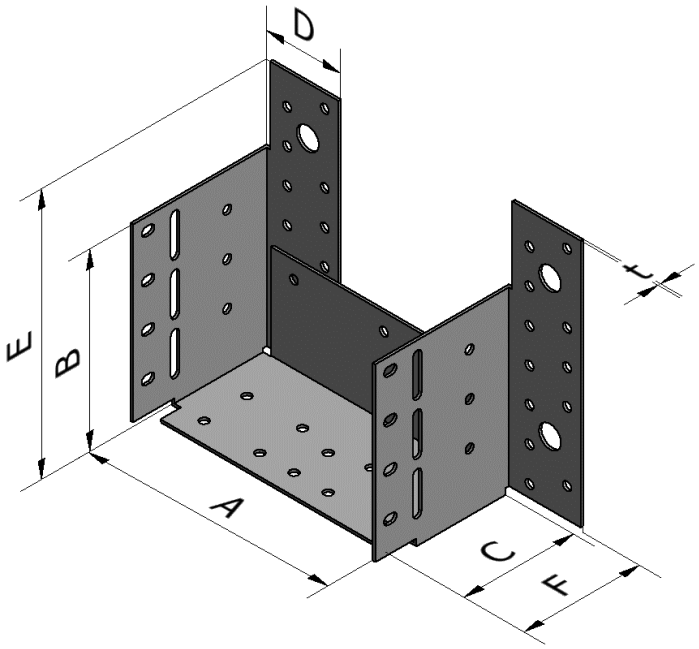
Dimensions

Model	Dimensions [mm]							Holes							
								Header				Supported member			
	A	B	C	D	E	F	t	Qty	size	Qty	size	Qty	size	Qty	size
ETC434D	140	102	77.5	42	147	79.5	1.5	37	Ø5	3	Ø13	16	Ø5	8	Ø5x7.5
ETC434G	140	102	77.5	42	147	79.5	1.5	37	Ø5	3	Ø13	16	Ø5	8	Ø5x7.5
ETC485D	195	90	110	42	145	112	2	30	Ø5	5	Ø13	43	Ø5	-	-
ETC485G	195	90	110	42	145	112	2	30	Ø5	5	Ø13	43	Ø5	-	-
Permitted deviation	-	-	±1.0	±1.0	±1.0	±1.0	-	-	-			-	-		

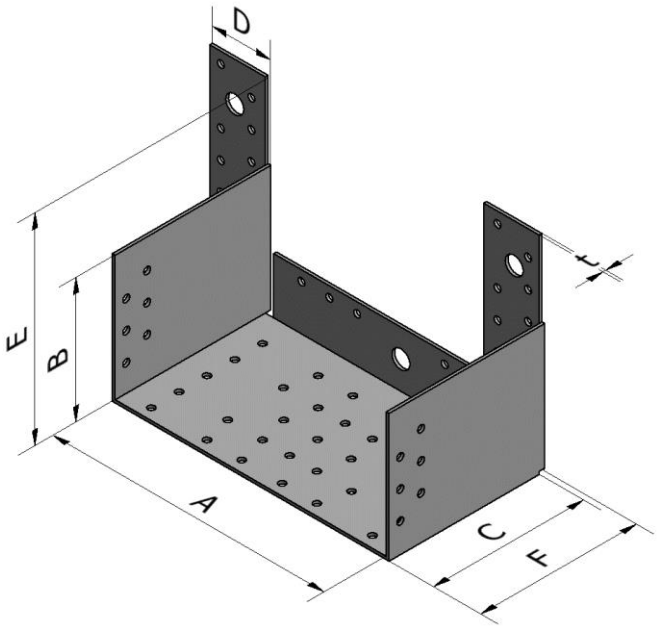
ETC434G



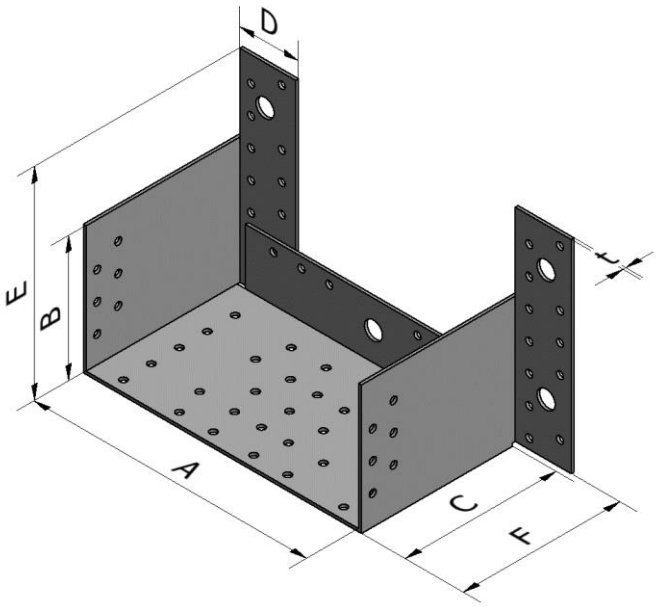
ETC434D



ETC485RG



ETC485RD



Characteristic capacity for ETC G/D - Full nailing - F1 - timber to timber

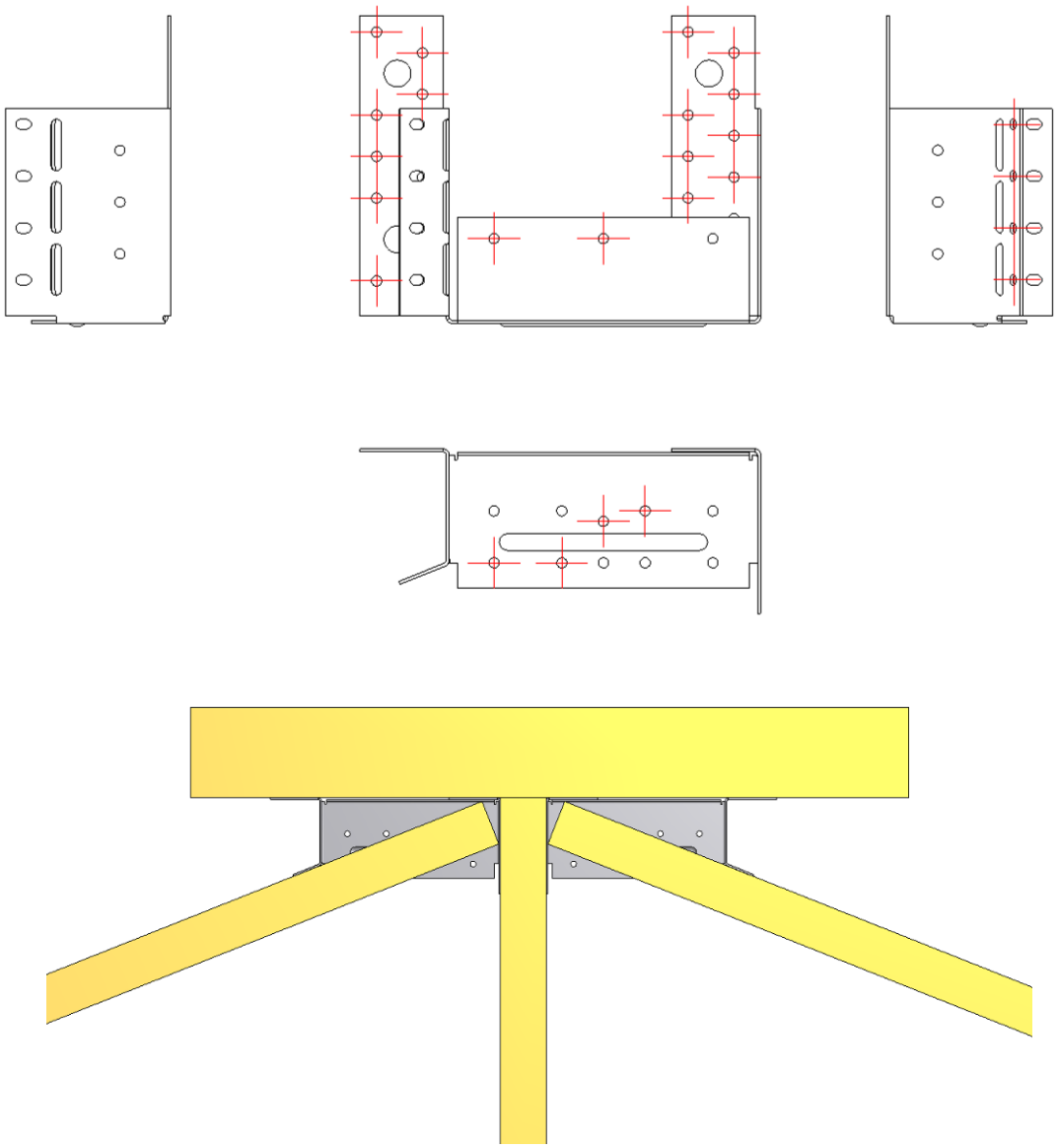
Model	Fasteners - CNA4.0x35							Characteristic capacity [kN] - C24		
	Header		Hip			Jack		$R_{1,k}$		
	Timber	Rigid support	Type	Side	Bottom	Side	Bottom	Hip	Jack	Total
ETC434G + ETC434D	40	6 Ø12	1 Ply	4	10	6	0	6.6	3.3	16.5
ETC485RG + ETC485RD	42	6 Ø12	1 Ply	3	8	6	0	7	3.5	17.5

Nail pattern

ETC434G + ETC434D Hangers

Single Jack and two single hips

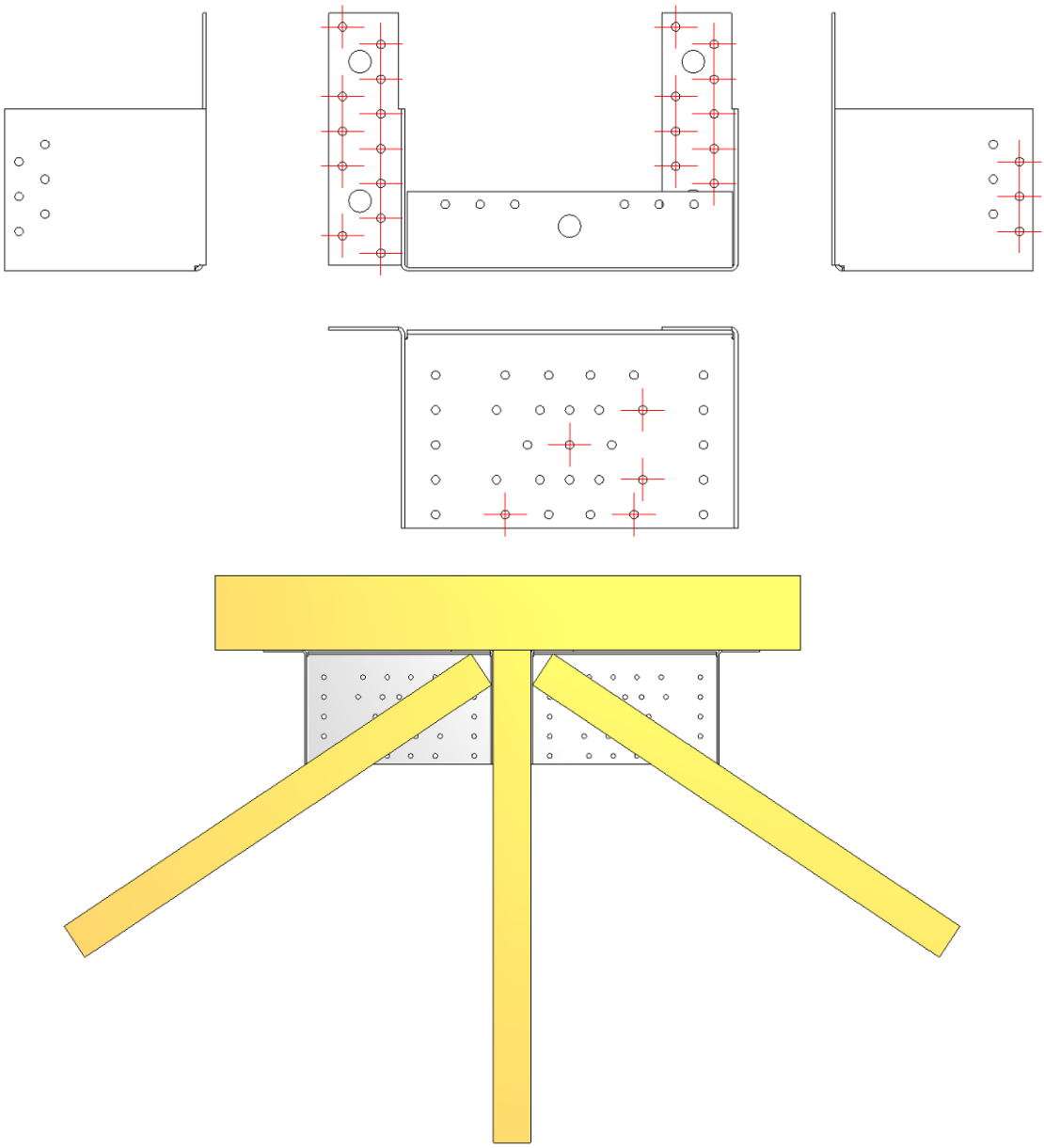
For ETC434D, it is a mirror of the nail pattern presented just below.



ETC485RG + ETC485RD Hangers

Single Jack and two single hips

For ETC485RD it is a mirror of the nail pattern presented just below.



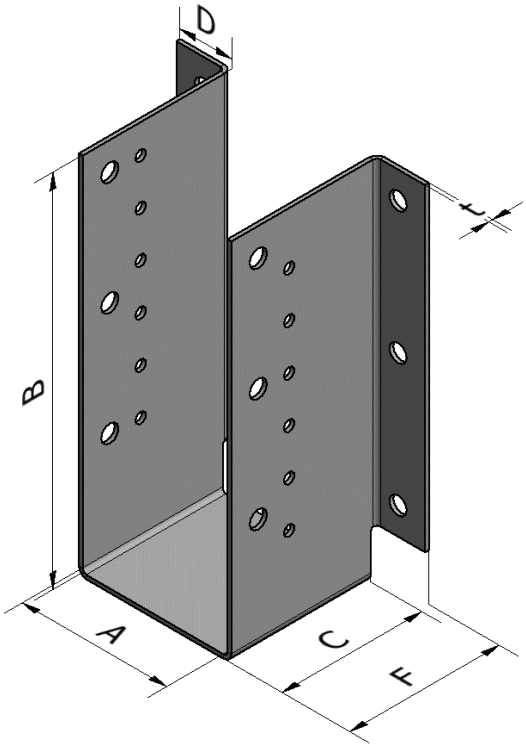
D13 GBE Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
GBE	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header		Joist			
	A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
600	75-225	(600-A)/2	145	54	156	4	4	Ø18	6	Ø11	4	Ø18
750	75-225	(750-A)/2	145	54	156	4	4	Ø18	8	Ø11	4	Ø18
900	75-225	(900-A)/2	145	54	156	4	6	Ø18	12	Ø11	6	Ø18
1050	75-225	(1050-A)/2	145	54	156	4	6	Ø18	14	Ø11	6	Ø18
1200	75-225	(1200-A)/2	145	54	156	4	8	Ø18	18	Ø11	8	Ø18
1350	75-225	(1350-A)/2	145	54	156	4	8	Ø18	20	Ø11	8	Ø18
1500	75-225	(1500-A)/2	145	54	156	4	10	Ø18	24	Ø11	10	Ø18
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-

Minimum spacing between bolts on the header is equal to 120mm
Minimum spacing between bolts on the joist is equal to 60mm



Options:
- Holes for screws are optional
- The number and position of holes per flange can vary.
- Bolts can be in class 4.6 to 10.9

Parameters have to be used with equation in Annex C

Parameters for Joist Hanger GBE

Blank model	Qty Bolt flange	Spacing on header	Qty of bolt joist	Spacing bolt joist	Qty screws Joist	Spacing Screw joist	γ	γ_s	$k_{b.h}$	a
600	2	122.5	2	90	3	48	0.332	0.325	0.7	60
750	2	197.5	2	165	4	48	0.542	0.395	0.7	60
900	3	136	3	120	6	48	0.53	0.516	0.85	60
1050	3	173.5	3	157.5	7	48	0.634	0.567	0.85	60
1200	4	140.5	4	130	9	48	0.646	0.652	0.95	60
1350	4	165.5	4	155	10	48	0.71	0.687	0.95	60
1500	5	143	5	135	12	48	0.726	0.745	0.95	60

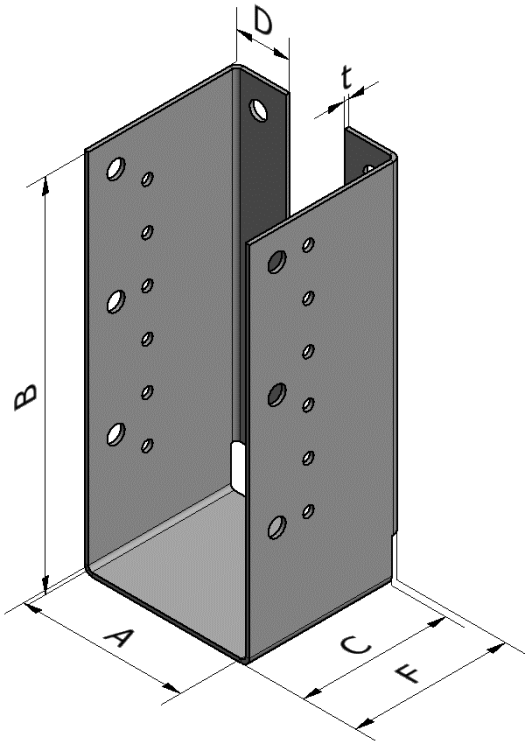
D14 GBI Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
GBI	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header		Joist			
	A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
600	120-225	(600-A)/2	145	54	156	4	4	Ø18	6	Ø11	4	Ø18
750	120-225	(750-A)/2	145	54	156	4	4	Ø18	8	Ø11	4	Ø18
900	120-225	(900-A)/2	145	54	156	4	6	Ø18	12	Ø11	6	Ø18
1050	120-225	(1050-A)/2	145	54	156	4	6	Ø18	14	Ø11	6	Ø18
1200	120-225	(1200-A)/2	145	54	156	4	8	Ø18	18	Ø11	8	Ø18
1350	120-225	(1350-A)/2	145	54	156	4	8	Ø18	20	Ø11	8	Ø18
1500	120-225	(1500-A)/2	145	54	156	4	10	Ø18	24	Ø11	10	Ø18
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-

Minimum spacing between bolts on the header is equal to 120mm
Minimum spacing between bolts on the joist is equal to 60mm



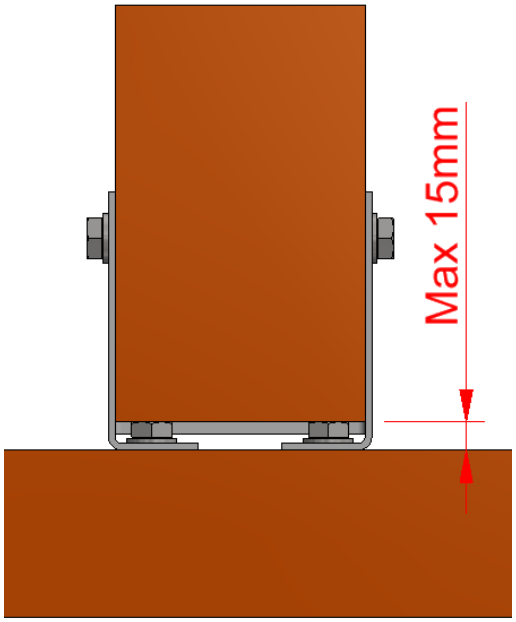
Options:
- Holes for screws are optional
- The number and position of holes per flange can vary.
- Bolts can be in class 4.6 to 10.9

Parameters have to be used with equation in Annex C

Parameters for Joist Hanger GBI

Blank model	Qty Bolt flange	Spacing on header	Qty of bolt joist	Spacing bolt joist	Qty screws Joist	Spacing Screw joist	γ	γ_s	$k_{b.h}$	a
600	2	122.5	2	90	3	48	0.332	0.325	0.7	60
750	2	197.5	2	165	4	48	0.542	0.395	0.7	60
900	3	136	3	120	6	48	0.53	0.516	0.85	60
1050	3	173.5	3	157.5	7	48	0.634	0.567	0.85	60
1200	4	140.5	4	130	9	48	0.646	0.652	0.95	60
1350	4	165.5	4	155	10	48	0.71	0.687	0.95	60
1500	5	143	5	135	12	48	0.726	0.745	0.95	60

Maximum distance to the end of the joist for internal flange version.

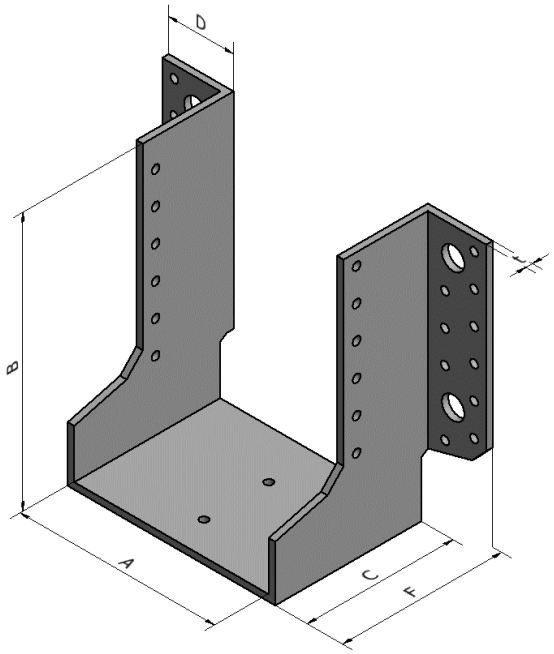


D15 GLE Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
GLE	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	Size	Qty	size
300/2.5X	32-110	(300-A)/2	90	38.5	95	2.5	12	Ø5	2	Ø14	7	Ø5
340/2.5X	32-110	(340-A)/2	90	38.5	95	2.5	16	Ø5	2	Ø14	9	Ø5
380/2.5X	32-110	(380-A)/2	90	38.5	95	2.5	20	Ø5	2	Ø14	11	Ø5
440/2.5X	32-160	(440-A)/2	90	38.5	95	2.5	20	Ø5	4	Ø14	12	Ø5
500/2.5X	32-160	(500-A)/2	90	38.5	95	2.5	26	Ø5	4	Ø14	15	Ø5
540/2.5X	32-160	(540-A)/2	90	38.5	95	2.5	30	Ø5	4	Ø14	17	Ø5
600/2.5X	32-160	(600-A)/2	90	38.5	95	2.5	36	Ø5	4	Ø14	20	Ø5
660/2.5X	32-160	(660-A)/2	90	38.5	95	2.5	40	Ø5	6	Ø14	23	Ø5
720/2.5X	32-160	(720-A)/2	90	38.5	95	2.5	46	Ø5	6	Ø14	26	Ø5
300/4X	32-110	(300-A)/2	90	40	98	4	12	Ø5	2	Ø14	7	Ø5
340/4X	32-110	(340-A)/2	90	40	98	4	16	Ø5	2	Ø14	9	Ø5
380/4X	32-110	(380-A)/2	90	40	98	4	20	Ø5	2	Ø14	11	Ø5
440/4X	32-160	(440-A)/2	90	40	98	4	20	Ø5	4	Ø14	12	Ø5
500/4X	32-160	(500-A)/2	90	40	98	4	26	Ø5	4	Ø14	15	Ø5
540/4X	32-160	(540-A)/2	90	40	98	4	30	Ø5	4	Ø14	17	Ø5
600/4X	32-160	(600-A)/2	90	40	98	4	36	Ø5	4	Ø14	20	Ø5
660/4X	32-160	(660-A)/2	90	40	98	4	40	Ø5	6	Ø14	23	Ø5
720/4X	32-160	(720-A)/2	90	40	98	4	46	Ø5	6	Ø14	26	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger GLE and GLI - Full nailing - F1

	300		340		380		440		500		540		600		660		720	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	12	7	16	9	20	11	20	12	26	15	30	17	36	20	40	23	46	26
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
32	134	24.2	154	33.1	174	43.3	204	55.8	234	78.4	254	94.3	284	121.7	314	142.9	344	176.8
34	133	23.9	153	32.7	173	42.9	203	55.3	233	77.8	253	93.6	283	120.8	313	142	343	175.8
36	132	23.5	152	32.3	172	42.4	202	54.8	232	77.1	252	92.9	282	120.0	312	141.1	342	174.8
38	131	23.2	151	31.9	171	41.9	201	54.3	231	76.5	251	92.2	281	119.2	311	140.2	341	173.8
40	130	22.9	150	31.5	170	41.4	200	53.8	230	75.9	250	91.5	280	118.4	310	139.3	340	172.8
42	129	22.5	149	31.1	169	40.9	199	53.3	229	75.3	249	90.8	279	117.6	309	138.4	339	171.9
44	128	22.2	148	30.7	168	40.4	198	52.8	228	74.7	248	90.1	278	116.8	308	137.6	338	170.9
46	127	21.9	147	30.3	167	39.9	197	52.3	227	74.0	247	89.4	277	115.9	307	136.7	337	169.9
48	126	21.6	146	29.9	166	39.5	196	51.8	226	73.4	246	88.7	276	115.1	306	135.8	336	168.9
50	125	21.3	145	29.5	165	39.0	195	51.3	225	72.8	245	88.0	275	114.3	305	134.9	335	167.9
52	124	20.9	144	29.1	164	38.5	194	50.8	224	72.2	244	87.3	274	113.5	304	134.1	334	166.9
54	123	20.6	143	28.7	163	38.0	193	50.3	223	71.6	243	86.6	273	112.7	303	133.2	333	165.9
56	122	20.3	142	28.3	162	37.6	192	49.8	222	70.9	242	85.9	272	111.9	302	132.3	332	164.9
58	121	20.0	141	27.9	161	37.1	191	49.3	221	70.3	241	85.3	271	111.1	301	131.5	331	164
60	120	19.7	140	27.5	160	36.6	190	48.8	220	69.7	240	84.6	270	110.3	300	130.6	330	163
62	119	19.3	139	27.1	159	36.1	189	48.3	219	69.1	239	83.9	269	109.5	299	129.7	329	162
64	118	19.0	138	26.7	158	35.7	188	47.8	218	68.5	238	83.2	268	108.7	298	128.9	328	161
66	117	18.7	137	26.3	157	35.2	187	47.3	217	67.9	237	82.5	267	107.9	297	128	327	160
68	116	18.4	136	25.9	156	34.7	186	46.9	216	67.3	236	81.8	266	107.1	296	127.1	326	159.1
70	115	18.1	135	25.5	155	34.3	185	46.4	215	66.7	235	81.1	265	106.3	295	126.3	325	158.1
72	114	17.8	134	25.1	154	33.8	184	45.9	214	66.1	234	80.5	264	105.5	294	125.4	324	157.1
74	113	17.5	133	24.7	153	33.4	183	45.4	213	65.5	233	79.8	263	104.7	293	124.6	323	156.2
76	112	17.1	132	24.4	152	32.9	182	44.9	212	64.9	232	79.1	262	103.9	292	123.7	322	155.2
78	111	16.8	131	24.0	151	32.5	181	44.4	211	64.3	231	78.4	261	103.1	291	122.9	321	154.2
80	110	16.5	130	23.6	150	32	180	43.9	210	63.7	230	77.7	260	102.3	290	122	320	153.3
82	109	16.2	129	23.2	149	31.5	179	43.5	209	63.1	229	77.1	259	101.6	289	121.2	319	152.3
84	108	15.9	128	22.8	148	31.1	178	43	208	62.5	228	76.4	258	100.8	288	120.3	318	151.4
86	107	15.6	127	22.5	147	30.6	177	42.5	207	61.9	227	75.7	257	100.0	287	119.5	317	150.4
88	106	15.3	126	22.1	146	30.2	176	42	206	61.3	226	75.1	256	99.2	286	118.6	316	149.5
90	105	15	125	21.7	145	29.8	175	41.6	205	60.7	225	74.4	255	98.4	285	117.8	315	148.5
92	104	14.7	124	21.3	144	29.3	174	41.1	204	60.1	224	73.7	254	97.6	284	117	314	147.6
94	103	14.4	123	21	143	28.9	173	40.6	203	59.5	223	73.1	253	96.9	283	116.1	313	146.6
96	102	14.1	122	20.6	142	28.4	172	40.1	202	58.9	222	72.4	252	96.1	282	115.3	312	145.7
98	101	13.8	121	20.2	141	28	171	39.7	201	58.3	221	71.7	251	95.3	281	114.4	311	144.7
100	100	13.5	120	19.9	140	27.6	170	39.2	200	57.7	220	71.1	250	94.6	280	113.6	310	143.8
102	99	13.3	119	19.5	139	27.1	169	38.7	199	57.2	219	70.4	249	93.8	279	112.8	309	142.8
104	98	13	118	19.2	138	26.7	168	38.3	198	56.6	218	69.8	248	93.0	278	112	308	141.9
106	97	12.7	117	18.8	137	26.3	167	37.8	197	56.0	217	69.1	247	92.3	277	111.1	307	141
108	96	12.4	116	18.4	136	25.9	166	37.3	196	55.4	216	68.5	246	91.5	276	110.3	306	140
110	95	12.1	115	18.1	135	25.4	165	36.9	195	54.8	215	67.8	245	90.7	275	109.5	305	139.1
112	-	-	-	-	-	-	164	36.4	194	54.3	214	67.2	244	90	274	108.7	304	138.2

114	-	-	-	-	-	-	163	35.9	193	53.7	213	66.5	243	89.2	273	107.9	303	137.2
116	-	-	-	-	-	-	162	35.5	192	53.1	212	65.9	242	88.5	272	107	302	136.3
118	-	-	-	-	-	-	161	35	191	52.6	211	65.2	241	87.7	271	106.2	301	135.4
120	-	-	-	-	-	-	160	34.6	190	52	210	64.6	240	87	270	105.4	300	134.5
122	-	-	-	-	-	-	159	34.1	189	51.4	209	63.9	239	86.2	269	104.6	299	133.6
124	-	-	-	-	-	-	158	33.7	188	50.9	208	63.3	238	85.5	268	103.8	298	132.6
126	-	-	-	-	-	-	157	33.2	187	50.3	207	62.7	237	84.7	267	103	297	131.7
128	-	-	-	-	-	-	156	32.8	186	49.7	206	62	236	84	266	102.2	296	130.8
130	-	-	-	-	-	-	155	32.3	185	49.2	205	61.4	235	83.2	265	101.4	295	129.9
132	-	-	-	-	-	-	154	31.9	184	48.6	204	60.8	234	82.5	264	100.6	294	129
134	-	-	-	-	-	-	153	31.4	183	48.1	203	60.2	233	81.8	263	99.8	293	128.1
136	-	-	-	-	-	-	152	31	182	47.5	202	59.5	232	81	262	99	292	127.2
138	-	-	-	-	-	-	151	30.6	181	47	201	58.9	231	80.3	261	98.2	291	126.3
140	-	-	-	-	-	-	150	30.1	180	46.4	200	58.3	230	79.6	260	97.4	290	125.4
142	-	-	-	-	-	-	149	29.7	179	45.9	199	57.7	229	78.9	259	96.7	289	124.5
144	-	-	-	-	-	-	148	29.3	178	45.3	198	57.1	228	78.1	258	95.9	288	123.6
146	-	-	-	-	-	-	147	28.8	177	44.8	197	56.4	227	77.4	257	95.1	287	122.7
148	-	-	-	-	-	-	146	28.4	176	44.3	196	55.8	226	76.7	256	94.3	286	121.9
150	-	-	-	-	-	-	145	28	175	43.7	195	55.2	225	76	255	93.5	285	121
152	-	-	-	-	-	-	144	27.6	174	43.2	194	54.6	224	75.3	254	92.8	284	120.1
154	-	-	-	-	-	-	143	27.1	173	42.7	193	54	223	74.6	253	92	283	119.2
156	-	-	-	-	-	-	142	26.7	172	42.1	192	53.4	222	73.9	252	91.2	282	118.3
158	-	-	-	-	-	-	141	26.3	171	41.6	191	52.8	221	73.2	251	90.5	281	117.5
160	-	-	-	-	-	-	140	25.9	170	41.1	190	52.2	220	72.5	250	89.7	280	116.6

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,1}$ for Joist Hanger GLE and GLI - Partial nailing - F1

	300		340		380		440		500		540		600		660		720	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	6	4	8	5	10	6	8	6	12	8	14	9	16	10	18	12	20	14
A	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1
32	134	14.2	154	19.5	174	25.6	204	26.7	234	42.2	254	62.3	284	64.5	314	76.7	344	92.6
34	133	14.0	153	19.3	173	25.3	203	26.5	233	41.9	253	61.9	283	64.1	313	76.3	343	92.2
36	132	13.9	152	19.1	172	25.1	202	26.3	232	41.6	252	61.6	282	63.7	312	75.9	342	91.8
38	131	13.7	151	18.9	171	24.8	201	26.1	231	41.4	251	61.2	281	63.4	311	75.5	341	91.4
40	130	13.5	150	18.7	170	24.6	200	25.9	230	41.1	250	60.9	280	63.0	310	75.1	340	91
42	129	13.3	149	18.4	169	24.3	199	25.7	229	40.8	249	60.5	279	62.7	309	74.7	339	90.5
44	128	13.2	148	18.2	168	24.1	198	25.5	228	40.5	248	60.2	278	62.3	308	74.4	338	90.1
46	127	13.0	147	18.0	167	23.8	197	25.3	227	40.2	247	59.8	277	61.9	307	74	337	89.7
48	126	12.8	146	17.8	166	23.6	196	25.1	226	39.9	246	59.5	276	61.6	306	73.6	336	89.3
50	125	12.6	145	17.6	165	23.3	195	24.9	225	39.6	245	59.1	275	61.2	305	73.2	335	88.9
52	124	12.5	144	17.4	164	23.1	194	24.7	224	39.3	244	58.8	274	60.9	304	72.8	334	88.5
54	123	12.3	143	17.2	163	22.9	193	24.5	223	39.0	243	58.4	273	60.5	303	72.5	333	88.1
56	122	12.1	142	17.0	162	22.6	192	24.3	222	38.7	242	58.1	272	60.2	302	72.1	332	87.7
58	121	12.0	141	16.8	161	22.4	191	24.1	221	38.5	241	57.7	271	59.8	301	71.7	331	87.3
60	120	11.8	140	16.6	160	22.1	190	23.9	220	38.2	240	57.4	270	59.5	300	71.3	330	86.9
62	119	11.6	139	16.4	159	21.9	189	23.7	219	37.9	239	57.0	269	59.1	299	70.9	329	86.5
64	118	11.5	138	16.1	158	21.7	188	23.5	218	37.6	238	56.7	268	58.8	298	70.6	328	86.1
66	117	11.3	137	15.9	157	21.4	187	23.3	217	37.3	237	56.3	267	58.4	297	70.2	327	85.7
68	116	11.1	136	15.7	156	21.2	186	23.1	216	37.0	236	56.0	266	58.1	296	69.8	326	85.3
70	115	11.0	135	15.5	155	20.9	185	22.9	215	36.8	235	55.7	265	57.7	295	69.5	325	84.9
72	114	10.8	134	15.3	154	20.7	184	22.7	214	36.5	234	55.3	264	57.4	294	69.1	324	84.5
74	113	10.6	133	15.1	153	20.5	183	22.5	213	36.2	233	55.0	263	57.0	293	68.7	323	84.1
76	112	10.5	132	14.9	152	20.2	182	22.3	212	35.9	232	54.6	262	56.7	292	68.3	322	83.7
78	111	10.3	131	14.8	151	20.0	181	22.1	211	35.7	231	54.3	261	56.3	291	68	321	83.3
80	110	10.2	130	14.6	150	19.8	180	21.9	210	35.4	230	54.0	260	56.0	290	67.6	320	82.9
82	109	10.0	129	14.4	149	19.6	179	21.7	209	35.1	229	53.6	259	55.7	289	67.2	319	82.5
84	108	9.8	128	14.2	148	19.3	178	21.5	208	34.8	228	53.3	258	55.3	288	66.9	318	82.1
86	107	9.7	127	14.0	147	19.1	177	21.3	207	34.5	227	53.0	257	55.0	287	66.5	317	81.7
88	106	9.5	126	13.8	146	18.9	176	21.1	206	34.3	226	52.6	256	54.6	286	66.2	316	81.3
90	105	9.4	125	13.6	145	18.7	175	20.9	205	34.0	225	52.3	255	54.3	285	65.8	315	81
92	104	9.2	124	13.4	144	18.4	174	20.7	204	33.7	224	52.0	254	54.0	284	65.4	314	80.6
94	103	9.1	123	13.2	143	18.2	173	20.5	203	33.5	223	51.7	253	53.6	283	65.1	313	80.2
96	102	8.9	122	13.0	142	18.0	172	20.3	202	33.2	222	51.3	252	53.3	282	64.7	312	79.8
98	101	8.8	121	12.9	141	17.8	171	20.1	201	32.9	221	51.0	251	53.0	281	64.4	311	79.4
100	100	8.6	120	12.7	140	17.6	170	19.9	200	32.7	220	50.7	250	52.6	280	64	310	79
102	99	8.5	119	12.5	139	17.4	169	19.8	199	32.4	219	50.4	249	52.3	279	63.7	309	78.7
104	98	8.3	118	12.3	138	17.1	168	19.6	198	32.1	218	50.1	248	52.0	278	63.3	308	78.3
106	97	8.2	117	12.1	137	16.9	167	19.4	197	31.9	217	49.7	247	51.7	277	62.9	307	77.9
108	96	8.0	116	12.0	136	16.7	166	19.2	196	31.6	216	49.4	246	51.3	276	62.6	306	77.5
110	95	7.9	115	11.8	135	16.5	165	19.0	195	31.3	215	49.1	245	51.0	275	62.3	305	77.2
112	-	-	-	-	-	-	164	18.8	194	31.1	214	48.8	244	50.7	274	61.9	304	76.8
114	-	-	-	-	-	-	163	18.7	193	30.8	213	48.5	243	50.4	273	61.6	303	76.4
116	-	-	-	-	-	-	162	18.5	192	30.6	212	48.2	242	50.1	272	61.2	302	76
118	-	-	-	-	-	-	161	18.3	191	30.3	211	47.8	241	49.7	271	60.9	301	75.7
120	-	-	-	-	-	-	160	18.1	190	30	210	47.5	240	49.4	270	60.5	300	75.3

122	-	-	-	-	-	-	159	17.9	189	29.8	209	47.2	239	49.1	269	60.2	299	74.9
124	-	-	-	-	-	-	158	17.8	188	29.5	208	46.9	238	48.8	268	59.8	298	74.6
126	-	-	-	-	-	-	157	17.6	187	29.3	207	46.6	237	48.5	267	59.5	297	74.2
128	-	-	-	-	-	-	156	17.4	186	29	206	46.3	236	48.2	266	59.2	296	73.9
130	-	-	-	-	-	-	155	17.2	185	28.8	205	46	235	47.8	265	58.8	295	73.5
132	-	-	-	-	-	-	154	17.1	184	28.5	204	45.7	234	47.5	264	58.5	294	73.1
134	-	-	-	-	-	-	153	16.9	183	28.3	203	45.4	233	47.2	263	58.2	293	72.8
136	-	-	-	-	-	-	152	16.7	182	28	202	45.1	232	46.9	262	57.8	292	72.4
138	-	-	-	-	-	-	151	16.5	181	27.8	201	44.8	231	46.6	261	57.5	291	72.1
140	-	-	-	-	-	-	150	16.4	180	27.6	200	44.5	230	46.3	260	57.2	290	71.7
142	-	-	-	-	-	-	149	16.2	179	27.3	199	44.2	229	46	259	56.9	289	71.4
144	-	-	-	-	-	-	148	16	178	27.1	198	44	228	45.7	258	56.5	288	71
146	-	-	-	-	-	-	147	15.9	177	26.8	197	43.7	227	45.4	257	56.2	287	70.7
148	-	-	-	-	-	-	146	15.7	176	26.6	196	43.4	226	45.1	256	55.9	286	70.3
150	-	-	-	-	-	-	145	15.6	175	26.4	195	76.7	225	44.8	255	55.6	285	70
152	-	-	-	-	-	-	144	15.4	174	26.1	194	76.3	224	44.5	254	55.3	284	69.6
154	-	-	-	-	-	-	143	15.2	173	25.9	193	75.9	223	44.2	253	54.9	283	69.3
156	-	-	-	-	-	-	142	15.1	172	25.7	192	75.5	222	44	252	54.6	282	69
158	-	-	-	-	-	-	141	14.9	171	25.4	191	75.1	221	43.7	251	54.3	281	68.6
160	-	-	-	-	-	-	140	14.8	170	25.2	190	74.7	220	43.4	250	54	280	68.3

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,2}$ for GLE and GLI - Full or partial nailing - F2

Blank	Total number of nails in the header		k_{H2}	
	Full nailing	Partial nailing	Full nailing	Partial nailing
300	12	6	10.1	5.6
340	16	8	15.8	8.8
380	20	10	22.7	12.5
440	20	8	22.8	5.2
500	26	12	34.5	16.2
540	30	14	43.9	20.7
600	36	16	59.9	24.6
660	40	18	76.3	35.1
720	46	20	97	39.6

GLE fire resistance R30 to EN 13501-2

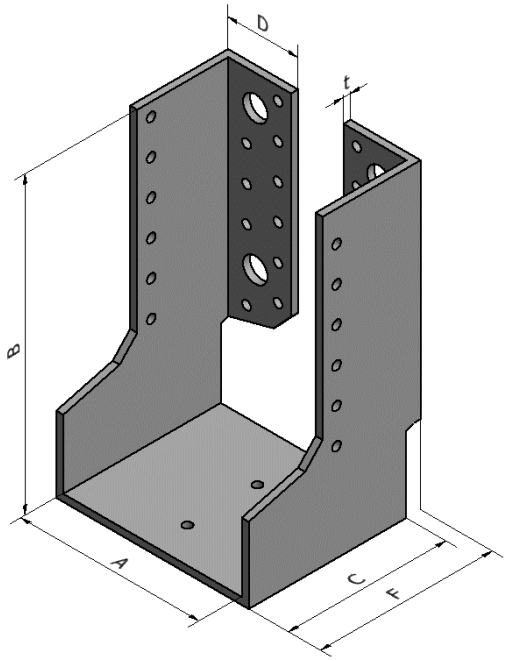
See GSE Joist hanger

D16 GLI Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
GLI	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	Size	Qty	size
300/2.5X	76-110	(300-A)/2	90	38.5	95	2.5	12	Ø5	2	Ø14	7	Ø5
340/2.5X	76-110	(340-A)/2	90	38.5	95	2.5	16	Ø5	2	Ø14	9	Ø5
380/2.5X	76-110	(380-A)/2	90	38.5	95	2.5	20	Ø5	2	Ø14	11	Ø5
440/2.5X	76-160	(440-A)/2	90	38.5	95	2.5	20	Ø5	4	Ø14	12	Ø5
500/2.5X	76-160	(500-A)/2	90	38.5	95	2.5	26	Ø5	4	Ø14	15	Ø5
540/2.5X	76-160	(540-A)/2	90	38.5	95	2.5	30	Ø5	4	Ø14	17	Ø5
600/2.5X	76-160	(600-A)/2	90	38.5	95	2.5	36	Ø5	4	Ø14	20	Ø5
660/2.5X	76-160	(660-A)/2	90	38.5	95	2.5	40	Ø5	6	Ø14	23	Ø5
720/2.5X	76-160	(720-A)/2	90	38.5	95	2.5	46	Ø5	6	Ø14	26	Ø5
300/4X	76-110	(300-A)/2	90	40	98	4	12	Ø5	2	Ø14	7	Ø5
340/4X	76-110	(340-A)/2	90	40	98	4	16	Ø5	2	Ø14	9	Ø5
380/4X	76-110	(380-A)/2	90	40	98	4	20	Ø5	2	Ø14	11	Ø5
440/4X	76-160	(440-A)/2	90	40	98	4	20	Ø5	4	Ø14	12	Ø5
500/4X	76-160	(500-A)/2	90	40	98	4	26	Ø5	4	Ø14	15	Ø5
540/4X	76-160	(540-A)/2	90	40	98	4	30	Ø5	4	Ø14	17	Ø5
600/4X	76-160	(600-A)/2	90	40	98	4	36	Ø5	4	Ø14	20	Ø5
660/4X	76-160	(660-A)/2	90	40	98	4	40	Ø5	6	Ø14	23	Ø5
720/4X	76-160	(720-A)/2	90	40	98	4	46	Ø5	6	Ø14	26	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger GLI - Full nailing - F1

See GLE Joist hanger

$k_{H,1}$ for Joist Hanger GLI - Partial nailing - F1

See GLE Joist hanger

$k_{H,2}$ for GLI - Full or partial nailing - F2

See GLE Joist hanger

GLI fire resistance R30 to EN 13501-2

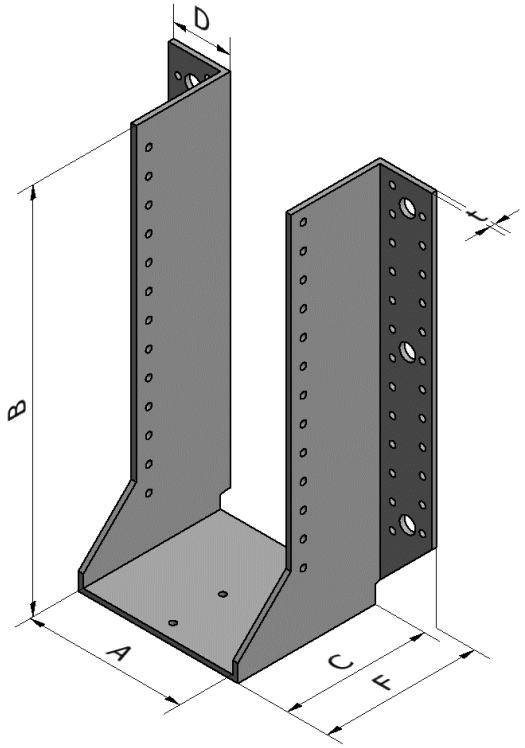
See GSE Joist hanger

D17 GSE Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
GSE	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	Size	Qty	size
300/2.5X	32-110	(300-A)/2	110	42.5	115	2.5	12	Ø5	2	Ø13	6	Ø5
340/2.5X	32-110	(340-A)/2	110	42.5	115	2.5	16	Ø5	2	Ø13	8	Ø5
380/2.5X	32-140	(380-A)/2	110	42.5	115	2.5	16	Ø5	4	Ø13	8	Ø5
440/2.5X	32-140	(440-A)/2	110	42.5	115	2.5	22	Ø5	4	Ø13	12	Ø5
500/2.5X	32-140	(500-A)/2	110	42.5	115	2.5	28	Ø5	4	Ø13	14	Ø5
540/2.5X	32-140	(540-A)/2	110	42.5	115	2.5	32	Ø5	4	Ø13	16	Ø5
600/2.5X	32-140	(600-A)/2	110	42.5	115	2.5	38	Ø5	4	Ø13	20	Ø5
660/2.5X	32-140	(660-A)/2	110	42.5	115	2.5	44	Ø5	6	Ø13	22	Ø5
720/2.5X	32-140	(720-A)/2	110	42.5	115	2.5	50	Ø5	6	Ø13	26	Ø5
780/2.5X	32-140	(780-A)/2	110	42.5	115	2.5	56	Ø5	6	Ø13	28	Ø5
840/2.5X	32-140	(840-A)/2	110	42.5	115	2.5	62	Ø5	6	Ø13	32	Ø5
900/2.5X	32-140	(900-A)/2	110	42.5	115	2.5	68	Ø5	6	Ø13	38	Ø5
960/2.5X	32-140	(960-A)/2	110	42.5	115	2.5	74	Ø5	6	Ø13	38	Ø5
1020/2.5X	32-140	(1020-A)/2	110	42.5	115	2.5	80	Ø5	6	Ø13	40	Ø5
300/4X	32-110	(300-A)/2	110	45.5	118	4	12	Ø5	2	Ø13	6	Ø5
340/4X	32-110	(340-A)/2	110	45.5	118	4	16	Ø5	2	Ø13	8	Ø5
380/4X	32-140	(380-A)/2	110	45.5	118	4	16	Ø5	4	Ø13	8	Ø5
440/4X	32-140	(440-A)/2	110	45.5	118	4	22	Ø5	4	Ø13	12	Ø5
500/4X	32-140	(500-A)/2	110	45.5	118	4	28	Ø5	4	Ø13	14	Ø5
540/4X	32-140	(540-A)/2	110	45.5	118	4	32	Ø5	4	Ø13	16	Ø5
600/4X	32-140	(600-A)/2	110	45.5	118	4	38	Ø5	4	Ø13	20	Ø5
660/4X	32-140	(660-A)/2	110	45.5	118	4	44	Ø5	6	Ø13	22	Ø5
720/4X	32-140	(720-A)/2	110	45.5	118	4	50	Ø5	6	Ø13	26	Ø5
780/4X	32-140	(780-A)/2	110	45.5	118	4	56	Ø5	6	Ø13	28	Ø5
840/4X	32-140	(840-A)/2	110	45.5	118	4	62	Ø5	6	Ø13	32	Ø5
900/4X	32-140	(900-A)/2	110	45.5	118	4	68	Ø5	6	Ø13	38	Ø5
960/4X	32-140	(960-A)/2	110	45.5	118	4	74	Ø5	6	Ø13	38	Ø5
1020/4X	32-140	(1020-A)/2	110	45.5	118	4	80	Ø5	6	Ø13	40	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-


D
t
B
A
C
F

Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger GSE and GSI - Full nailing - F1

	300		340		380		440		500		540		600		660		720		780		840		900		960		1020	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	12	6	16	8	16	8	22	12	28	14	32	16	38	20	44	22	50	26	56	28	62	32	68	38	74	38	80	40
A	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1
32	134	17.5	154	21.0	174	25.4	204	41.2	234	55.7	254	66.1	284	82.9	314	102.2	344	122.8	374	145.9	404	170.3	434	196.1	464	225.3	494	255.9
34	133	17.3	153	20.8	173	25.2	203	40.8	233	55.3	253	65.6	283	82.3	313	101.6	343	122.1	373	145.1	403	169.4	433	195.2	463	224.4	493	254.9
36	132	17.1	152	20.5	172	24.9	202	40.5	232	54.8	252	65.1	282	81.8	312	101	342	121.4	372	144.3	402	168.6	432	194.4	462	223.4	492	253.9
38	131	16.8	151	20.3	171	24.7	201	40.1	231	54.4	251	64.6	281	81.2	311	100.3	341	120.7	371	143.6	401	167.8	431	193.5	461	222.4	491	252.9
40	130	16.6	150	20.1	170	24.5	200	39.8	230	54.0	250	64.2	280	80.7	310	99.7	340	120	370	142.8	400	167	430	192.6	460	221.5	490	251.8
42	129	16.4	149	19.9	169	24.3	199	39.4	229	53.5	249	63.7	279	80.1	309	99.1	339	119.4	369	142.1	399	166.1	429	191.7	459	220.5	489	250.8
44	128	16.2	148	19.7	168	24.1	198	39.1	228	53.1	248	63.2	278	79.6	308	98.5	338	118.7	368	141.3	398	165.3	428	190.8	458	219.6	488	249.8
46	127	15.9	147	19.4	167	23.8	197	38.7	227	52.7	247	62.7	277	79.0	307	97.9	337	118	367	140.6	397	164.5	427	189.9	457	218.6	487	248.8
48	126	15.7	146	19.2	166	23.6	196	38.3	226	52.2	246	62.2	276	78.5	306	97.2	336	117.3	366	139.8	396	163.7	426	189	456	217.7	486	247.7
50	125	15.5	145	19.0	165	23.4	195	38.0	225	51.8	245	61.7	275	77.9	305	96.6	335	116.6	365	139	395	162.9	425	188.2	455	216.7	485	246.7
52	124	15.3	144	18.8	164	23.2	194	37.6	224	51.4	244	61.3	274	77.4	304	96	334	115.9	364	138.3	394	162	424	187.3	454	215.8	484	245.7
54	123	15.1	143	18.6	163	22.9	193	37.3	223	50.9	243	60.8	273	76.8	303	95.4	333	115.2	363	137.5	393	161.2	423	186.4	453	214.8	483	244.7
56	122	14.8	142	18.4	162	22.7	192	36.9	222	50.5	242	60.3	272	76.3	302	94.8	332	114.6	362	136.8	392	160.4	422	185.5	452	213.9	482	243.7
58	121	14.6	141	18.1	161	22.5	191	36.6	221	50.1	241	59.8	271	75.8	301	94.2	331	113.9	361	136	391	159.6	421	184.6	451	212.9	481	242.7
60	120	14.4	140	17.9	160	22.3	190	36.2	220	49.6	240	59.4	270	75.2	300	93.5	330	113.2	360	135.3	390	158.8	420	183.8	450	212	480	241.7
62	119	14.2	139	17.7	159	22.1	189	35.9	219	49.2	239	58.9	269	74.7	299	92.9	329	112.5	359	134.6	389	158	419	182.9	449	211	479	240.6
64	118	13.9	138	17.5	158	21.8	188	35.5	218	48.8	238	58.4	268	74.1	298	92.3	328	111.9	358	133.8	388	157.2	418	182	448	210.1	478	239.6
66	117	13.7	137	17.3	157	21.6	187	35.2	217	48.4	237	57.9	267	73.6	297	91.7	327	111.2	357	133.1	387	156.4	417	181.1	447	209.1	477	238.6
68	116	13.5	136	17.1	156	21.4	186	34.8	216	47.9	236	57.5	266	73.1	296	91.1	326	110.5	356	132.3	386	155.5	416	180.3	446	208.2	476	237.6
70	115	13.3	135	16.8	155	21.2	185	34.5	215	47.5	235	57.0	265	72.5	295	90.5	325	109.8	355	131.6	385	154.7	415	179.4	445	207.3	475	236.6
72	114	13.1	134	16.6	154	21.0	184	34.1	214	47.1	234	56.5	264	72.0	294	89.9	324	109.2	354	130.8	384	153.9	414	178.5	444	206.3	474	235.6
74	113	12.9	133	16.4	153	20.8	183	33.8	213	46.7	233	56.1	263	71.4	293	89.3	323	108.5	353	130.1	383	153.1	413	177.7	443	205.4	473	234.6
76	112	12.6	132	16.2	152	20.5	182	33.4	212	46.2	232	55.6	262	70.9	292	88.7	322	107.8	352	129.4	382	152.3	412	176.8	442	204.5	472	233.6
78	111	12.4	131	16.0	151	20.3	181	33.1	211	45.8	231	55.1	261	70.4	291	88.1	321	107.2	351	128.6	381	151.5	411	175.9	441	203.5	471	232.6
80	110	12.2	130	15.8	150	20.1	180	32.7	210	45.4	230	54.7	260	69.8	290	87.5	320	106.5	350	127.9	380	150.7	410	175.1	440	202.6	470	231.6

82	109	12.0	129	15.6	149	19.9	179	32.4	209	45.0	229	54.2	259	69.3	289	86.9	319	105.8	349	127.2	379	149.9	409	174.2	439	201.7	469	230.6
84	108	11.8	128	15.4	148	19.7	178	32.0	208	44.6	228	53.7	258	68.8	288	86.3	318	105.2	348	126.4	378	149.1	408	173.4	438	200.7	468	229.6
86	107	11.6	127	15.1	147	19.4	177	31.7	207	44.2	227	53.3	257	68.3	287	85.7	317	104.5	347	125.7	377	148.3	407	172.5	437	199.8	467	228.6
88	106	11.4	126	14.9	146	19.2	176	31.4	206	43.7	226	52.8	256	67.7	286	85.1	316	103.8	346	125	376	147.5	406	171.6	436	198.9	466	227.6
90	105	11.1	125	14.7	145	19.0	175	31.0	205	43.3	225	52.3	255	67.2	285	84.5	315	103.2	345	124.2	375	146.7	405	170.8	435	198	465	226.7
92	104	10.9	124	14.5	144	18.8	174	30.7	204	42.9	224	51.9	254	66.7	284	83.9	314	102.5	344	123.5	374	146	404	169.9	434	197	464	225.7
94	103	10.7	123	14.3	143	18.6	173	30.3	203	42.5	223	51.4	253	66.2	283	83.3	313	101.9	343	122.8	373	145.2	403	169.1	433	196.1	463	224.7
96	102	10.5	122	14.1	142	18.4	172	30.0	202	42.1	222	51.0	252	65.6	282	82.7	312	101.2	342	122.1	372	144.4	402	168.2	432	195.2	462	223.7
98	101	10.3	121	13.9	141	18.1	171	29.7	201	41.7	221	50.5	251	65.1	281	82.1	311	100.5	341	121.3	371	143.6	401	167.4	431	194.3	461	222.7
100	100	10.1	120	13.7	140	17.9	170	29.3	200	41.3	220	50.1	250	64.6	280	81.5	310	99.9	340	120.6	370	142.8	400	166.5	430	193.4	460	221.7
102	99	9.9	119	13.5	139	17.7	169	29.0	199	40.8	219	49.6	249	64.1	279	80.9	309	99.2	339	119.9	369	142	399	165.7	429	192.5	459	220.8
104	98	9.7	118	13.2	138	17.5	168	28.6	198	40.4	218	49.1	248	63.5	278	80.4	308	98.6	338	119.2	368	141.2	398	164.8	428	191.5	458	219.8
106	97	9.5	117	13.0	137	17.3	167	28.3	197	40.0	217	48.7	247	63.0	277	79.8	307	97.9	337	118.5	367	140.5	397	164	427	190.6	457	218.8
108	96	9.3	116	12.8	136	17.1	166	28.0	196	39.6	216	48.2	246	62.5	276	79.2	306	97.3	336	117.8	366	139.7	396	163.2	426	189.7	456	217.8
110	95	9.1	115	12.6	135	16.8	165	27.6	195	39.2	215	47.8	245	62.0	275	78.6	305	96.6	335	117	365	138.9	395	162.3	425	188.8	455	216.8
112	-	-	-	-	134	16.6	164	27.3	194	38.8	214	47.3	244	61.5	274	78	304	96	334	116.3	364	138.1	394	161.5	424	187.9	454	215.9
114	-	-	-	-	133	16.4	163	27	193	38.4	213	46.9	243	61	273	77.4	303	95.3	333	115.6	363	137.4	393	160.6	423	187	453	214.9
116	-	-	-	-	132	16.2	162	26.6	192	38	212	46.4	242	60.5	272	76.9	302	94.7	332	114.9	362	136.6	392	159.8	422	186.1	452	213.9
118	-	-	-	-	131	16	161	26.3	191	37.6	211	46	241	60	271	76.3	301	94.1	331	114.2	361	135.8	391	159	421	185.2	451	213
120	-	-	-	-	130	15.8	160	26	190	37.2	210	45.6	240	59.4	270	75.7	300	93.4	330	113.5	360	135	390	158.1	420	184.3	450	212
122	-	-	-	-	129	15.6	159	25.7	189	36.8	209	45.1	239	58.9	269	75.1	299	92.8	329	112.8	359	134.3	389	157.3	419	183.4	449	211
124	-	-	-	-	128	15.4	158	25.3	188	36.4	208	44.7	238	58.4	268	74.6	298	92.1	328	112.1	358	133.5	388	156.5	418	182.5	448	210.1
126	-	-	-	-	127	15.1	157	25	187	36	207	44.2	237	57.9	267	74	297	91.5	327	111.4	357	132.7	387	155.7	417	181.6	447	209.1
128	-	-	-	-	126	14.9	156	24.7	186	35.6	206	43.8	236	57.4	266	73.4	296	90.9	326	110.7	356	132	386	154.8	416	180.7	446	208.2
130	-	-	-	-	125	14.7	155	24.4	185	35.2	205	43.4	235	56.9	265	72.8	295	90.2	325	110	355	131.2	385	154	415	179.8	445	207.2
132	-	-	-	-	124	14.5	154	24	184	34.8	204	42.9	234	56.4	264	72.3	294	89.6	324	109.3	354	130.5	384	153.2	414	178.9	444	206.3
134	-	-	-	-	123	14.3	153	23.7	183	34.4	203	42.5	233	55.9	263	71.7	293	89	323	108.6	353	129.7	383	152.4	413	178.1	443	205.3
136	-	-	-	-	122	14.1	152	23.4	182	34	202	42.1	232	55.4	262	71.2	292	88.4	322	107.9	352	128.9	382	151.6	412	177.2	442	204.3
138	-	-	-	-	121	13.9	151	23.1	181	33.7	201	41.6	231	54.9	261	70.6	291	87.7	321	107.2	351	128.2	381	150.7	411	176.3	441	203.4
140	-	-	-	-	120	13.7	150	22.8	180	33.3	200	41.2	230	54.4	260	70	290	87.1	320	106.5	350	127.4	380	149.9	410	175.4	440	202.4

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,1}$ for Joist Hanger GSE and GSI - Partial nailing - F1

	300		340		380		440		500		540		600		660		720		780		840		900		960		1020	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	6	4	8	4	8	4	12	6	14	8	16	8	20	10	22	12	26	14	28	14	32	16	34	18	38	20	40	20
A	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1
32	134	10.7	154	15.0	174	18.4	204	25.3	234	31.9	254	38.2	284	47.3	314	56.6	344	67.7	374	80.1	404	92.9	434	106.2	464	120.9	494	137.1
34	133	10.6	153	14.9	173	18.2	203	25.1	233	31.6	253	37.9	283	47.0	313	56.3	343	67.3	373	79.7	403	92.5	433	105.7	463	120.4	493	136.6
36	132	10.4	152	14.7	172	18.0	202	24.8	232	31.4	252	37.6	282	46.7	312	55.9	342	66.9	372	79.2	402	92	432	105.2	462	119.9	492	136
38	131	10.3	151	14.6	171	17.9	201	24.6	231	31.1	251	37.3	281	46.4	311	55.6	341	66.5	371	78.8	401	91.6	431	104.8	461	119.4	491	135.5
40	130	10.2	150	14.4	170	17.7	200	24.4	230	30.9	250	37.0	280	46.1	310	55.3	340	66.2	370	78.4	400	91.1	430	104.3	460	118.9	490	135
42	129	10.1	149	14.2	169	17.5	199	24.2	229	30.7	249	36.7	279	45.8	309	54.9	339	65.8	369	78	399	90.7	429	103.8	459	118.4	489	134.4
44	128	9.9	148	14.1	168	17.4	198	24.0	228	30.4	248	36.4	278	45.4	308	54.6	338	65.4	368	77.6	398	90.2	428	103.4	458	117.9	488	133.9
46	127	9.8	147	13.9	167	17.2	197	23.8	227	30.2	247	36.2	277	45.1	307	54.3	337	65	367	77.2	397	89.8	427	102.9	457	117.4	487	133.4
48	126	9.7	146	13.7	166	17.0	196	23.6	226	30.0	246	35.9	276	44.8	306	53.9	336	64.7	366	76.8	396	89.3	426	102.4	456	116.9	486	132.8
50	125	9.6	145	13.6	165	16.9	195	23.3	225	29.7	245	35.6	275	44.5	305	53.6	335	64.3	365	76.4	395	88.9	425	101.9	455	116.4	485	132.3
52	124	9.4	144	13.4	164	16.7	194	23.1	224	29.5	244	35.3	274	44.2	304	53.3	334	63.9	364	76	394	88.5	424	101.5	454	115.9	484	131.7
54	123	9.3	143	13.3	163	16.5	193	22.9	223	29.3	243	35.0	273	43.9	303	53	333	63.6	363	75.6	393	88	423	101	453	115.3	483	131.2
56	122	9.2	142	13.1	162	16.4	192	22.7	222	29.0	242	34.7	272	43.6	302	52.6	332	63.2	362	75.2	392	87.6	422	100.6	452	114.8	482	130.7
58	121	9.1	141	12.9	161	16.2	191	22.5	221	28.8	241	34.4	271	43.3	301	52.3	331	62.8	361	74.8	391	87.1	421	100.1	451	114.3	481	130.1
60	120	8.9	140	12.8	160	16.0	190	22.3	220	28.6	240	34.1	270	43.0	300	52	330	62.5	360	74.4	390	86.7	420	99.6	450	113.8	480	129.6
62	119	8.8	139	12.6	159	15.9	189	22.1	219	28.3	239	33.9	269	42.7	299	51.6	329	62.1	359	74	389	86.3	419	99.2	449	113.3	479	129.1
64	118	8.7	138	12.5	158	15.7	188	21.9	218	28.1	238	33.6	268	42.4	298	51.3	328	61.7	358	73.6	388	85.8	418	98.7	448	112.8	478	128.6
66	117	8.6	137	12.3	157	15.5	187	21.6	217	27.9	237	33.3	267	42.1	297	51	327	61.4	357	73.2	387	85.4	417	98.2	447	112.3	477	128
68	116	8.4	136	12.1	156	15.4	186	21.4	216	27.6	236	33.0	266	41.8	296	50.7	326	61	356	72.8	386	85	416	97.8	446	111.8	476	127.5
70	115	8.3	135	12.0	155	15.2	185	21.2	215	27.4	235	32.7	265	41.5	295	50.3	325	60.6	355	72.4	385	84.5	415	97.3	445	111.3	475	127
72	114	8.2	134	11.8	154	15.0	184	21.0	214	27.2	234	32.4	264	41.2	294	50	324	60.3	354	72	384	84.1	414	96.9	444	110.9	474	126.4
74	113	8.1	133	11.7	153	14.9	183	20.8	213	26.9	233	32.2	263	40.9	293	49.7	323	59.9	353	71.6	383	83.7	413	96.4	443	110.4	473	125.9
76	112	7.9	132	11.5	152	14.7	182	20.6	212	26.7	232	31.9	262	40.6	292	49.4	322	59.5	352	71.2	382	83.2	412	95.9	442	109.9	472	125.4
78	111	7.8	131	11.4	151	14.6	181	20.4	211	26.5	231	31.6	261	40.3	291	49	321	59.2	351	70.8	381	82.8	411	95.5	441	109.4	471	124.9
80	110	7.7	130	11.2	150	14.4	180	20.2	210	26.2	230	31.3	260	40.0	290	48.7	320	58.8	350	70.4	380	82.4	410	95	440	108.9	470	124.3
82	109	7.6	129	11.0	149	14.2	179	20.0	209	26.0	229	31.1	259	39.7	289	48.4	319	58.4	349	70.1	379	81.9	409	94.6	439	108.4	469	123.8
84	108	7.5	128	10.9	148	14.1	178	19.8	208	25.8	228	30.8	258	39.4	288	48.1	318	58.1	348	69.7	378	81.5	408	94.1	438	107.9	468	123.3
86	107	7.3	127	10.7	147	13.9	177	19.6	207	25.5	227	30.5	257	39.1	287	47.7	317	57.7	347	69.3	377	81.1	407	93.7	437	107.4	467	122.8

88	106	7.2	126	10.6	146	13.7	176	19.3	206	25.3	226	30.2	256	38.8	286	47.4	316	57.4	346	68.9	376	80.7	406	93.2	436	106.9	466	122.2
90	105	7.1	125	10.4	145	13.6	175	19.1	205	25.1	225	30.0	255	38.5	285	47.1	315	57	345	68.5	375	80.2	405	92.7	435	106.4	465	121.7
92	104	7.0	124	10.3	144	13.4	174	18.9	204	24.9	224	29.7	254	38.2	284	46.8	314	56.6	344	68.1	374	79.8	404	92.3	434	105.9	464	121.2
94	103	6.9	123	10.1	143	13.3	173	18.7	203	24.6	223	29.4	253	37.9	283	46.5	313	56.3	343	67.7	373	79.4	403	91.8	433	105.4	463	120.7
96	102	6.7	122	10.0	142	13.1	172	18.5	202	24.4	222	29.2	252	37.6	282	46.1	312	55.9	342	67.3	372	79	402	91.4	432	105	462	120.2
98	101	6.6	121	9.8	141	12.9	171	18.3	201	24.2	221	28.9	251	37.3	281	45.8	311	55.6	341	66.9	371	78.5	401	90.9	431	104.5	461	119.6
100	100	6.5	120	9.6	140	12.8	170	18.1	200	23.9	220	28.6	250	37.0	280	45.5	310	55.2	340	66.5	370	78.1	400	90.5	430	104	460	119.1
102	99	6.4	119	9.5	139	12.6	169	17.9	199	23.7	219	28.4	249	36.7	279	45.2	309	54.9	339	66.2	369	77.7	399	90	429	103.5	459	118.6
104	98	6.3	118	9.3	138	12.5	168	17.7	198	23.5	218	28.1	248	36.4	278	44.9	308	54.5	338	65.8	368	77.3	398	89.6	428	103	458	118.1
106	97	6.1	117	9.2	137	12.3	167	17.5	197	23.3	217	27.8	247	36.2	277	44.6	307	54.2	337	65.4	367	76.9	397	89.1	427	102.5	457	117.6
108	96	6.0	116	9.0	136	12.1	166	17.3	196	23.0	216	27.6	246	35.9	276	44.2	306	53.8	336	65	366	76.4	396	88.7	426	102	456	117.1
110	95	5.9	115	8.9	135	12.0	165	17.1	195	22.8	215	27.3	245	35.6	275	43.9	305	53.5	335	64.6	365	76	395	88.2	425	101.6	455	116.6
112	--	--	--	--	134	11.8	164	16.9	194	22.6	214	27	244	35.3	274	43.6	304	53.1	334	64.2	364	75.6	394	87.8	424	101.1	454	116
114	--	--	--	--	133	11.7	163	16.7	193	22.4	213	26.8	243	35	273	43.3	303	52.8	333	63.9	363	75.2	393	87.4	423	100.6	453	115.5
116	--	--	--	--	132	11.5	162	16.5	192	22.2	212	26.5	242	34.7	272	43	302	52.4	332	63.5	362	74.8	392	86.9	422	100.1	452	115
118	--	--	--	--	131	11.4	161	16.3	191	21.9	211	26.3	241	34.4	271	42.7	301	52.1	331	63.1	361	74.3	391	86.5	421	99.7	451	114.5
120	--	--	--	--	130	11.2	160	16.1	190	21.7	210	26	240	34.1	270	42.4	300	51.7	330	62.7	360	73.9	390	86	420	99.2	450	114
122	--	--	--	--	129	11	159	15.9	189	21.5	209	25.8	239	33.9	269	42.1	299	51.4	329	62.3	359	73.5	389	85.6	419	98.7	449	113.5
124	--	--	--	--	128	10.9	158	15.7	188	21.3	208	25.5	238	33.6	268	41.7	298	51	328	62	358	73.1	388	85.1	418	98.2	448	113
126	--	--	--	--	127	10.7	157	15.5	187	21.1	207	25.3	237	33.3	267	41.4	297	50.7	327	61.6	357	72.7	387	84.7	417	97.8	447	112.5
128	--	--	--	--	126	10.6	156	15.3	186	20.8	206	25	236	33	266	41.1	296	50.3	326	61.2	356	72.3	386	84.3	416	97.3	446	112
130	--	--	--	--	125	10.4	155	15.1	185	20.6	205	24.8	235	32.7	265	40.8	295	50	325	60.8	355	71.9	385	83.8	415	96.8	445	111.5
132	--	--	--	--	124	10.3	154	14.9	184	20.4	204	24.5	234	32.4	264	40.5	294	49.7	324	60.5	354	71.5	384	83.4	414	96.3	444	111
134	--	--	--	--	123	10.1	153	14.8	183	20.2	203	24.3	233	32.2	263	40.2	293	49.3	323	60.1	353	71.1	383	83	413	95.9	443	110.5
136	--	--	--	--	122	10	152	14.6	182	20	202	24	232	31.9	262	39.9	292	49	322	59.7	352	70.7	382	82.5	412	95.4	442	110
138	--	--	--	--	121	9.8	151	14.4	181	19.8	201	23.8	231	31.6	261	39.6	291	48.6	321	59.3	351	70.2	381	82.1	411	94.9	441	109.5
140	--	--	--	--	120	9.6	150	14.2	180	19.5	200	23.5	230	31.3	260	39.3	290	48.3	320	59	350	69.8	380	81.7	410	94.5	440	109

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,2}$ for GSE and GSI - Full or partial nailing - F2

Blank	Total number of nails in the header		k_{H2}	
	Full nailing	Partial nailing	Full nailing	Partial nailing
300	12	6	5,6	2.6
340	12	8	5,6	4.3
380	12	8	5,6	4.3
440	22	12	16,0	9
500	28	14	24,7	12
540	32	16	31,7	15.4
600	38	20	43,6	23.4
660	44	22	57,5	28.1
720	50	26	73,3	38.8
780	56	28	91,0	44.7
840	62	32	110,6	57.9
900	68	38	132,1	65.1
960	74	38	155,6	80.9
1020	80	40	180,9	89.4

GSE/GSI and GLE/GLI fire resistance R30 to EN 13501-2

Performance declared: 30 minutes resistance to Fire (R30) to EN 13501-2 with all faces of the hanger exposed to the fire (Table 3). The performance values were determined by a static model developed by SST validated and verified by testing to EN 1365-2 and ETAG 015 by the Assessment Report *BTC 18511FA* issued by the Building Test Centre (UKAS accredited No. 0296 and member of the Fire Test Study Group, FTSP).

Scope of Certification: This certification applies to the following products and sizes GSE/GSI and GLE/GLI range of 4mm thick (ETA-06/0270).

Table 1: GSE/GSI (4mm thickness) Hanger Height (mm)

Blank Length (mm)	Seat Width (mm)					
	100	120	140	160	180	200
380	140	130	-	-	-	-
440	170	160	-	-	-	-
500	200	190	180	170	160	150
540	220	210	200	190	180	170
600	250	240	230	220	210	200
660	280	270	260	250	240	230
720	310	300	290	280	270	260
780	340	330	320	310	300	290
840	370	360	350	340	330	320
900	400	390	380	370	360	350
960	430	420	410	400	390	380
1020	460	450	440	430	420	410

Table 2: GLE/GLI (4mm thickness) Hanger Height (mm)

Blank Length (mm)	Seat Width (mm)					
	100	120	140	160	180	200
380	140	-	-	-	-	-
440	170	160	150	140	-	-
500	200	190	180	170	-	-
540	220	210	200	190	-	-
600	250	240	230	220	-	-
660	280	270	260	250	-	-
720	310	300	290	280	-	-
780	-	-	-	-	-	-
840	-	-	-	-	-	-
900	-	-	-	-	-	-
960	-	-	-	-	-	-
1020	-	-	-	-	-	-

Service Class: 1 and 2 to Eurocode 5.

Fasteners: Fully nailed with CNA4,0x75mm or CSA5.0x80 (ETA-04/0013).

Timber: Untreated C24 strength class timber to EN338. The joist was exposed on 3 faces (sides and bottom) and the header on 2 faces (side and bottom).

Boundary conditions:

- Header height ≥ Joist height ≥ Hanger height + 10mm

- Joist end shall be within the header face edges
- Member width ≥ 100mm
- Gap between members ≤ 3mm

Any other relevant National minimum requirement shall be fulfilled.

Table 3: Characteristic vertical load bearing capacity R30 to EN 13501-2, $F_{v,Rk,fi}$, in kN

Blank Length (mm)	Seat Width (mm) 100	120	140	160	180	200
380	1	1	-	-	-	-
440	2.52	2.52	2.52	2.52	-	-
500	3.55	3.55	2.52	2.52	2.52	2.52
540	4.72	4.72	3.55	3.55	3.55	3.55
600	7.3	7.3	5.98	5.98	5.98	5.98
660	8.65	8.65	7.3	7.3	7.3	7.3
720	11.4	11.4	10.03	10.03	10.03	10.03
780	12.76	12.76	11.4	11.4	11.4	11.4
840	15.44	15.44	14.11	14.11	14.11	14.11
900	18.04	18.04	15.44	15.44	15.44	15.44
960	19.32	19.32	16.75	16.75	16.75	16.75
1020	20.57	20.57	19.32	19.32	19.32	19.32

$$E_{d,fi} \leq R_{d,30,fi}$$
$$R_{d,30,fi} = F_{v,Rk,fi} / \gamma_{M,fi}$$

where,
$E_{d,fi}$ is the design effect of actions for the fire situation, determined in accordance with EN 1995-1-2.
$R_{d,30,fi}$ is the design resistance in the fire situation.
$\gamma_{M,fi}$ is the material safety factor for the fire situation. The value is 1, unless otherwise specify in the National annex.

Simplified calculation of $E_{d,fi}$ according to Eurocode 5 part 1-2:

$$E_{d,fi} = \eta_{fi} E_d \quad (2.8)$$

where:

E_d is the design effect of actions for normal temperature design for the fundamental combination of actions, see EN 1990:2002;

η_{fi} is the reduction factor for the design load in the fire situation.

(3) The reduction factor η_{fi} for load combination (6.10) in EN 1990:2002 should be taken as

$$\eta_{fi} = \frac{G_k + \psi_{fi} Q_{k,1}}{\gamma_G G_k + \gamma_{Q,1} Q_{k,1}} \quad (2.9)$$

or, for load combinations (6.10a) and (6.10b) in EN 1990:2002, as the smallest value given by the following two expressions

$$\eta_{fi} = \frac{G_k + \psi_{fi} Q_{k,1}}{\gamma_G G_k + \gamma_{Q,1} Q_{k,1}} \quad (2.9a)$$

$$\eta_{fi} = \frac{G_k + \psi_{fi} Q_{k,1}}{\xi \gamma_G G_k + \gamma_{Q,1} Q_{k,1}} \quad (2.9b)$$

where:

$Q_{k,1}$ is the characteristic value of the leading variable action;

G_k is the characteristic value of the permanent action;

γ_G is the partial factor for permanent actions;

$\gamma_{Q,1}$ is the partial factor for variable action 1;

[AC2] ψ_{fi} is the combination factor for frequent values of variable actions in the fire situation, given either by $\psi_{1,1}$ or $\psi_{2,1}$, see EN 1991-1-1; [AC2]

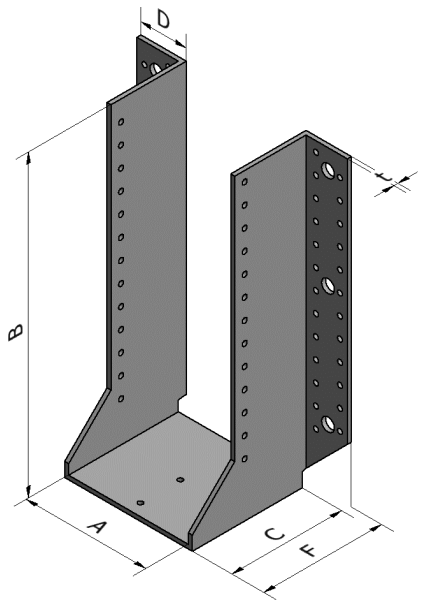
ξ is a reduction factor for unfavourable permanent actions G.

D18 GSE-AL Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
GSE-AL	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
500/2.5X-AL	135-200	(500-A)/2	110	42.5	115	2.5	22	Ø5	2	Ø13	12	Ø5
540/2.5X-AL	135-200	(540-A)/2	110	42.5	115	2.5	26	Ø5	4	Ø13	14	Ø5
600/2.5X-AL	135-200	(600-A)/2	110	42.5	115	2.5	32	Ø5	4	Ø13	18	Ø5
660/2.5X-AL	135-200	(660-A)/2	110	42.5	115	2.5	38	Ø5	4	Ø13	20	Ø5
720/2.5X-AL	135-200	(720-A)/2	110	42.5	115	2.5	44	Ø5	6	Ø13	24	Ø5
780/2.5X-AL	135-200	(780-A)/2	110	42.5	115	2.5	50	Ø5	6	Ø13	26	Ø5
840/2.5X-AL	135-200	(840-A)/2	110	42.5	115	2.5	56	Ø5	6	Ø13	30	Ø5
900/2.5X-AL	135-200	(900-A)/2	110	42.5	115	2.5	62	Ø5	6	Ø13	32	Ø5
960/2.5X-AL	135-200	(960-A)/2	110	42.5	115	2.5	66	Ø5	6	Ø13	34	Ø5
1020/2.5X-AL	135-200	(1020-A)/2	110	42.5	115	2.5	74	Ø5	6	Ø13	38	Ø5
500/4X-AL	135-200	(500-A)/2	110	45.5	118	4	22	Ø5	2	Ø13	12	Ø5
540/4X-AL	135-200	(540-A)/2	110	45.5	118	4	26	Ø5	4	Ø13	14	Ø5
600/4X-AL	135-200	(600-A)/2	110	45.5	118	4	32	Ø5	4	Ø13	18	Ø5
660/4X-AL	135-200	(660-A)/2	110	45.5	118	4	38	Ø5	4	Ø13	20	Ø5
720/4X-AL	135-200	(720-A)/2	110	45.5	118	4	44	Ø5	6	Ø13	24	Ø5
780/4X-AL	135-200	(780-A)/2	110	45.5	118	4	50	Ø5	6	Ø13	26	Ø5
840/4X-AL	135-200	(840-A)/2	110	45.5	118	4	56	Ø5	6	Ø13	30	Ø5
900/4X-AL	135-200	(900-A)/2	110	45.5	118	4	62	Ø5	6	Ø13	32	Ø5
960/4X-AL	135-200	(960-A)/2	110	45.5	118	4	66	Ø5	6	Ø13	34	Ø5
1020/4X-AL	135-200	(1020-A)/2	110	45.5	118	4	74	Ø5	6	Ø13	38	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger GSE-AL and GSI-AL - Full nailing - F1

	500-AL		540-AL		600-AL		660-AL		720-AL		780-AL		840-AL		900-AL		960-AL		1020-AL	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	22	12	26	14	32	18	38	20	44	24	50	26	56	30	62	32	66	34	74	38
A	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$
136	182	33.4	202	41.6	232	55.0	262	70.9	292	88.2	322	107.8	352	128.9	382	152.3	412	177.7	420	204.5
138	181	33.1	201	41.2	231	54.6	261	70.4	291	87.6	321	107.2	351	128.2	381	151.5	411	176.8	441	203.5
140	180	32.7	200	40.8	230	54.1	260	69.8	290	87	320	106.5	350	127.4	380	150.7	410	175.9	440	202.6
142	179	32.4	199	40.4	229	53.6	259	69.3	289	86.4	319	105.8	349	126.7	379	149.9	409	175.1	439	201.7
144	178	32.0	198	40.0	228	53.2	258	68.8	288	85.8	318	105.2	348	126	378	149.1	408	174.2	438	200.7
146	177	31.7	197	39.6	227	52.7	257	68.3	287	85.2	317	104.5	347	125.2	377	148.3	407	173.3	437	199.8
148	176	31.4	196	39.2	226	52.3	256	67.7	286	84.6	316	103.8	346	124.5	376	147.5	406	172.5	436	198.9
150	175	31.0	195	38.8	225	51.8	255	67.2	285	84	315	103.2	345	123.8	375	146.7	405	171.6	435	198
152	174	30.7	194	38.4	224	51.4	254	66.7	284	83.4	314	102.5	344	123.1	374	146	404	170.8	434	197
154	173	30.3	193	38.0	223	50.9	253	66.2	283	82.8	313	101.9	343	122.3	373	145.2	403	169.9	433	196.1
156	172	30.0	192	37.7	222	50.5	252	65.6	282	82.2	312	101.2	342	121.6	372	144.4	402	169.1	432	195.2
158	171	29.7	191	37.3	221	50.0	251	65.1	281	81.6	311	100.5	341	120.9	371	143.6	401	168.2	431	194.3
160	170	29.3	190	36.9	220	49.5	250	64.6	280	81.1	310	99.9	340	120.2	370	142.8	400	167.4	430	193.4
162	169	29.0	189	36.5	219	49.1	249	64.1	279	80.5	309	99.2	339	119.5	369	142	399	166.5	429	192.5
164	168	28.6	188	36.1	218	48.6	248	63.5	278	79.9	308	98.6	338	118.7	368	141.2	398	165.7	428	191.5
166	167	28.3	187	35.7	217	48.2	247	63	277	79.3	307	97.9	337	118	367	140.5	397	164.8	427	190.6
168	166	28.0	186	35.3	216	47.8	246	62.5	276	78.7	306	97.3	336	117.3	366	139.7	396	164	426	189.7
170	165	27.6	185	35.0	215	47.3	245	62	275	78.1	305	96.6	335	116.6	365	138.9	395	163.1	425	188.8
172	164	27.3	184	34.6	214	46.9	244	61.5	274	77.6	304	96	334	115.9	364	138.1	394	162.3	424	187.9
174	163	27.0	183	34.2	213	46.4	243	61	273	77	303	95.3	333	115.2	363	137.4	393	161.4	423	187
176	162	26.6	182	33.8	212	46.0	242	60.5	272	76.4	302	94.7	332	114.5	362	136.6	392	160.6	422	186.1
178	161	26.3	181	33.5	211	45.5	241	60	271	75.8	301	94.1	331	113.8	361	135.8	391	159.8	421	185.2
180	160	26.0	180	33.1	210	45.1	240	59.4	270	75.3	300	93.4	330	113.1	360	135	390	158.9	420	184.3
182	159	25.7	179	32.7	209	44.7	239	58.9	269	74.7	299	92.8	329	112.4	359	134.3	389	158.1	419	183.4
184	158	25.3	178	32.3	208	44.2	238	58.4	268	74.1	298	92.1	328	111.7	358	133.5	388	157.3	418	182.5
186	157	25.0	177	32.0	207	43.8	237	57.9	267	73.6	297	91.5	327	111	357	132.7	387	156.4	417	181.6
188	156	24.7	176	31.6	206	43.3	236	57.4	266	73	296	90.9	326	110.3	356	132	386	155.6	416	180.7
190	155	24.4	175	31.2	205	42.9	235	56.9	265	72.4	295	90.2	325	109.6	355	131.2	385	154.8	415	179.8
192	154	24.0	174	30.9	204	42.5	234	56.4	264	71.9	294	89.6	324	108.9	354	130.5	384	153.9	414	178.9
194	153	23.7	173	30.5	203	42.1	233	55.9	263	71.3	293	89	323	108.2	353	129.7	383	153.1	413	178.1
196	152	23.4	172	30.1	202	41.6	232	55.4	262	70.7	292	88.4	322	107.5	352	128.9	382	152.3	412	177.2
198	151	23.1	171	29.8	201	41.2	231	54.9	261	70.2	291	87.7	321	106.8	351	128.2	381	151.5	411	176.3
200	150	22.8	170	29.4	200	40.8	230	54.4	260	69.6	290	87.1	320	106.1	350	127.4	380	150.7	410	175.4

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,1}$ for Joist Hanger GSE-AL and GSI-AL - Partial nailing - F1

	500-AL		540-AL		600-AL		660-AL		720-AL		780-AL		840-AL		900-AL		960-AL		1020-AL	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	12	6	14	8	18	10	20	10	24	12	26	14	30	16	32	16	34	18	38	20
A	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$	B	$k_{H.1}$
136	182	20.6	202	24.4	232	31.7	262	40.6	292	49.7	322	59.5	352	70.6	382	83.2	412	96.1	442	109.9
138	181	20.4	201	24.2	231	31.5	261	40.3	291	49.4	321	59.2	351	70.2	381	82.8	411	95.7	441	109.4
140	180	20.2	200	23.9	230	31.2	260	40	290	49	320	58.8	350	69.8	380	82.4	410	95.2	440	108.9
142	179	20.0	199	23.7	229	31.5	259	39.7	289	48.7	319	58.4	349	69.4	379	81.9	409	94.6	439	108.4
144	178	19.8	198	23.5	228	31.3	258	39.4	288	48.4	318	58.1	348	69	378	81.5	408	94.1	438	107.9
146	177	19.6	197	23.3	227	31.0	257	39.1	287	48	317	57.7	347	68.6	377	81.1	407	93.7	437	107.4
148	176	19.3	196	23.0	226	30.8	256	38.8	286	47.7	316	57.4	346	68.2	376	80.7	406	93.2	436	106.9
150	175	19.1	195	22.8	225	30.5	255	38.5	285	47.4	315	57	345	67.8	375	80.2	405	92.7	435	106.4
152	174	18.9	194	22.6	224	30.3	254	38.2	284	47	314	56.6	344	67.4	374	79.8	404	92.3	434	105.9
154	173	18.7	193	22.4	223	30.0	253	37.9	283	46.7	313	56.3	343	67	373	79.4	403	91.8	433	105.4
156	172	18.5	192	22.2	222	29.7	252	37.6	282	46.4	312	55.9	342	66.6	372	79	402	91.4	432	105
158	171	18.3	191	21.9	221	29.5	251	37.3	281	46	311	55.6	341	66.2	371	78.5	401	90.9	431	104.5
160	170	18.1	190	21.7	220	29.2	250	37	280	45.7	310	55.2	340	65.8	370	78.1	400	90.5	430	104
162	169	17.9	189	21.5	219	29.0	249	36.7	279	45.4	309	54.9	339	65.4	369	77.7	399	90	429	103.5
164	168	17.7	188	21.3	218	28.7	248	36.4	278	45.1	308	54.5	338	65.1	368	77.3	398	89.6	428	103
166	167	17.5	187	21.1	217	28.5	247	36.2	277	44.7	307	54.2	337	64.7	367	76.9	397	89.1	427	102.5
168	166	17.3	186	20.8	216	28.2	246	35.9	276	44.4	306	53.8	336	64.3	366	76.4	396	88.7	426	102
170	165	17.1	185	20.6	215	28.0	245	35.6	275	44.1	305	53.5	335	63.9	365	76	395	88.2	425	101.6
172	164	16.9	184	20.4	214	27.7	244	35.3	274	43.8	304	53.1	334	63.5	364	75.6	394	87.8	424	101.1
174	163	16.7	183	20.2	213	27.5	243	35	273	43.4	303	52.8	333	63.1	363	75.2	393	87.4	423	100.6
176	162	16.5	182	20.0	212	27.2	242	34.7	272	43.1	302	52.4	332	62.7	362	74.8	392	86.9	422	100.1
178	161	16.3	181	19.8	211	27.0	241	34.4	271	42.8	301	52.1	331	62.4	361	74.3	391	86.5	421	99.7
180	160	16.1	180	19.5	210	26.7	240	34.1	270	42.5	300	51.7	330	62	360	73.9	390	86	420	99.2
182	159	15.9	179	19.3	209	26.5	239	33.9	269	42.2	299	51.4	329	61.6	359	73.5	389	85.6	419	98.7
184	158	15.7	178	19.1	208	26.2	238	33.6	268	41.8	298	51	328	61.2	358	73.1	388	85.1	418	98.2
186	157	15.5	177	18.9	207	26.0	237	33.3	267	41.5	297	50.7	327	60.8	357	72.7	387	84.7	417	97.8
188	156	15.3	176	18.7	206	25.7	236	33	266	41.2	296	50.3	326	60.5	356	72.3	386	84.3	416	97.3
190	155	15.1	175	18.5	205	25.5	235	32.7	265	40.9	295	50	325	60.1	355	71.9	385	83.8	415	96.8
192	154	14.9	174	18.3	204	25.2	234	32.4	264	40.6	294	49.7	324	59.7	354	71.5	384	83.4	414	96.3
194	153	14.8	173	18.1	203	25.0	233	32.2	263	40.3	293	49.3	323	59.3	353	71.1	383	83	413	95.9
196	152	14.6	172	17.8	202	24.8	232	31.9	262	40	292	49	322	59	352	70.7	382	82.5	412	95.4
198	151	14.4	171	17.6	201	24.5	231	31.6	261	39.6	291	48.6	321	58.6	351	70.2	381	82.1	411	94.9
200	150	14.2	170	17.4	200	24.3	230	31.3	260	39.3	290	48.3	320	58.2	350	69.8	380	81.7	410	94.5

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,2}$ for GSE-AL and GSI-AL - Full or partial nailing - F2

Blank	Total number of nails in the header		k_{H2}	
	Full nailing	Partial nailing	Full nailing	Partial nailing
500	22	12	16	9.0
540	26	14	21.6	12.0
600	32	18	31.7	19.2
660	38	20	43.6	23.4
720	44	24	57.5	33.2
780	50	26	73.3	38.8
840	56	30	91	51.1
900	62	32	110.6	57.9
960	68	34	132.1	72.8
1020	74	38	155.6	80.9

GSE-AL fire resistance R30 to EN 13501-2

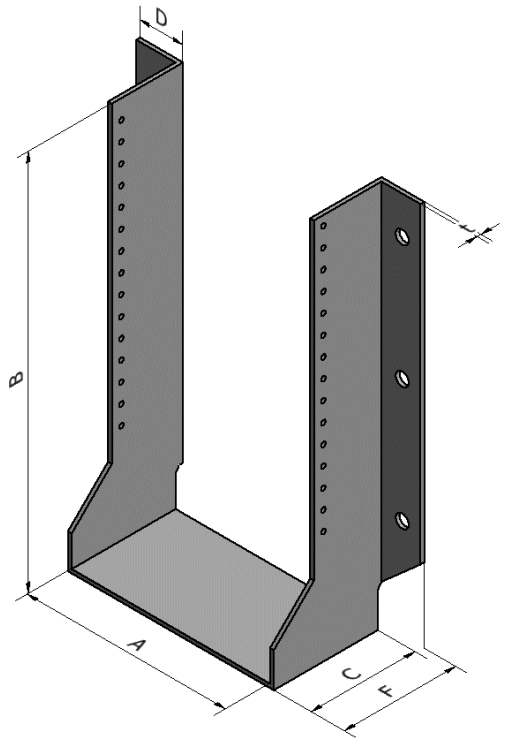
See GSE Joist hanger

D19 GSEXL Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
GSEXL	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes			
							Header		Joist	
	A	B	C	D	F	t	Qty	size	Qty	size
720	201-270	(720 - A)/2	110	42.5	118	4	4	Ø14	16	Ø5
1020	201-270	(1020 - A)/2	110	42.5	118	4	6	Ø14	30	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-



Characteristic capacity for GSEXL - Full nailing - F1 F2 F3 F4 - timber to rigid support

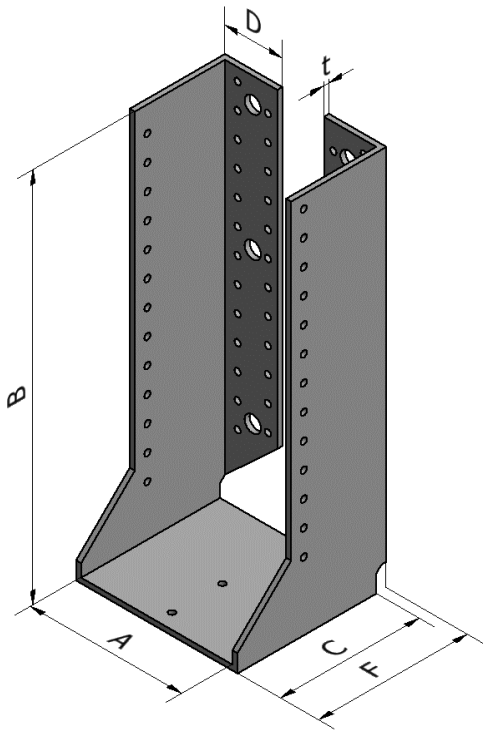
See formulas from Annex C for characteristic values calculation

D20 GSI Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
GSI	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
300/2.5X	76-110	(300-A)/2	110	42.5	115	2.5	12	Ø5	2	Ø13	6	Ø5
340/2.5X	76-110	(340-A)/2	110	42.5	115	2.5	16	Ø5	2	Ø13	8	Ø5
380/2.5X	76-140	(380-A)/2	110	42.5	115	2.5	16	Ø5	4	Ø13	8	Ø5
440/2.5X	76-140	(440-A)/2	110	42.5	115	2.5	22	Ø5	4	Ø13	12	Ø5
500/2.5X	76-140	(500-A)/2	110	42.5	115	2.5	28	Ø5	4	Ø13	14	Ø5
540/2.5X	76-140	(540-A)/2	110	42.5	115	2.5	32	Ø5	4	Ø13	16	Ø5
600/2.5X	76-140	(600-A)/2	110	42.5	115	2.5	38	Ø5	4	Ø13	20	Ø5
660/2.5X	76-140	(660-A)/2	110	42.5	115	2.5	44	Ø5	6	Ø13	22	Ø5
720/2.5X	76-140	(720-A)/2	110	42.5	115	2.5	50	Ø5	6	Ø13	26	Ø5
780/2.5X	76-140	(780-A)/2	110	42.5	115	2.5	56	Ø5	6	Ø13	28	Ø5
840/2.5X	76-140	(840-A)/2	110	42.5	115	2.5	62	Ø5	6	Ø13	32	Ø5
900/2.5X	76-140	(900-A)/2	110	42.5	115	2.5	68	Ø5	6	Ø13	38	Ø5
960/2.5X	76-140	(960-A)/2	110	42.5	115	2.5	74	Ø5	6	Ø13	38	Ø5
1020/2.5X	76-140	(1020-A)/2	110	42.5	115	2.5	80	Ø5	6	Ø13	40	Ø5
300/4X	76-110	(300-A)/2	110	45.5	118	4	12	Ø5	2	Ø13	6	Ø5
340/4X	76-110	(340-A)/2	110	45.5	118	4	16	Ø5	2	Ø13	8	Ø5
380/4X	76-140	(380-A)/2	110	45.5	118	4	16	Ø5	4	Ø13	8	Ø5
440/4X	76-140	(440-A)/2	110	45.5	118	4	22	Ø5	4	Ø13	12	Ø5
500/4X	76-140	(500-A)/2	110	45.5	118	4	28	Ø5	4	Ø13	14	Ø5
540/4X	76-140	(540-A)/2	110	45.5	118	4	32	Ø5	4	Ø13	16	Ø5
600/4X	76-140	(600-A)/2	110	45.5	118	4	38	Ø5	4	Ø13	20	Ø5
660/4X	76-140	(660-A)/2	110	45.5	118	4	44	Ø5	6	Ø13	22	Ø5
720/4X	76-140	(720-A)/2	110	45.5	118	4	50	Ø5	6	Ø13	26	Ø5
780/4X	76-140	(780-A)/2	110	45.5	118	4	56	Ø5	6	Ø13	28	Ø5
840/4X	76-140	(840-A)/2	110	45.5	118	4	62	Ø5	6	Ø13	32	Ø5
900/4X	76-140	(900-A)/2	110	45.5	118	4	68	Ø5	6	Ø13	38	Ø5
960/4X	76-140	(960-A)/2	110	45.5	118	4	74	Ø5	6	Ø13	38	Ø5
1020/4X	76-140	(1020-A)/2	110	45.5	118	4	80	Ø5	6	Ø13	40	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger GSI/2.5X and GSI/4X - Full nailing - F1

See GSE Joist hanger

$k_{H,1}$ for Joist Hanger GSI/2.5X and GSI/4X - Partial nailing - F1

See GSE Joist hanger

$k_{H,2}$ for GSI - Full or partial nailing - F2

See GSE Joist hanger

GSI fire resistance R30 to EN 13501-2

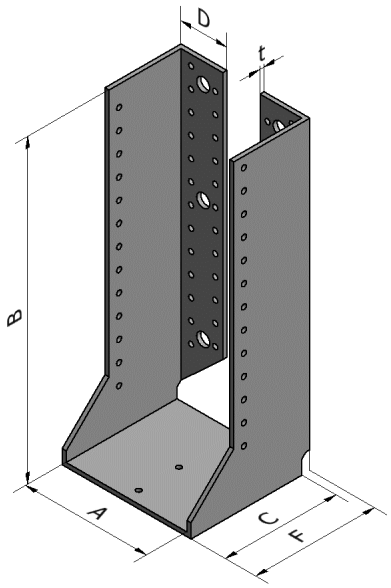
See GSE Joist hanger

D21 GSI-AL Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
GSI-AL	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
500/2.5X-AL	135-200	(500-A)/2	110	42.5	115	2.5	22	Ø5	2	Ø13	12	Ø5
540/2.5X-AL	135-200	(540-A)/2	110	42.5	115	2.5	26	Ø5	4	Ø13	14	Ø5
600/2.5X-AL	135-200	(600-A)/2	110	42.5	115	2.5	32	Ø5	4	Ø13	18	Ø5
660/2.5X-AL	135-200	(660-A)/2	110	42.5	115	2.5	38	Ø5	4	Ø13	20	Ø5
720/2.5X-AL	135-200	(720-A)/2	110	42.5	115	2.5	44	Ø5	6	Ø13	24	Ø5
780/2.5X-AL	135-200	(780-A)/2	110	42.5	115	2.5	50	Ø5	6	Ø13	26	Ø5
840/2.5X-AL	135-200	(840-A)/2	110	42.5	115	2.5	56	Ø5	6	Ø13	30	Ø5
900/2.5X-AL	135-200	(900-A)/2	110	42.5	115	2.5	62	Ø5	6	Ø13	32	Ø5
960/2.5X-AL	135-200	(960-A)/2	110	42.5	115	2.5	66	Ø5	6	Ø13	34	Ø5
1020/2.5X-AL	135-200	(1020-A)/2	110	42.5	115	2.5	74	Ø5	6	Ø13	38	Ø5
500/4X-AL	135-200	(500-A)/2	110	45.5	118	4	22	Ø5	2	Ø13	12	Ø5
540/4X-AL	135-200	(540-A)/2	110	45.5	118	4	26	Ø5	4	Ø13	14	Ø5
600/4X-AL	135-200	(600-A)/2	110	45.5	118	4	32	Ø5	4	Ø13	18	Ø5
660/4X-AL	135-200	(660-A)/2	110	45.5	118	4	38	Ø5	4	Ø13	20	Ø5
720/4X-AL	135-200	(720-A)/2	110	45.5	118	4	44	Ø5	6	Ø13	24	Ø5
780/4X-AL	135-200	(780-A)/2	110	45.5	118	4	50	Ø5	6	Ø13	26	Ø5
840/4X-AL	135-200	(840-A)/2	110	45.5	118	4	56	Ø5	6	Ø13	30	Ø5
900/4X-AL	135-200	(900-A)/2	110	45.5	118	4	62	Ø5	6	Ø13	32	Ø5
960/4X-AL	135-200	(960-A)/2	110	45.5	118	4	66	Ø5	6	Ø13	34	Ø5
1020/4X-AL	135-200	(1020-A)/2	110	45.5	118	4	74	Ø5	6	Ø13	38	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger GSI-AL - Full nailing - F1

See GSE-AL Joist hanger

$k_{H,1}$ for Joist Hanger GSI-AL - Partial nailing - F1

See GSE-AL Joist hanger

$k_{H,2}$ for GSI-AL - Full or partial nailing - F2

See GSE-AL Joist hanger

GSI-AL fire resistance R30 to EN 13501-2

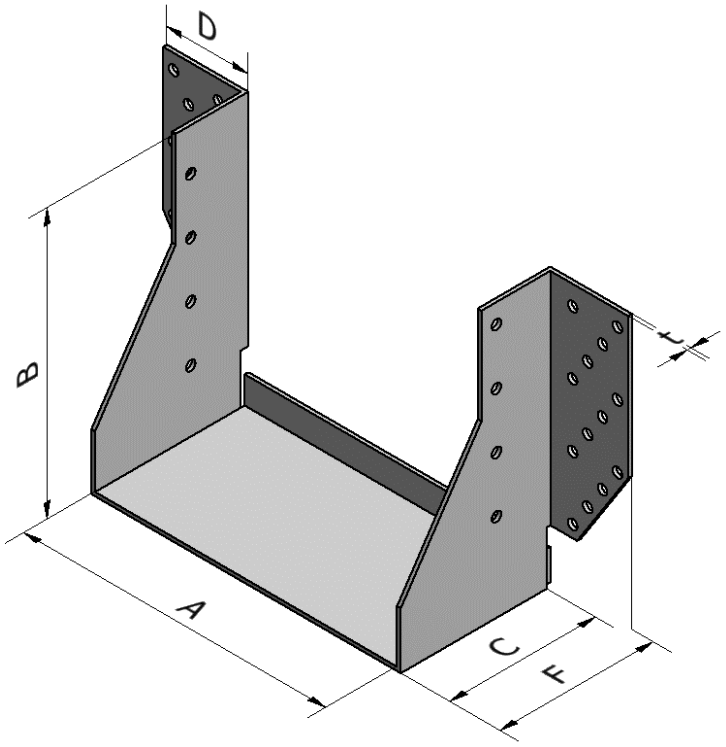
See GSE Joist hanger

D22 HGUQ Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
HGUQ SCR	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes			
							Header		Joist	
	A	B	C	D	F	t	Qty	size	Qty	size
HGUQ SCR	105-202	180	100	54.5	102.5	2.5	26	Ø6.4	8	Ø6.4
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-



Characteristic capacity for HGUQ SCR - F1 and F2 - timber to timber

Model	Fasteners - SDS 6.35x63		Characteristic capacity [kN] - TR26 / C27	
	n_H	n_J	$R_{1,k}$	$R_{2,k}$
HGUQ SCR	26	8	45.5	20.7

* F_k determined according to BS 5268-2:2002

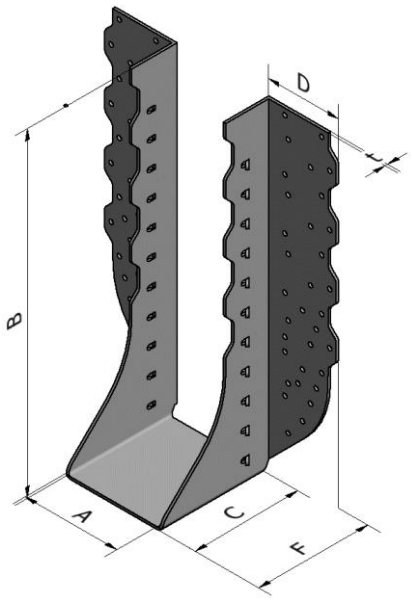
D23 HGUS Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
HGUS	Steel ref 1 - Steel ref 2	-

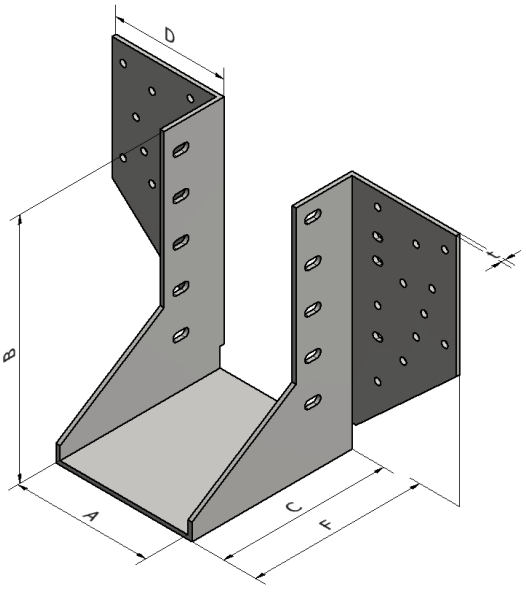
Dimensions

Blank	Dimensions [mm]						Holes			
							Header		Joist	
	A	B	C	D	F	t	Qty	size	Qty	size
HGUS48	92	180	100	66	106.5	2.5	36	Ø5	10	Ø5
HGUS410	92	229	100	66	106.5	2.5	46	Ø5	16	Ø5
HGUS412	92	265	100	66	106.5	2.5	56	Ø5	20	Ø5
HGUS414	92	316	100	66	106.5	2.5	66	Ø5	22	Ø5
HGUS180/135	135	180	100	66	106.5	2.5	36	Ø5	10	Ø5
HGUS5.50/10	140	227	100	66	106.5	2.5	46	Ø5	16	Ø5
HGUS5.50/12	140	265	100	66	106.5	2.5	56	Ø5	20	Ø5
HGUS5.50/14	140	316	100	66	106.5	2.5	66	Ø5	22	Ø5
HGUS7.25/10	184	219	100	66	106.5	2.5	46	Ø5	16	Ø5
HGUS7.25/12	184	270	100	66	106.5	2.5	56	Ø5	20	Ø5
HGUS7.25/14	184	320	100	66	106.5	2.5	66	Ø5	22	Ø5
HGUS125/80	80	122	100	66	106.5	2.5	8	Ø5	16	Ø5
HGUS145/80	80	145	100	66	106.5	2.5	10	Ø5	22	Ø5
HGUS125/105	105	110	100	66	106.5	2.5	8	Ø5	16	Ø5
HGUS145/105	105	145	100	66	106.5	2.5	10	Ø5	22	Ø5
HGUS145/120	120	145	100	66	106.5	2.5	10	Ø5	22	Ø5
HGUS145/155	155	145	100	66	106.5	2.5	10	Ø5	22	Ø5
Spec HGUS48	90-300	180	100	66	106.5	2.5	36	Ø5	10	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-

HGUS



HGUS-N



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger HGUS - Full nailing - F1

Model	n_H	n_J	$k_{H,1}$
HGUS 48	36	10	25.1
HGUS 410	46	16	31.9
HGUS 412	56	20	41.4
HGUS 414	66	22	54.5
HGUS 180/35	36	10	24.8
HGUS 5.5/10	46	16	32.2
HGUS 5.5/12	56	20	41.7
HGUS 5.5/14	66	22	54.9
HGUS 7.25/10	46	16	33.3
HGUS 7.25/12	56	20	43.2
HGUS 7.25/14	66	11	54.7

$k_{H,2}$ for HGUS - Full or partial nailing - F2

Blank	Total number of nails in the header	k_{H2}
	Full nailing	Full nailing
HGUS 48	36	53.35
HGUS 410	46	95.93
HGUS 412	56	145.59
HGUS 414	66	206.72
HGUS 180/35	36	47.7
HGUS 5.5/10	46	94.39
HGUS 5.5/12	56	145.59
HGUS 5.5/14	66	227.17
HGUS 7.25/10	46	96.1
HGUS 7.25/12	56	145.59
HGUS 7.25/14	66	206.72

Fk for Spec HGUS – F1

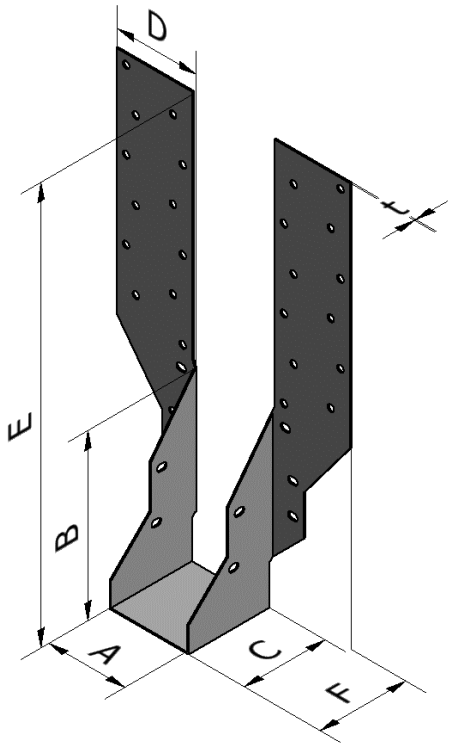
Model	A	B	Type of Fastener	Characteristic capacity
				$R_{1,k}$
Spec HGUS48	90-184	180	4.0x100 Smooth Shank Nails	as HGUS48
Spec HGUS48	185-200	180		49
Spec HGUS48	201-246	180		46.5
Spec HGUS48	247-300	180		43.7

D24 JHA270 Straps hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
JHA270	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]							Holes			
								Header		Joist	
	A	B	C	D	E	F	t	Qty	size	Qty	size
JHA270/38	38	106	50	48.8	241	52.1	0.9	22	Ø4.1	4	Ø4x6
JHA270/44	44	103	50	48.8	238	52.1	0.9	22	Ø4.1	4	Ø4x6
JHA270/47	47	101.5	50	48.8	236.5	52.1	0.9	24	Ø4.1	4	Ø4x6
JHA270/50	50	100	50	48.8	235	52.1	0.9	24	Ø4.1	4	Ø4x6
JHA270/63	63	113.5	50	48.8	248.5	52.1	0.9	22	Ø4.1	4	Ø4x6
JHA270/75	75	107.5	50	48.8	242.5	52.1	0.9	22	Ø4.1	4	Ø4x6
JHA270/91	91	99.5	50	48.8	234	52.1	0.9	22	Ø4.1	4	Ø4x6
JHA270/100	100	95	50	48.8	230	52.1	0.9	22	Ø4.1	4	Ø4x6
Permitted deviation	-	-	±1.0	±1.0		±1.0	-	-	-	-	-



Parameters have to be used with equation in Annex C

Parameters for JHA270 - F1 - timber to timber

Model	l	l_{ef}	S	B_{eff}	a-0.5a_c	e	c_{hor}	kef	d	neff (per flange) round wire
JHA270/38	47	96	28.5	80	112	28	10	1.2	1.1	5
JHA270/44	47	99	28.5	80	112	28	10	1.2	1.1	5
JHA270/47	47	100.5	28.5	80	112	28	10	1.2	1.1	5
JHA270/50	47	102	28.5	80	112	28	10	1.2	1.1	5
JHA270/63	47	107	28.5	76.75	112	28	10	1.2	1.1	5
JHA270/75	47	107	28.5	73.75	112	28	10	1.2	1.1	5
JHA270/91	47	107	28.5	69.75	112	28	10	1.2	1.1	5
JHA270/100	47	107	28.5	67.5	112	28	10	1.2	1.1	5

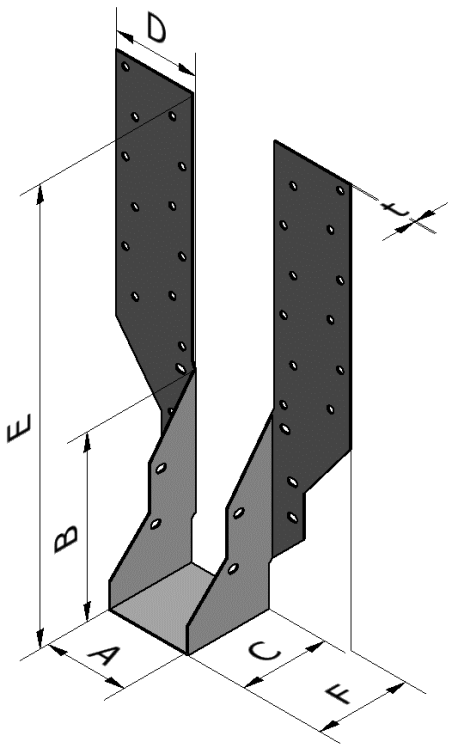
Hanger Type	Installation Configuration	Supporting Timber Fasteners		Supported Timber Fasteners	
		3.75 x 30 ST		ST 3.75 x 30	SS 3.75 x 75
		Top	Face		
JHA270	Face Fix	-	20	4	-
	Wrap Over	4	8	4	-
	Face Fix	-	20	-	4
	Wrap Over	4	8	-	4

D25 JHA450 Straps hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
JHA270	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]							Holes			
								Header		Joist	
	A	B	C	D	E	F	t	Qty	size	Qty	size
JHA450/38	38	191	50	51.5	481	61.5	1.5	38	Ø4	4	Ø4x6
JHA450/44	44	188	50	51.5	478	61.5	1.5	38	Ø4	4	Ø4x6
JHA450/47	47	187	50	51.5	477	61.5	1.5	38	Ø4	4	Ø4x6
JHA450/50	50	185	50	51.5	475	61.5	1.5	38	Ø4	4	Ø4x6
JHA450/63	63	179	50	51.5	469	61.5	1.5	38	Ø4	4	Ø4x6
JHA450/75	75	173	50	51.5	463	61.5	1.5	38	Ø4	4	Ø4x6
JHA450/91	91	165	50	51.5	455	61.5	1.5	38	Ø4	4	Ø4x6
JHA450/100	100	160	50	51.5	450	61.5	1.5	38	Ø4	4	Ø4x6
JHA450/125	125	162.5	63	51.5	452.5	64.5	1.5	38	Ø4	6	Ø4x6
JHA450/137	137	156.5	63	51.5	446.5	64.5	1.5	38	Ø4	6	Ø4x6
JHA450/150	150	150	63	51.5	440	64.5	1.5	38	Ø4	6	Ø4x6
Permitted deviation	-	-	±1.0	±1.0	±1.0	±1.0	-	-	-	-	-



Parameters have to be used with equation in Annex C

Parameters for JHA450 - F1 - timber to timber

Model	l	l_{ef}	S	B_{eff}	a-0.5a_c	e	c_{hor}	kef	d	neff (per flange) round wire
JHA450/38	50	99	35	80	174	36.5	10	1.1	1.1	6
JHA450/44	50	102	35	80	174	36.5	10	1.1	1.1	6
JHA450/47	50	104	35	80	174	36.5	10	1.1	1.1	6
JHA450/50	50	105	35	80	174	36.5	10	1.1	1.1	6
JHA450/63	50	110	35	77	174	36.5	10	1.1	1.1	6
JHA450/75	50	110	35	74	174	36.5	10	1.1	1.1	6
JHA450/91	50	110	35	70	174	36.5	10	1.1	1.1	6
JHA450/100	50	110	35	68	174	36.5	10	1.1	1.1	6
JHA450/125	63	123	44	69	164	31.5	10	1.1	1.1	6
JHA450/137	63	123	44	66	164	31.5	10	1.1	1.1	6
JHA450/150	63	123	44	62	164	31.5	10	1.1	1.1	6

Hanger Type	Installation Configuration	Supporting Timber Fasteners		Supported Timber Fasteners	
		ST 3.75 x 30		ST 3.75 x 30	SS 3.75 x 75
		Top	Face		
JHA450	Face Fix	-	20	6	-
	Wrap Over	4	8	6	-
	Face Fix	-	20	-	6
	Wrap Over	4	8	-	6
	Face Fix*	-	20	6	-
	Wrap Over*	4	4	6	-

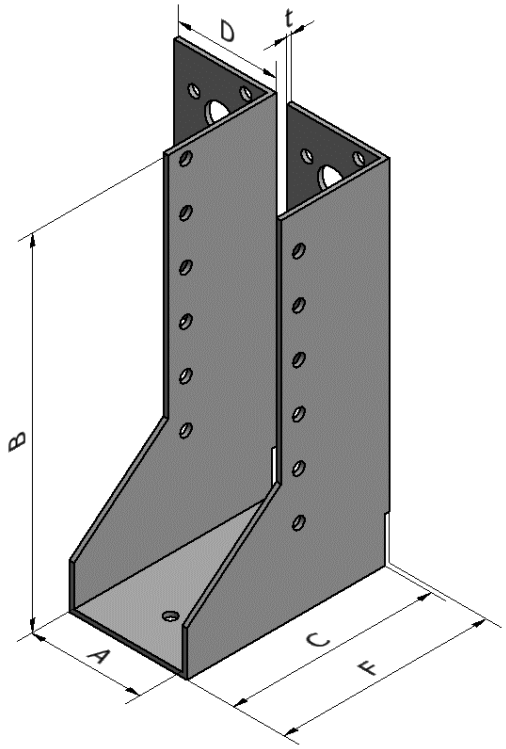
*Under slung installation where the joist sits lower than the header

D26 JHR/L Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
JHR	Steel ref 1 - Steel ref 2	-
JHL	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
JHR34462	46	147	84	41.5	86	2	22	Ø5	4	Ø13	12	Ø5
JHL34462	46	147	84	41.5	86	2	22	Ø5	4	Ø13	12	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-



Characteristic capacity for JHR-L - Full nailing - F1 - timber to timber

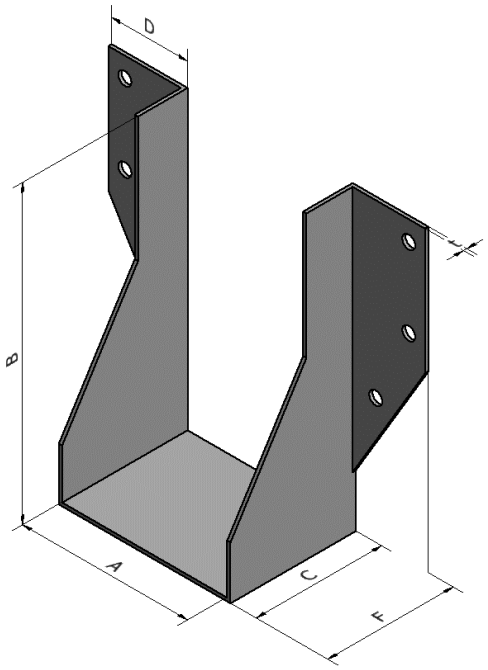
Model	Fasteners						Characteristic capacity [kN] - C24	
	Header				Joist			
	Rigid Support		Timber					
	n_H	Type	n_H	Type	n_J	Type	$R_{1,k}$	$R_{2,k}$
JHR34462	4	Ø12	22	CNA4.0x50	12	CNA4.0x35	17.8	9.7
JHL34462	4	Ø12	22	CNA4.0x50	12	CNA4.0x35	17.8	9.7

D27 LUP Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
LUP	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes			
							Header		Joist	
	A	B	C	D	F	t	Qty	size	Qty	size
LUP230	38-50	(230-A)/2	37	23	38	1	6	Ø5	0	Ø5
LUP24	40	79	38	23.2	39.2	1.2	4	Ø5	0	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger LUP - Full nailing - F1

	LUP230		LUP24	
	nH	nJ	nH	nJ
	6	0	4	0
A	B	kH,1	B	kH,1
38	96	13.7	-	-
44	93	12.9	-	-
50	93	12.9	-	-
40	-	-	79	7.0

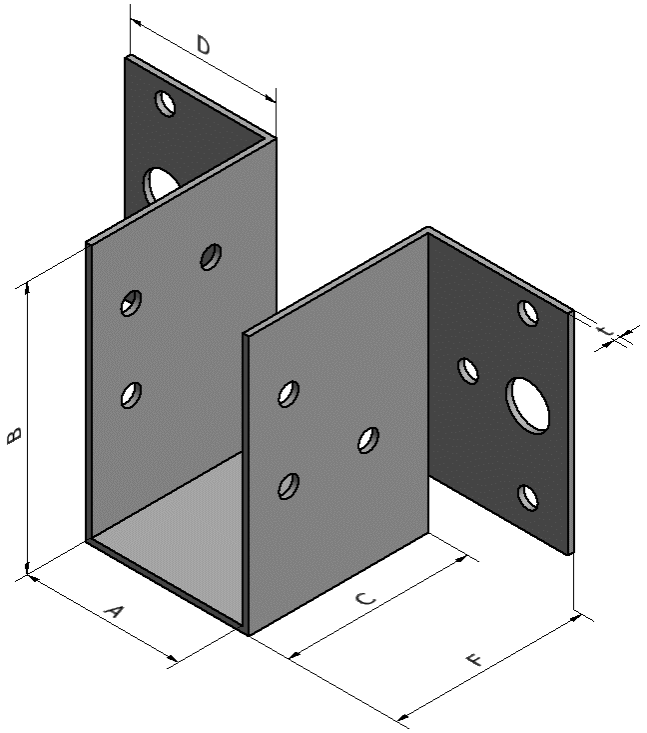
In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

D28 MF Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
MF	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
165	32-60	(165-A)/2	45	36.5	46.5	1.5	6	Ø5	2	Ø11	6	Ø5
180	32-60	(180-A)/2	45	36.5	46.5	1.5	6	Ø5	2	Ø11	6	Ø5
200	32-60	(200-A)/2	45	36.5	46.5	1.5	8	Ø5	2	Ø11	6	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger MF - Full nailing - F1

	165		180		200	
	nH	nJ	nH	nJ	nH	nJ
	6	6	6	6	8	6
A	B	kH,1	B	kH,1	B	kH,1
38	64	10.3	71	10.3	81	15.4
50	58	8.5	65	8.5	75	13.2
60	53	7.1	60	7.1	70	11.4

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,2}$ for MF - Full or partial nailing - F2

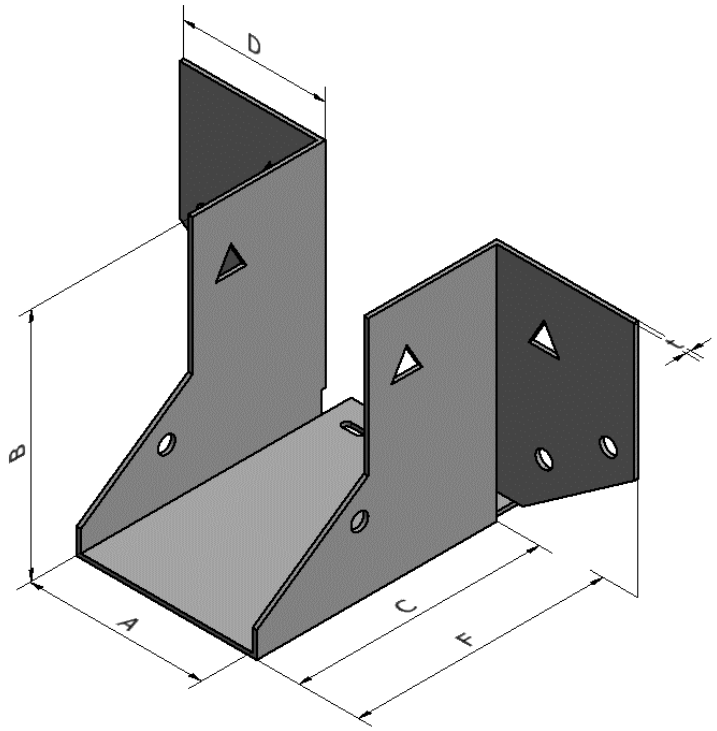
Blank	Total number of nails in the header	k_{H2}
	Full nailing	Full nailing
165	6	8.7
180	6	8.7
230	8	13.9

D29 MH Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
MH	Steel ref 1 - Steel ref 2	-

Dimensions

Model	Dimensions [mm]						Holes			
							Header		Joist	
	A	B	C	D	F	t	Qty	size	Qty	size
MH	40-50	50-55	56	33	63	1	4	Ø4	2	Ø4
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-



Characteristic capacity for MH - Full nailing - F1 - timber to timber and timber

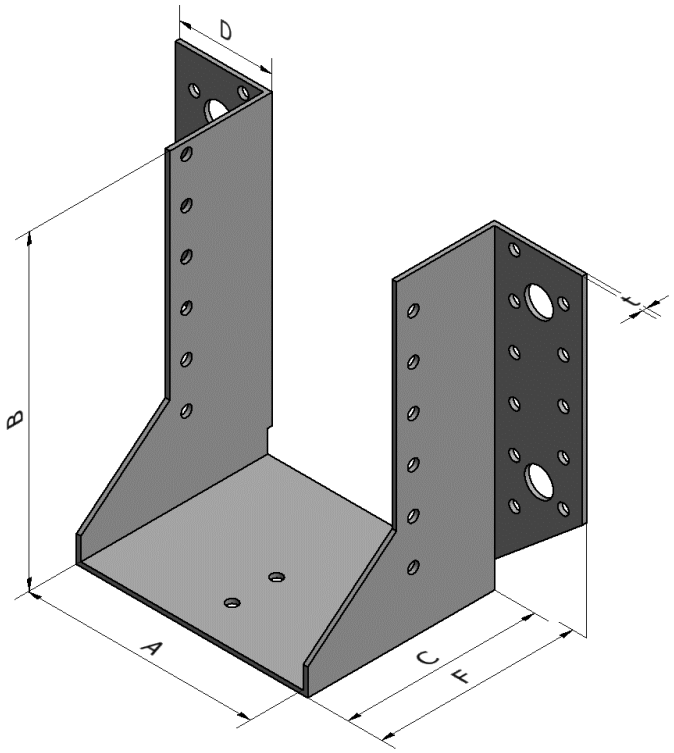
Model	Fasteners - N3.75x30		Characteristic capacity [kN] - C24
	n_H	n_J	$R_{1,k}$
MH	4	2	5.0

D30 SAE Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
SAE	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
200	24-80	(200-A)/2	84	41.5	86	2	8	Ø5	2	Ø11	5	Ø5
250	24-80	(250-A)/2	84	41.5	86	2	12	Ø5	2	Ø11	7	Ø5
300	24-70	(300-A)/2	84	41.5	86	2	18	Ø5	4	Ø13	10	Ø5
340	24-70	(340-A)/2	84	41.5	86	2	22	Ø5	4	Ø13	12	Ø5
380	24-110	(380-A)/2	84	41.5	86	2	22	Ø5	4	Ø13	12	Ø5
440	24-110	(440-A)/2	84	41.5	86	2	28	Ø5	4	Ø13	15	Ø5
500	24-110	(500-A)/2	84	41.5	86	2	34	Ø5	6	Ø13	18	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger SAE and SAIX - Full nailing - F1

	200		250		300		340		380		440		500	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	8	5	12	7	18	10	22	12	22	12	28	15	34	18
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
32	84	11.6	109	18.4	134	31.0	154	41.0	174	51.8	204	71.7	234	94.6
34	83	11.4	108	18.1	133	30.5	153	40.5	173	51.2	203	71.0	233	93.8
36	82	11.1	107	17.7	132	30.1	152	40.0	172	50.7	202	70.3	232	93.0
38	81	10.9	106	17.4	131	29.6	151	39.4	171	50.1	201	69.7	231	92.3
40	80	10.6	105	17.1	130	29.2	150	38.9	170	49.6	200	69.0	230	91.5
42	79	10.4	104	16.8	129	28.7	149	38.4	169	49.0	199	68.3	229	90.7
44	78	10.2	103	16.4	128	28.3	148	37.9	168	48.5	198	67.7	228	89.9
46	77	9.9	102	16.1	127	27.9	147	37.4	167	47.9	197	67.0	227	89.2
48	76	9.7	101	15.8	126	27.4	146	36.9	166	47.4	196	66.4	226	88.4
50	75	9.4	100	15.5	125	27.0	145	36.4	165	46.9	195	65.7	225	87.7
52	74	9.2	99	15.1	124	26.6	144	35.9	164	46.3	194	65.1	224	86.9
54	73	9.0	98	14.8	123	26.1	143	35.4	163	45.8	193	64.4	223	86.1
56	72	8.7	97	14.5	122	25.7	142	34.9	162	45.2	192	63.8	222	85.4
58	71	8.5	96	14.2	121	25.3	141	34.4	161	44.7	191	63.1	221	84.6
60	70	8.3	95	13.9	120	24.8	140	33.9	160	44.2	190	62.5	220	83.9
62	69	8.0	94	13.6	119	24.4	139	33.4	159	43.6	189	61.8	219	83.1
64	68	7.8	93	13.3	118	24.0	138	32.9	158	43.1	188	61.2	218	82.4
66	67	7.6	92	13.0	117	23.6	137	32.4	157	42.6	187	60.6	217	81.6
68	66	7.3	91	12.7	116	23.2	136	31.9	156	42.1	186	59.9	216	80.9
70	65	7.1	90	12.3	115	22.8	135	31.4	155	41.5	185	59.3	215	80.1
72	64	6.9	89	12.0	-	-	-	-	154	41.0	184	58.6	214	79.4
74	63	6.7	88	11.7	-	-	-	-	153	40.5	183	58.0	213	78.6
76	62	6.4	87	11.4	-	-	-	-	152	40.0	182	57.4	212	77.9
78	61	6.2	86	11.2	-	-	-	-	151	39.4	181	56.8	211	77.2
80	60	6.0	85	10.9	-	-	-	-	150	38.9	180	56.1	210	76.4
82	-	-	-	-	-	-	-	-	149	38.4	179	55.5	209	75.7
84	-	-	-	-	-	-	-	-	148	37.9	178	54.9	208	75.0
86	-	-	-	-	-	-	-	-	147	37.4	177	54.3	207	74.2
88	-	-	-	-	-	-	-	-	146	36.9	176	53.6	206	73.5
90	-	-	-	-	-	-	-	-	145	36.4	175	53.0	205	72.8
92	-	-	-	-	-	-	-	-	144	35.9	174	52.4	204	72.1
94	-	-	-	-	-	-	-	-	143	35.4	173	51.8	203	71.3
96	-	-	-	-	-	-	-	-	142	34.9	172	51.2	202	70.6
98	-	-	-	-	-	-	-	-	141	34.4	171	50.6	201	69.9
100	-	-	-	-	-	-	-	-	140	33.9	170	50.0	200	69.2
102	-	-	-	-	-	-	-	-	139	33.4	169	49.4	199	68.5
104	-	-	-	-	-	-	-	-	138	32.9	168	48.8	198	67.8
106	-	-	-	-	-	-	-	-	137	32.4	167	48.2	197	67.1
108	-	-	-	-	-	-	-	-	136	31.9	166	47.6	196	66.4
110	-	-	-	-	-	-	-	-	135	31.4	165	47.0	195	65.7

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,1}$ for Joist Hanger SAE and SAIX - Partial nailing - F1

	200		250		300		340		380		440		500	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	4	3	6	4	10	6	12	6	12	6	14	8	18	10
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
32	84	7.7	109	11.7	134	22.3	154	25.0	174.0	31.4	204	41.2	234	58.6
34	83	7.5	108	11.5	133	22.0	153	24.7	173.0	31.1	203	40.8	233	58.2
36	82	7.4	107	11.3	132	21.7	152	24.4	172.0	30.7	202	40.5	232	57.7
38	81	7.2	106	11.1	131	21.4	151	24.1	171.0	30.4	201	40.1	231	57.2
40	80	7.1	105	10.9	130	21.1	150	23.8	170.0	30.1	200	39.7	230	56.8
42	79	7.0	104	10.7	129	20.8	149	23.5	169.0	29.8	199	39.4	229	56.3
44	78	6.8	103	10.6	128	20.6	148	23.2	168.0	29.4	198.0	39.0	228.0	55.9
46	77	6.7	102	10.4	127	20.3	147	22.9	167.0	29.1	197	38.7	227	55.4
48	76	6.5	101	10.2	126	20.0	146	22.6	166.0	28.8	196.0	38.3	226.0	55.0
50	75	6.4	100	10.0	125	19.7	145	22.3	165.0	28.5	195.0	37.9	225.0	54.5
52	74	6.3	99	9.8	124	19.4	144	22.0	164.0	28.2	194	37.6	224	54.1
54	73	6.1	98	9.6	123	19.1	143	21.7	163.0	27.8	193	37.2	223	53.6
56	72	6.0	97	9.4	122	18.9	142	21.4	162.0	27.5	192.0	36.9	222.0	53.2
58	71	5.8	96	9.3	121	18.6	141	21.1	161.0	27.2	191.0	36.5	221.0	52.7
60	70	5.7	95	9.1	120	18.3	140	20.8	160.0	26.9	190.0	36.2	220.0	52.3
62	69	5.6	94	8.9	119	18.0	139	20.5	159.0	26.6	189.0	35.8	219.0	51.8
64	68	5.4	93	8.7	118	17.7	138	20.2	158.0	26.3	188.0	35.5	218.0	51.4
66	67	5.3	92	8.5	117	17.4	137	19.9	157.0	25.9	187	35.1	217	50.9
68	66	5.2	91	8.4	116	17.2	136	19.6	156.0	25.6	186.0	34.7	216.0	50.5
70	65	5.0	90	8.2	115	16.9	135	19.3	155.0	25.3	185.0	34.4	215.0	50.0
72	64	4.9	89	8.0	-	-	-	-	154.0	25.0	184.0	34.0	214.0	49.6
74	63	4.7	88	7.8	-	-	-	-	153.0	24.7	183.0	33.7	213.0	49.2
76	62	4.6	87	7.6	-	-	-	-	152.0	24.4	182.0	33.4	212.0	48.7
78	61	4.5	86	7.5	-	-	-	-	151.0	24.1	181	33.0	211	48.3
80	60	4.3	85	7.3	-	-	-	-	150.0	23.8	180	32.7	210	47.8
82	-	-	-	-	-	-	-	-	149.0	23.5	179	32.3	209	47.4
84	-	-	-	-	-	-	-	-	148.0	23.2	178	32.0	208	47.0
86	-	-	-	-	-	-	-	-	147.0	22.9	177	31.6	207	46.5
88	-	-	-	-	-	-	-	-	146.0	22.6	176	31.3	206	46.1
90	-	-	-	-	-	-	-	-	145.0	22.3	175	30.9	205	45.7
92	-	-	-	-	-	-	-	-	144.0	22.0	174	30.6	204	45.2
94	-	-	-	-	-	-	-	-	143.0	21.7	173	30.3	203	44.8
96	-	-	-	-	-	-	-	-	142.0	21.4	172	29.9	202	44.4
98	-	-	-	-	-	-	-	-	141.0	21.1	171	29.6	201	43.9
100	-	-	-	-	-	-	-	-	140.0	20.8	170	29.3	200	43.5
102	-	-	-	-	-	-	-	-	139.0	20.5	169	28.9	199	43.1
104	-	-	-	-	-	-	-	-	138.0	20.2	168	28.6	198	42.7
106	-	-	-	-	-	-	-	-	137.0	19.9	167	28.3	197	42.2
108	-	-	-	-	-	-	-	-	136.0	19.6	166	27.9	196	41.8
110	-	-	-	-	-	-	-	-	135.0	19.3	165	27.6	195	41.4

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,2}$ for SAE - Full or partial nailing - F2

Blank	Total number of nails in the header		k_{H2}	
	Full nailing	Partial nailing	Full nailing	Partial nailing
200	8	4	5.6	3
250	12	6	10.3	4.2
300	18	10	19.9	11.4
340	22	12	28.1	15.8
380	22	12	28.1	15.8
440	28	14	42.9	20.4
500	34	18	60.8	32.9

$n_{j,ef,1}$ and $n_{j,ef,2}$ for SAE - Full or partial nailing - F1 or F2

Blank	Total number of nails in the joist		F1		F2	
	Full nailing	Partial nailing	Full nailing	Partial nailing	Full nailing	Partial nailing
			$n_{J,ef,1}$	$n_{J,ef,1}$	$n_{J,ef,2}$	$n_{J,ef,2}$
200	5	4	1.29	1.29	1.26	1.24
250	7	4	2.84	2.13	2.69	1.92
300	10	6	6.15	3.9	5.54	3.4
340	12	6	8.76	4.91	7.69	4
380	12	6	8.76	4.91	7.69	4
440	15	8	12.92	7.59	11.06	5.99
500	18	10	17.08	10.69	14.46	8.21

Characteristic capacity for SAE with Square twist nails - Full nailing - F1 - timber to timber

Model	Dimensions[1)]		Total no. of square twist nails 3,75x30 mm		Characteristic capacity[2)]
	A	B	n_H	n_J	$R_{1,k}$
250	50	100	12	7	13.5
250	76	87	12	7	13.5
380	38	171	22	12	22.3
380	45	167.5	22	12	22.3
380	50	165	22	12	22.3
380	64	158	22	12	22.3
380	66	157	22	12	22.3
380	76	152	22	12	22.3
380	90	145	22	12	22.3
380	92	144	22	12	22.3
380	100	140	22	12	22.3
500	38	231	34	18	35
500	46	227	34	18	35
500	50	225	34	18	35
500	64	218	34	18	35
500	66	217	34	18	35
500	76	212	34	18	35
500	91	204.5	34	18	35
500	100	200	34	18	35
500	125	187.5	32	16	28

[1)]For futher dimensions see the section Dimensions of this annex

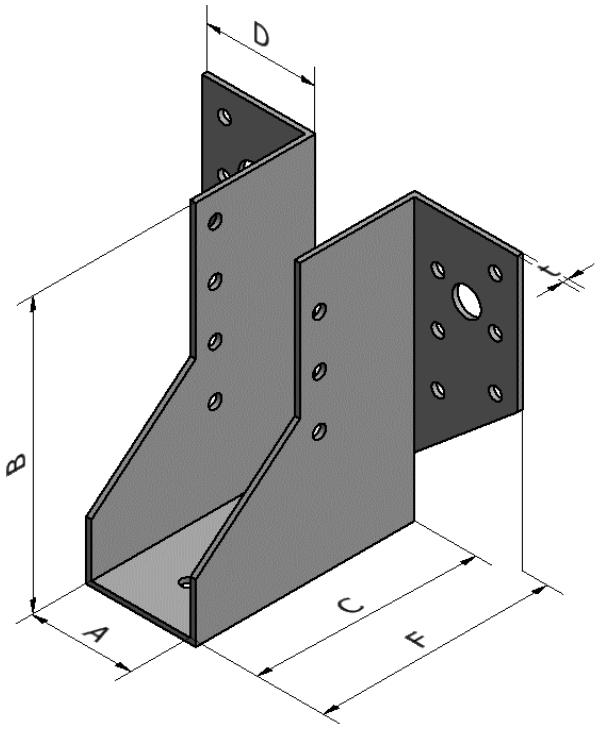
[2)]The characteristic capacity is given for Timber Grade C24 (characteristic density of 350 kg/m3)

D31 SAE250/38/1,5 Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
SAE250/38/1.5	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
250	38	106	84	41.5	87	1.5	12	Ø5	2	Ø11	7	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-



Characteristic capacity for SAE - Full nailing - timber to timber

Model	Fasteners - CNA4.0x35		Characteristic capacity [kN] - C24		
	n_H	n_J	$R_{1,k}$	$R_{2,k}$	$R_{3,k}$
SAE250/38/1.5	12	7	10.8	4.7	6.4

To change the timber density instead of using the k_{dens} factor use in this specific case:

Timber class	C14	C16	C18	C20	C22	C24
Factor	0.91	0.93	0.95	0.96	0.98	1.00

Characteristic capacity for SAE - timber to rigid support

Model	Fasteners				Characteristic capacity [kN]		
	Header		Joist				
	n_H	Type	n_J	Type	$R_{1,k}$	$R_{2,k}$	$R_{3,k}$
SAE250/38/1.5	2	M10	7	CNA4.0x35	11.7	5.0	4.4
SAE250/38/1.5*	2	M10	5	CNA4.0x35	11.7	4.3	4.4

*For joist >95mm

The check of the connection with the bolts has to be make as following:

The bolt group (both bolts) has to be as minimum:

a lateral capacity of $F_{i.d}$ x $f_{bolt.lat}$, ** for the bolt on the far side of the force

an axial capacity of $F_{i.d}$ x $f_{bolt.ax}$

	$f_{bolt.lat}$	$f_{bolt.ax}$
$R_{1,k}$	1,00	0,40
$R_{2,k}$	1,00	1,22
$R_{3,k}$	1,00**	0,50

The timber elements have to be check also according to EN 1995, 8.1.4 for force direction F2

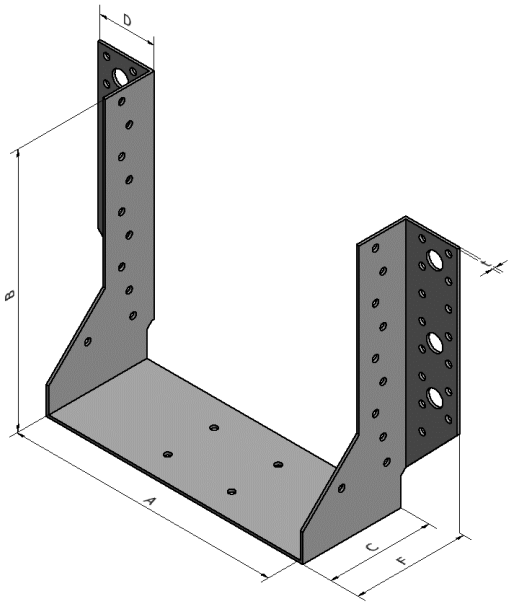
D32 SAE590, SAE620 and SAE690 Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
SAE	Steel ref 1 - Steel ref 2	-

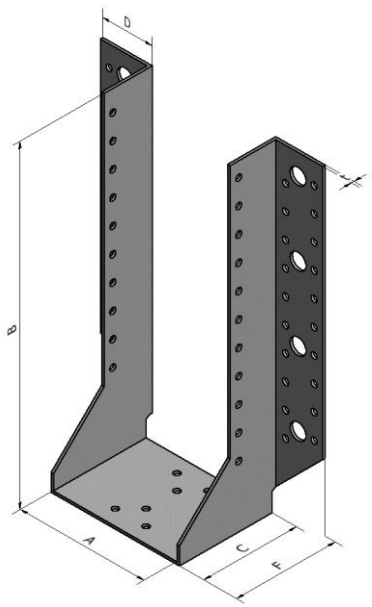
Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
590	200	(590-A)/2	78	43	84	1.5 - 2	30	Ø5	6	Ø13	20	Ø5
620-a	38-100	(620-A)/2	75	40	81	1.5 - 2	40	Ø5	8	Ø13	22	Ø5
620-b	101-125	(620-A)/2	75	40	77	1.5 - 2	40	Ø5	8	Ø13	22	Ø5
690	201-300	195	82	42	84	1.5 - 2	30	Ø5	6	Ø13	20	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-

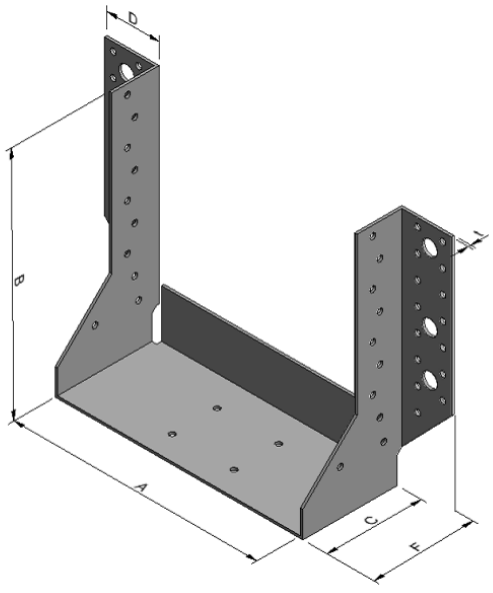
SAE590



SAE620



SAE690



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger SAE590 - SAE620 - SAE690 - Full nailing - F1

	590		620		620		690	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	30	20	40	22	40	22	40	22
A	B	kH.1	B	kH.1	B	kH.1	B	kH.1
38	-	-	291	170.5	-	-	-	-
45	-	-	287.5	166.5	-	-	-	-
50	-	-	285	163.6	-	-	-	-
64	-	-	278	155.6	-	-	-	-
76	-	-	272	148.8	-	-	-	-
100	-	-	260	135.5	-	-	-	-
125	-	-	-	-	247.5	132.6	-	-
150	-	-	-	-	235	119.4	-	-
200	195	105	210	85.4	-	-	-	-
201-300	-	-	-	-	-	-	195	105

$k_{H,2}$ for SAE590 - SAE620 - SAE690 - Full or partial nailing - F2

Blank	Total number of nails in the header		k_{H2}	
	Full nailing	Partial nailing	Full nailing	Partial nailing
590	30	16	81.5	40.9
620-a	40	20	105.1	48.9
620-b	40	22	114.7	61.3
690	30	16	81.5	40.9

$n_{j,ef,1}$ and $n_{j,ef,2}$ for SAE590 - SAE620 - SAE690 - Full or partial nailing - F1 or F2

Blank	Total number of nails in the joist		F1		F2	
	Full nailing	Partial nailing	Full nailing	Partial nailing	Full nailing	Partial nailing
			$n_{J,ef,1}$	$n_{J,ef,1}$	$n_{J,ef,2}$	$n_{J,ef,2}$
590	20	10	18.46	9.11	15.9	7.42
620-a	22	12	20.67	10.69	17.87	8.9
620-b	22	12	22.35	12	18.92	9.62
690	20	10	18.46	9.11	15.9	7.42

Characteristic capacity for SAE590 - SAE620 - SAE690 with Square twist nails - Full nailing - F1 - timber to timber

Model	Dimensions[1)]		Total no. of square twist nails 3,75x30 mm		Characteristic capacity[2)]
	A	B	n_H	n_J	$R_{1,k}$
590	200	195	30	20	30
620	38	291	40	22	50
620	44	288	40	22	50
620	50	285	40	22	50
620	64	278	40	22	50
620	76	272	40	22	50
620	91	264.5	40	22	50
620	100	260	40	22	50
620	116	252	40	22	50
620	125	247.5	40	22	50
620	150	235	40	22	50
620	195	200-300	30	20	30

[1)]For further dimensions see the section Dimensions of this annex

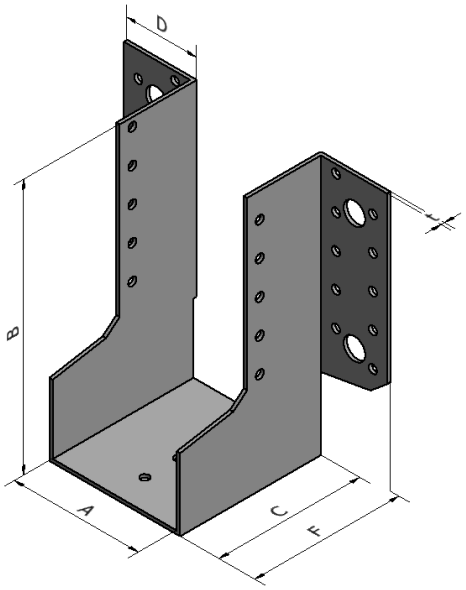
[2)]The characteristic capacity is given for Timber Grade C24 (characteristic density of 350 kg/m3)

D33 SAEL Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
SAEL	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
200	24-80	(200-A)/2	84	41.5	86	2	8	Ø5	2	Ø11	5	Ø5
250	24-80	(250-A)/2	84	41.5	86	2	12	Ø5	2	Ø11	7	Ø5
300	24-70	(300-A)/2	84	41.5	86	2	18	Ø5	4	Ø13	10	Ø5
340	24-70	(340-A)/2	84	41.5	86	2	22	Ø5	4	Ø13	12	Ø5
380	24-110	(380-A)/2	84	41.5	86	2	22	Ø5	4	Ø13	12	Ø5
440	24-110	(440-A)/2	84	41.5	86	2	28	Ø5	4	Ø13	15	Ø5
500	24-110	(500-A)/2	84	41.5	86	2	34	Ø5	6	Ø13	18	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger SAEL - Full nailing - F1

	300		340		380		440		500	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	16	8	20	10	20	10	26	13	32	16
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
32	134	31.1	154	41.2	174	51.5	204	71.5	234	94.5
34	133	30.6	153	40.7	173	51.0	203	70.9	233	93.8
36	132	30.2	152	40.2	172	50.5	202	70.2	232	93.0
38	131	29.8	151	39.7	171	49.9	201	69.6	231	92.3
40	130	29.4	150	39.2	170	49.4	200	69.0	230	91.5
42	129	29.0	149	38.7	169	48.9	199	68.3	229	90.8
44	128	28.5	148	38.2	168	48.4	198	67.7	228	90.0
46	127	28.1	147	37.7	167	47.9	197	67.0	227	89.3
48	126	27.7	146	37.2	166	47.3	196	66.4	226	88.5
50	125	27.3	145	36.7	165	46.8	195	65.8	225	87.8
52	124	26.9	144	36.2	164	46.3	194	65.1	224	87.0
54	123	26.4	143	35.7	163	45.8	193	64.5	223	86.3
56	122	26.0	142	35.2	162	45.3	192	63.9	222	85.5
58	121	25.6	141	34.7	161	44.8	191	63.2	221	84.8
60	120	25.2	140	34.3	160	44.2	190	62.6	220	84.0
62	119	24.8	139	33.8	159	43.7	189	62.0	219	83.3
64	118	24.4	138	33.3	158	43.2	188	61.4	218	82.6
66	117	24.0	137	32.8	157	42.7	187	60.7	217	81.8
68	116	23.6	136	32.3	156	42.2	186	60.1	216	81.1
70	115	23.2	135	31.9	155	41.7	185	59.5	215	80.4
72	114	22.8	134	31.4	154	41.2	184	58.9	214	79.6
74	113	22.4	133	30.9	153	40.7	183	58.3	213	78.9
76	112	22.0	132	30.4	152	40.2	182	57.6	212	78.2
78	111	21.6	131	30.0	151	39.7	181	57.0	211	77.5
80	110	21.2	130	29.5	150	39.2	180	56.4	210	76.7
82	109	20.8	129	29.0	149	38.7	179	55.8	209	76.0
84	108	20.4	128	28.6	148	38.2	178	55.2	208	75.3
86	107	20.0	127	28.1	147	37.7	177	54.6	207	74.6
88	106	19.6	126	27.7	146	37.2	176	54.0	206	73.9
90	105	19.2	125	27.2	145	36.7	175	53.4	205	73.2
92	104	18.9	124	26.8	144	36.2	174	52.8	204	72.5
94	103	18.5	123	26.3	143	35.7	173	52.2	203	71.7
96	102	18.1	122	25.9	142	35.2	172	51.6	202	71.0
98	101	17.7	121	25.4	141	34.7	171	51.0	201	70.3
100	100	17.4	120	25.0	140	34.3	170	50.4	200	69.6
102	99	17.0	119	24.5	139	33.8	169	49.8	199	68.9
104	98	16.6	118	24.1	138	33.3	168	49.2	198	68.2
106	97	16.3	117	23.7	137	32.8	167	48.6	197	67.5
108	96	15.9	116	23.2	136	32.3	166	48.0	196	66.9
110	95	15.5	115	22.8	135	31.9	165	47.5	195	66.2
112	94	15.2	114	22.4	134	31.4	164	46.9	194	65.5
114	93	14.8	113	22.0	133	30.9	163	46.3	193	64.8
116	92	14.5	112	21.6	132	30.4	162	45.7	192	64.1
118	91	14.2	111	21.1	131	30.0	161	45.1	191	63.4
120	90	13.8	110	20.7	130	29.5	160	44.6	190	62.7
122	-	-	-	-	129	29.0	159	44.0	189	62.1
124	-	-	-	-	128	28.6	158	43.4	188	61.4
126	-	-	-	-	127	28.1	157	42.9	187	60.7
128	-	-	-	-	126	27.7	156	42.3	186	60.1
130	-	-	-	-	125	27.2	155	41.7	185	59.4
132	-	-	-	-	124	26.8	154	41.2	184	58.7
134	-	-	-	-	123	26.3	153	40.6	183	58.1
136	-	-	-	-	122	25.9	152	40.1	182	57.4
138	-	-	-	-	121	25.4	151	39.5	181	56.8
140	-	-	-	-	120	25.0	150	39.0	180	56.1
142	-	-	-	-	119	24.5	149	38.4	179	55.5
144	-	-	-	-	118	24.1	148	37.9	178	54.8

146	-	-	-	-	117	23.7	147	37.4	177	54.2
148	-	-	-	-	116	23.2	146	36.8	176	53.6
150	-	-	-	-	115	22.8	145	36.3	175	52.9
152	-	-	-	-	114	22.4	144	35.8	174	52.3
154	-	-	-	-	113	22.0	143	35.3	173	51.7
156	-	-	-	-	112	21.6	142	34.7	172	51.0
158	-	-	-	-	111	21.1	141	34.2	171	50.4
160	-	-	-	-	110	20.7	140	33.7	170	49.8

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,1}$ for Joist Hanger SAEL - Partial nailing - F1

	300		340		380		440		500	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	8	4	10	6	10	6	12	7	16	8
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
32	134	18.8	154	24.0	174	29.4	204	38.8	234	55.7
34	133	18.6	153	23.8	173	29.1	203	38.5	233	55.3
36	132	18.3	152	23.5	172	28.8	202	38.2	232	54.9
38	131	18.1	151	23.3	171	28.5	201	37.9	231	54.5
40	130	17.9	150	23.0	170	28.3	200	37.6	230	54.1
42	129	17.6	149	22.8	169	28.0	199	37.3	229	53.7
44	128	17.4	148	22.5	168	27.7	198	37.0	228	53.3
46	127	17.2	147	22.3	167	27.5	197	36.7	227	53.0
48	126	17.0	146	22.0	166	27.2	196	36.4	226	52.6
50	125	16.7	145	21.8	165	26.9	195	36.1	225	52.2
52	124	16.5	144	21.5	164	26.7	194	35.8	224	51.8
54	123	16.3	143	21.3	163	26.4	193	35.5	223	51.5
56	122	16.1	142	21.0	162	26.1	192	35.2	222	51.1
58	121	15.9	141	20.8	161	25.9	191	35.0	221	50.7
60	120	15.6	140	20.5	160	25.6	190	34.7	220	50.3
62	119	15.4	139	20.3	159	25.3	189	34.4	219	50.0
64	118	15.2	138	20.0	158	25.1	188	34.1	218	49.6
66	117	15.0	137	19.8	157	24.8	187	33.8	217	49.2
68	116	14.8	136	19.6	156	24.6	186	33.5	216	48.8
70	115	14.6	135	19.3	155	24.3	185	33.2	215	48.5
72	114	14.3	134	19.1	154	24.0	184	32.9	214	48.1
74	113	14.1	133	18.9	153	23.8	183	32.6	213	47.7
76	112	13.9	132	18.6	152	23.5	182	32.4	212	47.4
78	111	13.7	131	18.4	151	23.3	181	32.1	211	47.0
80	110	13.5	130	18.2	150	23.0	180	31.8	210	46.7
82	109	13.3	129	17.9	149	22.8	179	31.5	209	46.3
84	108	13.1	128	17.7	148	22.5	178	31.2	208	45.9
86	107	12.9	127	17.5	147	22.3	177	30.9	207	45.6
88	106	12.7	126	17.2	146	22.0	176	30.7	206	45.2
90	105	12.5	125	17.0	145	21.8	175	30.4	205	44.9
92	104	12.3	124	16.8	144	21.5	174	30.1	204	44.5
94	103	12.1	123	16.6	143	21.3	173	29.8	203	44.2
96	102	11.9	122	16.4	142	21.0	172	29.6	202	43.8
98	101	11.7	121	16.1	141	20.8	171	29.3	201	43.5
100	100	11.5	120	15.9	140	20.5	170	29.0	200	43.1
102	99	11.3	119	15.7	139	20.3	169	28.8	199	42.8
104	98	11.1	118	15.5	138	20.0	168	28.5	198	42.4
106	97	11.0	117	15.3	137	19.8	167	28.2	197	42.1
108	96	10.8	116	15.1	136	19.6	166	28.0	196	41.7
110	95	10.6	115	14.9	135	19.3	165	27.7	195	41.4
112	94	10.4	114	14.7	134	19.1	164	27.4	194	41.1
114	93	10.3	113	14.5	133	18.9	163	27.2	193	40.7
116	92	10.1	112	14.3	132	18.6	162	26.9	192	40.4
118	91	9.9	111	14.1	131	18.4	161	26.6	191	40.1
120	90	9.7	110	13.9	130	18.2	160	26.4	190	39.7
122	-	-	-	-	129	17.9	159	26.1	189	39.4
124	-	-	-	-	128	17.7	158	25.9	188	39.1
126	-	-	-	-	127	17.5	157	25.6	187	38.7
128	-	-	-	-	126	17.2	156	25.4	186	38.4
130	-	-	-	-	125	17.0	155	25.1	185	38.1
132	-	-	-	-	124	16.8	154	24.9	184	37.8
134	-	-	-	-	123	16.6	153	24.6	183	37.5
136	-	-	-	-	122	16.4	152	24.4	182	37.1
138	-	-	-	-	121	16.1	151	24.2	181	36.8
140	-	-	-	-	120	15.9	150	23.9	180	36.5
142	-	-	-	-	119	15.7	149	23.7	179	36.2

144	-	-	-	-	118	15.5	148	23.5	178	35.9
146	-	-	-	-	117	15.3	147	23.2	177	35.6
148	-	-	-	-	116	15.1	146	23.0	176	35.3
150	-	-	-	-	115	14.9	145	22.8	175	35.0
152	-	-	-	-	114	14.7	144	22.5	174	34.7
154	-	-	-	-	113	14.5	143	22.3	173	34.4
156	-	-	-	-	112	14.3	142	22.1	172	34.1
158	-	-	-	-	111	14.1	141	21.9	171	33.8
160	-	-	-	-	110	13.9	140	21.7	170	33.5

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,2}$ for SAEL - Full or partial nailing - F2

Blank	Total number of nails in the header		k_{H2}	
	Full nailing	Partial nailing	Full nailing	Partial nailing
300	16	8	16.4	7.9
340	20	10	23.8	11.4
380	20	10	23.8	11.4
440	26	12	37.6	21.9
500	32	16	54.5	25.9

$n_{j,ef,1}$ and $n_{j,ef,2}$ for SAEL - Full or partial nailing - F1 or F2

Blank	Total number of nails in the joist		F1		F2	
	Full nailing	Partial nailing	Full nailing	Partial nailing	Full nailing	Partial nailing
			$n_{J,ef,1}$	$n_{J,ef,1}$	$n_{J,ef,2}$	$n_{J,ef,2}$
300	8	4	3.83	2.59	3.57	2.23
340	10	6	6.15	4.22	5.54	3.61
380	10	6	6.15	4.22	5.54	3.61
440	13	8	10.13	6.45	8.81	5.38
500	16	8	14.31	7.78	12.2	6.08

Characteristic capacity for SAEL with Square twist nails - Full nailing - F1 - timber to timber

Model	Dimensions[1)]		Total no. of square twist nails 3,75x30 mm		Characteristic capacity[2)]
	A	B	n_H	n_J	$R_{1,k}$
500	150	175	32	16	28

[1)]For futher dimensions see the section Dimensions of this annex

[2)]The characteristic capacity is given for Timber Grade C24 (characteristic density of 350 kg/m3)

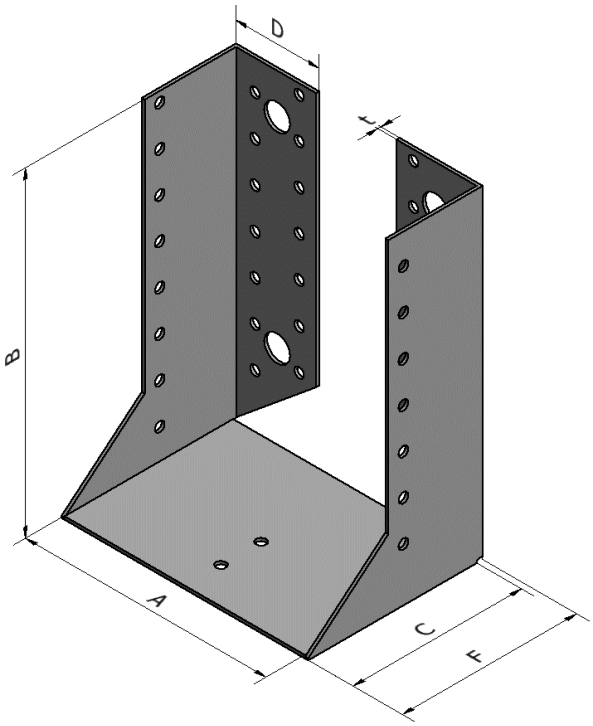
D34 SAI Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
SAI	Steel ref 1 - Steel ref 2	-

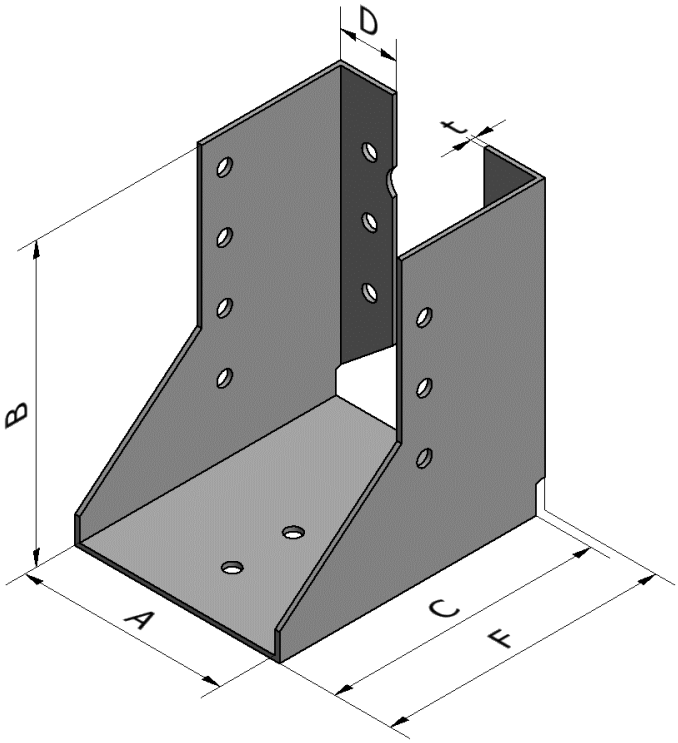
Dimensions

	Blank	Dimensions [mm]						Holes					
								Header				Joist	
		A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
1st Blank model	200	64-80	(200-A)/2	76	33.5	82	2	6	Ø5	2	Ø12	4	Ø5
	250	64-80	(250-A)/2	76	33.5	82	2	10	Ø5	2	Ø12	6	Ø5
	300	64-80	(300-A)/2	76	33.5	82	2	16	Ø5	4	Ø12	9	Ø5
	340	64-120	(340-A)/2	76	33.5	82	2	16	Ø5	4	Ø12	10	Ø5
	380	64-120	(380-A)/2	76	33.5	82	2	20	Ø5	4	Ø12	12	Ø5
	440	64-120	(440-A)/2	76	33.5	82	2	26	Ø5	4	Ø12	15	Ø5
	500	64-120	(500-A)/2	76	33.5	82	2	32	Ø5	6	Ø12	18	Ø5
2nd blank model	200	38-63	(200-A)/2	76	17.5	82	2	4	Ø5	-	-	4	Ø5
	250	38-63	(250-A)/2	76	17.5	82	2	6	Ø5	-	-	6	Ø5
	Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-

1st blank model



2nd blank model



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger SAI 1st blank model - Full nailing - F1

	200		250		300		340		380		440		500	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	6	4	10	6	16	9	16	10	20	12	26	15	32	18
A	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1
64	68	6.3	93	11.8	118	21.5	138	29.1	158	39.1	188	58.4	218	77.3
66	67	6.1	92	11.5	117	21.1	137	28.7	157	38.6	187	57.8	217	76.6
68	66	5.9	91	11.2	116	20.7	136	28.3	156	38.2	186	57.2	216	75.8
70	65	5.7	90	10.9	115	20.3	135	27.9	155	37.7	185	56.6	215	75.1
72	64	5.5	89	10.7	114	20	134	27.5	154	37.2	184	56	214	74.4
74	63	5.3	88	10.4	113	19.6	133	27.1	153	36.7	183	55.4	213	73.7
76	62	5.2	87	10.1	112	19.2	132	26.7	152	36.2	182	54.8	212	73
78	61	5	86	9.9	111	18.9	131	26.3	151	35.8	181	54.2	211	72.3
80	60	4.8	85	9.6	110	18.5	130	25.9	150	35.3	180	53.6	210	71.6
82	-	-	-	-	109	18.1	129	25.5	149	34.8	179	53	209	70.9
84	-	-	-	-	108	17.8	128	25.1	148	34.3	178	52.4	208	70.2
86	-	-	-	-	107	17.4	127	24.7	147	33.9	177	51.8	207	69.5
88	-	-	-	-	106	17.1	126	24.3	146	33.4	176	51.2	206	68.8
90	-	-	-	-	105	16.7	125	23.9	145	32.9	175	50.6	205	68.2
92	-	-	-	-	104	16.4	124	23.5	144	32.5	174	50	204	67.5
94	-	-	-	-	103	16	123	23.1	143	32	173	49.4	203	66.8
96	-	-	-	-	102	15.7	122	22.7	142	31.5	172	48.9	202	66.1
98	-	-	-	-	101	15.3	121	22.4	141	31.1	171	48.3	201	65.4
100	-	-	-	-	100	15	120	22	140	30.6	170	47.7	200	64.8
102	-	-	-	-	99	14.7	119	21.6	139	30.2	169	47.1	199	64.1
104	-	-	-	-	98	14.3	118	21.2	138	29.7	168	46.5	198	63.4
106	-	-	-	-	97	14	117	20.8	137	29.3	167	46	197	62.7
108	-	-	-	-	96	13.7	116	20.5	136	28.8	166	45.4	196	62.1
110	-	-	-	-	95	13.4	115	20.1	135	28.4	165	44.8	195	61.4
112	-	-	-	-	94	13	114	19.7	134	27.9	164	44.3	194	60.7
114	-	-	-	-	93	12.7	113	19.3	133	27.5	163	43.7	193	60.1
116	-	-	-	-	92	12.4	112	19	132	27	162	43.1	192	59.4
118	-	-	-	-	91	12.1	111	18.6	131	26.6	161	42.6	191	58.8
120	-	-	-	-	90	11.8	110	18.3	130	26.2	160	42	190	58.1

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,1}$ for Joist Hanger SAI 2nd blank model - Full nailing - F1

	200		**250**	
	nH	nJ	nH	nJ
	4	4	6	6
A	B	kH,1	B	kH,1
38	81	5.2	106	8.1
40	80	5	105	7.9
42	79	4.9	104	7.8
44	78	4.8	103	7.6
46	77	4.7	102	7.5
48	76	4.5	101	7.3
50	75	4.4	100	7.1
52	74	4.3	99	7
54	73	4.2	98	6.8
56	72	4	97	6.7
58	71	3.9	96	6.5
60	70	3.8	95	6.4
62	69	3.7	94	6.2
63	69	3.6	94	6.1

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,1}$ for Joist Hanger SAI 1st blank model - Partial nailing - F1

	200		250		300		340		380		440		500	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	-	-	6	6	10	9	10	10	12	12	14	15	18	18
A	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1	B	kH.1
64	-	-	93	6.5	118	14.1	138	19.3	158	25.5	188	31.1	218	45.7
66	-	-	92	6.4	117	13.9	137	19	157	25.2	187	30.8	217	45.3
68	-	-	91	6.2	116	13.7	136	18.7	156	24.9	186	30.4	216	44.9
70	-	-	90	6	115	13.4	135	18.5	155	24.5	185	30.1	215	44.5
72	-	-	89	5.9	114	13.2	134	18.2	154	24.2	184	29.8	214	44.1
74	-	-	88	5.7	113	13	133	17.9	153	23.9	183	29.4	213	43.7
76	-	-	87	5.5	112	12.7	132	17.7	152	23.6	182	29.1	212	43.3
78	-	-	86	5.4	111	12.5	131	17.4	151	23.3	181	28.8	211	42.9
80	-	-	85	5.2	110	12.3	130	17.2	150	23	180	28.4	210	42.5
82	-	-	-	-	109	12	129	16.9	149	22.7	179	28.1	209	42.1
84	-	-	-	-	108	11.8	128	16.6	148	22.4	178	27.8	208	41.7
86	-	-	-	-	107	11.6	127	16.4	147	22.1	177	27.4	207	41.3
88	-	-	-	-	106	11.4	126	16.1	146	21.8	176	27.1	206	40.9
90	-	-	-	-	105	11.1	125	15.9	145	21.5	175	26.8	205	40.5
92	-	-	-	-	104	10.9	124	15.6	144	21.2	174	26.5	204	40.1
94	-	-	-	-	103	10.7	123	15.4	143	20.9	173	26.1	203	39.7
96	-	-	-	-	102	10.5	122	15.1	142	20.6	172	25.8	202	39.3
98	-	-	-	-	101	10.3	121	14.9	141	20.3	171	25.5	201	38.9
100	-	-	-	-	100	10.1	120	14.6	140	20.1	170	25.2	200	38.5
102	-	-	-	-	99	9.9	119	14.4	139	19.8	169	24.9	199	38.1
104	-	-	-	-	98	9.7	118	14.1	138	19.5	168	24.5	198	37.7
106	-	-	-	-	97	9.5	117	13.9	137	19.2	167	24.2	197	37.3
108	-	-	-	-	96	9.3	116	13.7	136	18.9	166	23.9	196	37
110	-	-	-	-	95	9.1	115	13.4	135	18.6	165	23.6	195	36.6
112	-	-	-	-	94	8.9	114	13.2	134	18.3	164	23.3	194	36.2
114	-	-	-	-	93	8.7	113	13	133	18.1	163	23	193	35.8
116	-	-	-	-	92	8.5	112	12.7	132	17.8	162	22.7	192	35.4
118	-	-	-	-	91	8.3	111	12.5	131	17.5	161	22.4	191	35.1
120	-	-	-	-	90	8.2	110	12.3	130	17.2	160	22.1	190	34.7

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,2}$ for SAI - Full or partial nailing - F2

	Blank	Total number of nails in the header		k_{H2}	
		Full nailing	Partial nailing	Full nailing	Partial nailing
1st Blank model	200	6	4	3.6	2.5
	250	10	4	7.5	2.4
	300	15	8	13.5	7.6
	340	15	8	13.5	7.6
	380	18	10	19.2	12.1
	440	23	12	28.2	15
	500	28	14	41.3	19.6
2nd blank model	200	4	-	2.5	-
	250	6	-	4.7	-

$n_{j,ef,1}$ and $n_{j,ef,2}$ for SAI - Full or partial nailing - F1 or F2

	Blank	Total number of nails in the joist		F1		F2	
		Full nailing	Partial nailing	Full nailing	Partial nailing	Full nailing	Partial nailing
				$n_{J.ef.1}$	$n_{J.ef.1}$	$n_{J.ef.2}$	$n_{J.ef.2}$
1st Blank model	200	4	4	1.84	1.84	1.7	1.7
	250	6	4	1.91	1.6	1.84	1.51
	300	10	6	5.95	3.77	5.39	3.31
	340	10	6	5.95	5.69	5.39	4.4
	380	12	6	8.5	4.75	7.52	3.92
	440	14	8	11.22	7.21	9.74	5.8
	500	18	8	16.75	10.46	14.27	8.1
2nd blank model	380	4	-	1.84	-	1.7	-
	440	6	-	1.91	-	1.84	-

Characteristic capacity for SAI with Square twist nails - Full nailing - F1 - timber to timber

	Model	Dimensions[1)]		Total no. of square twist nails 3,75x30 mm		Characteristic capacity[2)]
		A	B	n_H	n_J	$R_{1,k}$
1st Blank Model	380	90	145	20	12	20.3
	380	100	140	20	12	20.3
	500	91	204.5	32	18	28
	500	100	200	32	18	28
	500	125	187.5	32	16	28
	500	150	175	32	16	28

[1)]For further dimensions see the section Dimensions of this annex

[2)]The characteristic capacity is given for Timber Grade C24 (characteristic density of 350 kg/m3)

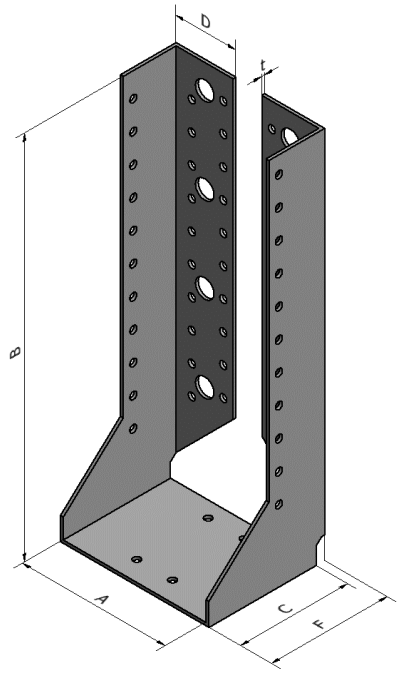
D35 SAI590, SAI620 Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
SAI	Steel ref 1 - Steel ref 2	-

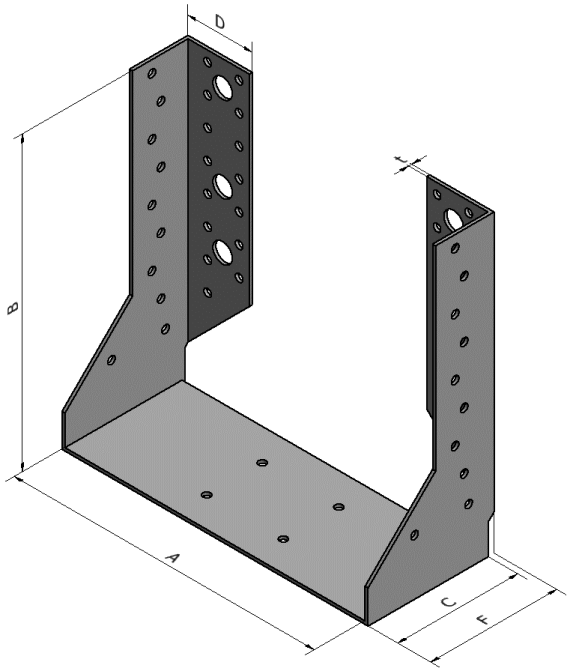
Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
590	200	(590-A)/2	78	43	84	1.5 - 2	30	Ø5	6	Ø13	20	Ø5
620-a	38-100	(620-A)/2	75	40	81	1.5 - 2	40	Ø5	8	Ø13	22	Ø5
620-b	101-125	(620-A)/2	75	40	77	1.5 - 2	40	Ø5	8	Ø13	22	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-

SAI590



SAI620



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger SAI590 - SAI620 - Full nailing - F1

See SAE590, SAE620 and SAE690 Joist hanger

$k_{H,2}$ for SAI590 - SAI620 - Full or partial nailing - F2

See SAE590, SAE620 and SAE690 Joist hanger

$n_{j,ef,1}$ and $n_{j,ef,2}$ for SAI590 - SAI620 - Full or partial nailing - F1 or F2

See SAE590, SAE620 and SAE690 Joist hanger

Characteristic capacity for SAI590 - SAI620 with Square twist nails - Full nailing - F1 - timber to timber

Model	Dimensions[1)]		Total no. of square twist nails 3,75x30 mm		Characteristic capacity[2)]
	A	B	n_H	n_J	$R_{1,k}$
590	200	195	30	20	30
620	91	264.5	40	22	35
620	100	260	40	22	35
620	116	252	40	22	35
620	125	247.5	40	22	35
620	150	235	40	22	35

[1)]For futher dimensions see the section Dimensions of this annex
[2)]The characteristic capacity is given for Timber Grade C24 (characteristic density of 350 kg/m3)

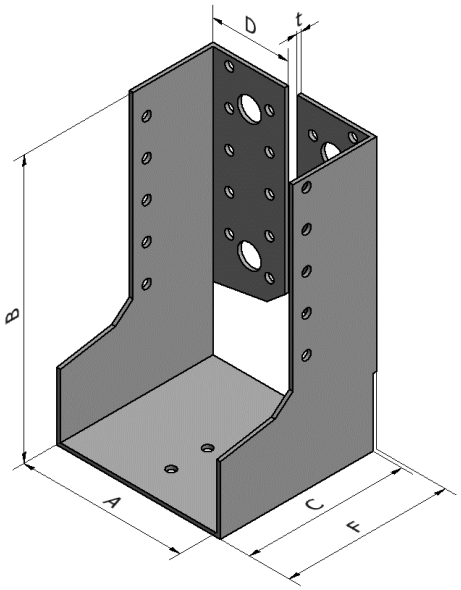
D36 SAIL Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
SAIL	Steel ref 1 - Steel ref 2	-

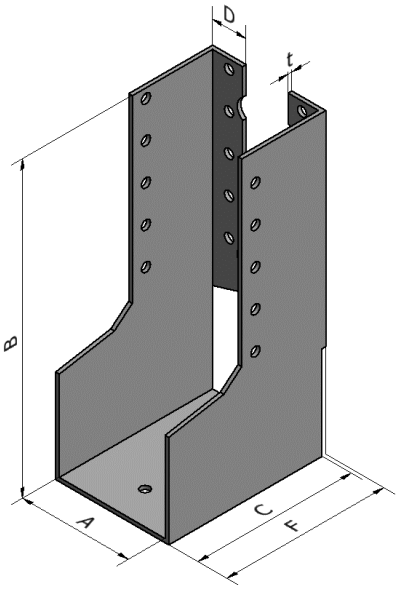
Dimensions

	Blank	Dimensions [mm]						Holes					
								Header				Joist	
		A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
1st Blank model	300	80-120	(300-A)/2	84	41.5	86	2	16	Ø5	4	Ø13	8	Ø5
	340	80-120	(340-A)/2	84	41.5	86	2	20	Ø5	4	Ø13	10	Ø5
	380	80-160	(380-A)/2	84	41.5	86	2	20	Ø5	4	Ø13	10	Ø5
	440	80-160	(440-A)/2	84	41.5	86	2	26	Ø5	4	Ø13	13	Ø5
	500	80-160	(500-A)/2	84	41.5	86	2	32	Ø5	6	Ø13	16	Ø5
2nd blank model	300	38-79	(300-A)/2	84	18.5	86	2	8	Ø5	-	-	10	Ø5
	340	38-79	(340-A)/2	84	18.5	86	2	10	Ø5	-	-	10	Ø5
	380	38-79	(380-A)/2	84	18.5	86	2	10	Ø5	-	-	12	Ø5
	440	38-79	(440-A)/2	84	18.5	86	2	12	Ø5	-	-	14	Ø5
	500	38-79	(500-A)/2	84	18.5	86	2	16	Ø5	-	-	18	Ø5
	Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-

1st blank model



2nd blank model



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger SAIL 1st blank model - Full nailing - F1

	300		340		380		440		500	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	16	9	16	10	20	12	26	15	32	18
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
80	110	21.2	130	29.5	150	39.2	180	56.4	210	76.7
82	109	20.8	129	29.0	149	38.7	179	55.8	209	76.0
84	108	20.4	128	28.6	148	38.2	178	55.2	208	75.3
86	107	20.0	127	28.1	147	37.7	177	54.6	207	74.6
88	106	19.6	126	27.7	146	37.2	176	54.0	206	73.9
90	105	19.2	125	27.2	145	36.7	175	53.4	205	73.2
92	104	18.9	124	26.8	144	36.2	174	52.8	204	72.5
94	103	18.5	123	26.3	143	35.7	173	52.2	203	71.7
96	102	18.1	122	25.9	142	35.2	172	51.6	202	71.0
98	101	17.7	121	25.4	141	34.7	171	51.0	201	70.3
100	100	17.4	120	25.0	140	34.3	170	50.4	200	69.6
102	99	17.0	119	24.5	139	33.8	169	49.8	199	68.9
104	98	16.6	118	24.1	138	33.3	168	49.2	198	68.2
106	97	16.3	117	23.7	137	32.8	167	48.6	197	67.5
108	96	15.9	116	23.2	136	32.3	166	48.0	196	66.9
110	95	15.5	115	22.8	135	31.9	165	47.5	195	66.2
112	-	-	-	-	134	31.4	164	46.9	194	65.5
114	-	-	-	-	133	30.9	163	46.3	193	64.8
116	-	-	-	-	132	30.4	162	45.7	192	64.1
118	-	-	-	-	131	30.0	161	45.1	191	63.4
120	-	-	-	-	130	29.5	160	44.6	190	62.7
122	-	-	-	-	129	29.0	159	44.0	189	62.1
124	-	-	-	-	128	28.6	158	43.4	188	61.4
126	-	-	-	-	127	28.1	157	42.9	187	60.7
128	-	-	-	-	126	27.7	156	42.3	186	60.1
130	-	-	-	-	125	27.2	155	41.7	185	59.4
132	-	-	-	-	124	26.8	154	41.2	184	58.7
134	-	-	-	-	123	26.3	153	40.6	183	58.1
136	-	-	-	-	122	25.9	152	40.1	182	57.4
138	-	-	-	-	121	25.4	151	39.5	181	56.8
140	-	-	-	-	120	25.0	150	39.0	180	56.1
142	-	-	-	-	119	24.5	149	38.4	179	55.5
144	-	-	-	-	118	24.1	148	37.9	178	54.8
146	-	-	-	-	117	23.7	147	37.4	177	54.2
148	-	-	-	-	116	23.2	146	36.8	176	53.6
150	-	-	-	-	115	22.8	145	36.3	175	52.9
152	-	-	-	-	114	22.4	144	35.8	174	52.3
154	-	-	-	-	113	22.0	143	35.3	173	51.7
156	-	-	-	-	112	21.6	142	34.7	172	51.0
158	-	-	-	-	111	21.1	141	34.2	171	50.4
160	-	-	-	-	110	20.7	140	33.7	170	49.8

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,1}$ for Joist Hanger SAIL 1st blank model - Partial nailing - F1

	300		340		380		440		500	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	8	4	10	6	10	6	12	7	16	8
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
80	110	13.0	130	17.6	150	22.4	180	31.8	210	46.7
82	109	12.8	129	17.4	149	22.1	179	31.5	209	46.3
84	108	12.6	128	17.1	148	21.9	178	31.2	208	45.9
86	107	12.4	127	16.9	147	21.6	177	30.9	207	45.6
88	106	12.2	126	16.7	146	21.4	176	30.7	206	45.2
90	105	12.0	125	16.5	145	21.1	175	30.4	205	44.9
92	104	11.8	124	16.3	144	20.9	174	30.1	204	44.5
94	103	11.6	123	16.0	143	20.6	173	29.8	203	44.2
96	102	11.4	122	15.8	142	20.4	172	29.6	202	43.8
98	101	11.2	121	15.6	141	20.2	171	29.3	201	43.5
100	100	11.1	120	15.4	140	19.9	170	29.0	200	43.1
102	99	10.9	119	15.2	139	19.7	169	28.8	199	42.8
104	98	10.7	118	15.0	138	19.4	168	28.5	198	42.4
106	97	10.5	117	14.8	137	19.2	167	28.2	197	42.1
108	96	10.3	116	14.6	136	19.0	166	28.0	196	41.7
110	95	10.2	115	14.4	135	18.7	165	27.7	195	41.4
112	-	-	-	-	134	18.5	164	27.4	194	41.1
114	-	-	-	-	133	18.3	163	27.2	193	40.7
116	-	-	-	-	132	18.0	162	26.9	192	40.4
118	-	-	-	-	131	17.8	161	26.6	191	40.1
120	-	-	-	-	130	17.6	160	26.4	190	39.7
122	-	-	-	-	129	17.4	159	26.1	189	39.4
124	-	-	-	-	128	17.1	158	25.9	188	39.1
126	-	-	-	-	127	16.9	157	25.6	187	38.7
128	-	-	-	-	126	16.7	156	25.4	186	38.4
130	-	-	-	-	125	16.5	155	25.1	185	38.1
132	-	-	-	-	124	16.3	154	24.9	184	37.8
134	-	-	-	-	123	16.0	153	24.6	183	37.5
136	-	-	-	-	122	15.8	152	24.4	182	37.1
138	-	-	-	-	121	15.6	151	24.2	181	36.8
140	-	-	-	-	120	15.4	150	23.9	180	36.5
142	-	-	-	-	119	15.2	149	23.7	179	36.2
144	-	-	-	-	118	15.0	148	23.5	178	35.9
146	-	-	-	-	117	14.8	147	23.2	177	35.6
148	-	-	-	-	116	14.6	146	23.0	176	35.3
150	-	-	-	-	115	14.4	145	22.8	175	35.0
152	-	-	-	-	114	14.2	144	22.5	174	34.7
154	-	-	-	-	113	14.0	143	22.3	173	34.4
156	-	-	-	-	112	13.8	142	22.1	172	34.1
158	-	-	-	-	111	13.6	141	21.9	171	33.8
160	-	-	-	-	110	13.5	140	21.7	170	33.5

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,2}$ for SAIL - Full or partial nailing - F2

	Blank	Total number of nails in the header		k_{H2}	
		Full nailing	Partial nailing	Full nailing	Partial nailing
1st Blank model	300	16	8	16.4	7.9
	340	20	10	23.8	11.4
	380	20	10	23.8	11.4
	440	26	14	37.6	21.9
	500	32	16	54.5	25.9
2nd blank model	300	8	-	7.8	-
	340	10	-	11.4	-
	380	10	-	11.4	-
	440	12	-	15.8	-
	500	16	-	26.5	-

$n_{j,ef,1}$ and $n_{j,ef,2}$ for SAIL - Full or partial nailing - F1 or F2

	Blank	Total number of nails in the joist		F1		F2	
		Full nailing	Partial nailing	Full nailing	Partial nailing	Full nailing	Partial nailing
				$n_{J,ef,1}$	$n_{J,ef,1}$	$n_{J,ef,2}$	$n_{J,ef,2}$
1st Blank model	300	8	4	3.83	2.59	3.57	2.23
	340	10	6	6.15	4.22	5.54	3.61
	380	10	6	6.15	4.22	5.54	3.61
	440	13	8	10.13	6.45	8.81	5.38
	500	16	8	14.31	7.78	12.2	6.08
2nd blank model	300	10	-	6.15	-	5.54	-
	340	10	-	6.15	-	5.54	-
	380	12	-	8.76	-	7.69	-
	440	14	-	11.52	-	9.93	-
	500	18	-	17.08	-	14.46	-

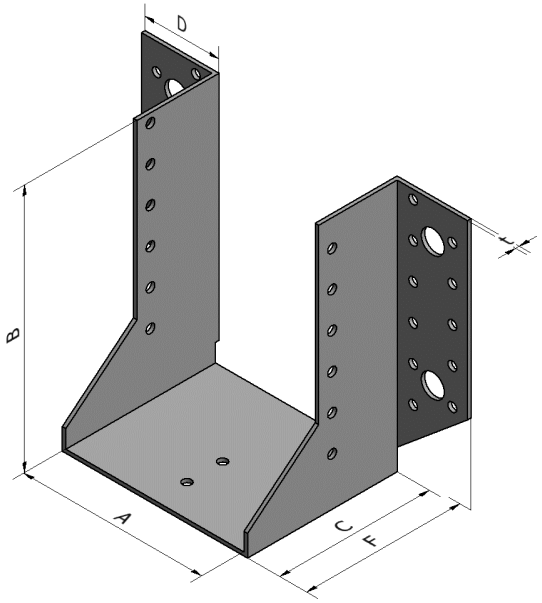
D37 SAIX Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
SAIX	Steel ref 2	-

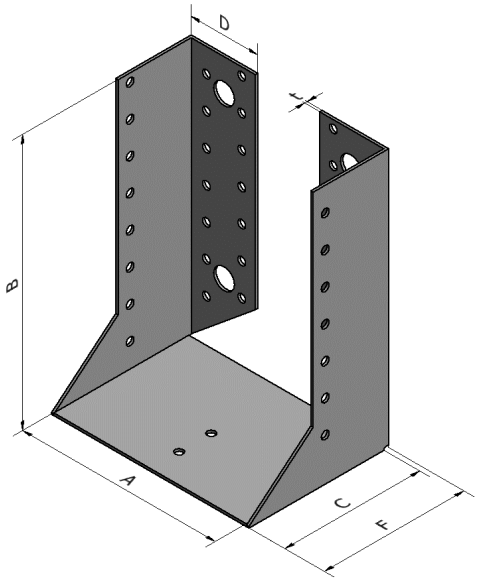
Dimensions

	Blank	Dimensions [mm]						Holes					
								Header				Joist	
		A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
1st Blank model	250	24-80	(250-A)/2	84	41.5	86	1.5	12	Ø5	2	Ø11	7	Ø5
	300	24-80	(300-A)/2	84	41.5	86	1.5	18	Ø5	4	Ø13	10	Ø5
	340	24-80	(340-A)/2	84	41.5	86	1.5	22	Ø5	4	Ø13	12	Ø5
	380	24-120	(380-A)/2	84	41.5	86	1.5	22	Ø5	4	Ø13	12	Ø5
	440	24-120	(440-A)/2	84	41.5	86	1.5	28	Ø5	4	Ø13	15	Ø5
	500	24-120	(500-A)/2	84	41.5	86	1.5	34	Ø5	6	Ø13	18	Ø5
2nd blank model	380	80-120	(380-A)/2	84	41.5	87	1.5	22	Ø5	4	Ø13	12	Ø5
	440	80-120	(440-A)/2	84	41.5	87	1.5	28	Ø5	4	Ø13	15	Ø5
	500	80-120	(500-A)/2	84	41.5	87	1.5	34	Ø5	6	Ø13	18	Ø5
3rd blank model	250	38-80	(250-A)/2	84	18.5	87	1.5	6	Ø5	-	-	7	Ø5
	300	38-80	(300-A)/2	84	18.5	87	1.5	10	Ø5	-	-	9	Ø5
	340	38-80	(340-A)/2	84	18.5	87	1.5	12	Ø5	-	-	11	Ø5
	380	38-80	(380-A)/2	84	18.5	87	1.5	12	Ø5	-	-	11	Ø5
	440	38-80	(440-A)/2	84	18.5	87	1.5	14	Ø5	-	-	15	Ø5
	500	38-80	(500-A)/2	84	18.5	87	1.5	18	Ø5	-	-	18	Ø5
	Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-

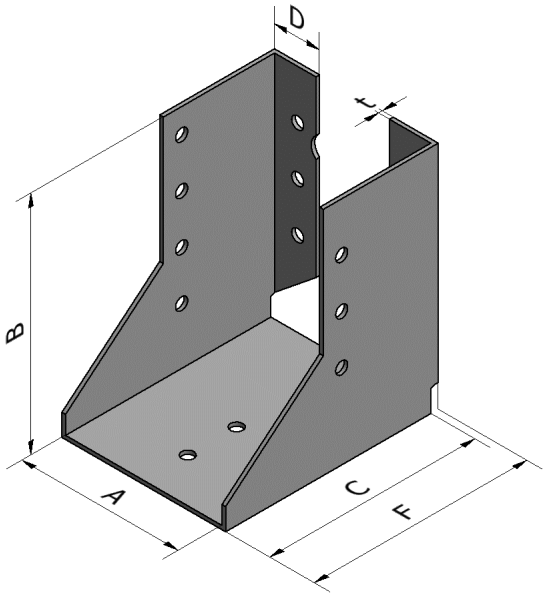
1st blank model



2nd blank model



3rd blank model



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger SAIX - Full nailing - F1

For 1st Blank model - See SAE Joist hanger

For 2nd Blank model

	380		440		500	
	n_H	n_J	n_H	n_J	n_H	n_J
	22	12	28	15	34	18
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
80	150	38.9	180	56.1	210	76.4
82	149	38.4	179	55.5	209	75.7
84	148	37.9	178	54.9	208	75.0
86	147	37.4	177	54.3	207	74.2
88	146	36.9	176	53.6	206	73.5
90	145	36.4	175	53.0	205	72.8
92	144	35.9	174	52.4	204	72.1
94	143	35.4	173	51.8	203	71.3
96	142	34.9	172	51.2	202	70.6
98	141	34.4	171	50.6	201	69.9
100	140	33.9	170	50.0	200	69.2
102	139	33.4	169	49.4	199	68.5
104	138	32.9	168	48.8	198	67.8
106	137	32.4	167	48.2	197	67.1
108	136	31.9	166	47.6	196	66.4
110	135	31.4	165	47.0	195	65.7
112	134	30.9	164	46.4	194	65.0
114	133	30.5	163	45.8	193	64.3
116	132	30.0	162	45.2	192	63.6
118	131	29.5	161	44.7	191	62.9
120	130	29.0	160	44.1	190	62.3

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

For 3rd Blank Model

	250		300		340		380		440		500	
	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J	n_H	n_J
	6	4	10	6	12	6	12	6	14	8	18	10
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
38	106	10.0	131	17.0	151	22.1	171	28.0	201	37.4	231	49.5
40	105	9.9	130	16.8	150	21.9	170	27.7	200	37.1	230	49.1
42	104	9.7	129	16.5	149	21.6	169	27.4	199	36.7	229	48.7
44	103	9.5	128	16.3	148	21.3	168	27.1	198	36.4	228	48.3
46	102	9.4	127	16.0	147	21.0	167	26.8	197	36.1	227	47.8
48	101	9.2	126	15.8	146	20.7	166	26.5	196	35.7	226	47.4
50	100	9.0	125	15.6	145	20.5	165	26.2	195	35.4	225	47.0
52	99	8.8	124	15.3	144	20.2	164	25.9	194	35.1	224	46.6
54	98	8.7	123	15.1	143	19.9	163	25.6	193	34.7	223	46.2
56	97	8.5	122	14.8	142	19.7	162	25.3	192	34.4	222	45.8
58	96	8.4	121	14.6	141	19.4	161	25.0	191	34.1	221	45.4
60	95	8.2	120	14.4	140	19.1	160	24.7	190	33.7	220	45.1
62	94	8.0	119	14.1	139	18.8	159	24.4	189	33.4	219	44.7
64	93	7.9	118	13.9	138	18.6	158	24.1	188	33.1	218	44.3
66	92	7.7	117	13.7	137	18.3	157	23.9	187	32.8	217	43.9
68	91	7.5	116	13.4	136	18.0	156	23.6	186	32.4	216	43.5
70	90	7.4	115	13.2	135	17.8	155	23.3	185	32.1	215	43.1
72	89	7.2	114	13.0	134	17.5	154	23.0	184	31.8	214	42.7
74	88	7.1	113	12.8	133	17.3	153	22.7	183	31.4	213	42.3
76	87	6.9	112	12.5	132	17.0	152	22.4	182	31.1	212	41.9
78	86	6.7	111	12.3	131	16.7	151	22.1	181	30.8	211	41.5
80	85	6.6	110	12.1	130	16.5	-	-	-	-	-	-

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,1}$ for Joist Hanger SAE and SAIX - Partial nailing - F1

For 1st Blank model - See SAE Joist hanger

For 2nd Blank model

	380		440		500	
	n_H	n_J	n_H	n_J	n_H	n_J
	22	12	28	15	34	18
A	B	$k_{H,1}$	B	$k_{H,1}$	B	$k_{H,1}$
80	150	23.8	180	32.7	210	47.8
82	149	23.5	179	32.3	209	47.4
84	148	23.2	178	32.0	208	47.0
86	147	22.9	177	31.6	207	46.5
88	146	22.6	176	31.3	206	46.1
90	145	22.3	175	30.9	205	45.7
92	144	22.0	174	30.6	204	45.2
94	143	21.7	173	30.3	203	44.8
96	142	21.4	172	29.9	202	44.4
98	141	21.1	171	29.6	201	43.9
100	140	20.8	170	29.3	200	43.5
102	139	20.5	169	28.9	199	43.1
104	138	20.2	168	28.6	198	42.7
106	137	19.9	167	28.3	197	42.2
108	136	19.6	166	27.9	196	41.8
110	135	19.3	165	27.6	195	41.4
112	134	19.1	164	27.3	194	41.0
114	133	18.8	163	26.9	193	40.5
116	132	18.5	162	26.6	192	40.1
118	131	18.2	161	26.3	191	39.7
120	130	17.9	160	26.0	190	39.3

For 3rd Blank model - No partial nailing capacities

$k_{H,2}$ for SAIX - Full or partial nailing - F2

	Blank	Total number of nails in the header		k_{H2}	
		Full nailing	Partial nailing	Full nailing	Partial nailing
1st Blank model	250	See SAE Joist hanger			
	300				
	340				
	380				
	440				
	500				
2nd blank model	380	22	12	27.4	15.4
	440	28	14	41.8	19.9
	500	34	18	59.3	32.1
3rd blank model	250	6	-	4.7	-
	300	10	-	11.1	-
	340	12	-	15.4	-
	380	12	-	15.4	-
	440	14	-	20.3	-
	500	18	-	32.1	-

$n_{j,ef,1}$ and $n_{j,ef,2}$ for SAIX - Full or partial nailing - F1 or F2

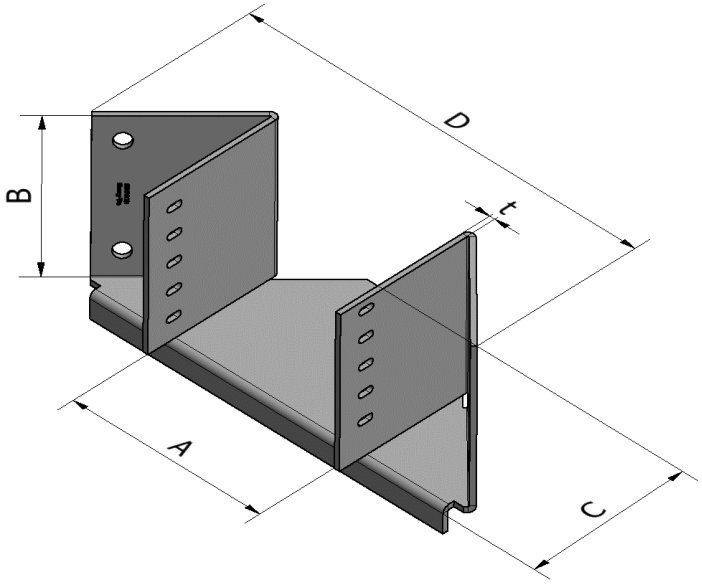
	Blank	Total number of nails in the joist		F1		F2	
		Full nailing	Partial nailing	Full nailing	Partial nailing	Full nailing	Partial nailing
				$n_{J,ef,1}$	$n_{J,ef,1}$	$n_{J,ef,2}$	$n_{J,ef,2}$
1st Blank model	250	See SAE Joist hanger					
	300						
	340						
	380						
	440						
	500						
2nd blank model	380	12	6	8.76	4.91	7.69	4
	440	15	8	12.92	7.59	11.06	5.99
	500	18	10	17.08	10.69	14.46	8.21
3rd blank model	250	7	4	2.84	2.13	2.69	1.92
	300	9	6	4.94	3.51	4.52	3.13
	340	11	6	7.43	5.12	6.6	4.12
	380	11	6	7.43	4.56	6.6	3.81
	440	15	8	12.92	7.96	11.06	6.16
	500	18	10	17.08	10.69	14.46	8.21

D38 SAMI/4X Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
SAMI/4X	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]					Holes			
						Joist		Header	
	A	B	C	D	t	Qty	size	Qty	size
SAMI/4X	76-150	116	121	310	4	10	Ø5x12	4	Ø12
Permitted deviation	-	-	±1.0	±1.0	-	-	-	-	-



Characteristic capacity for SAMI/4X - F1 - timber to timber

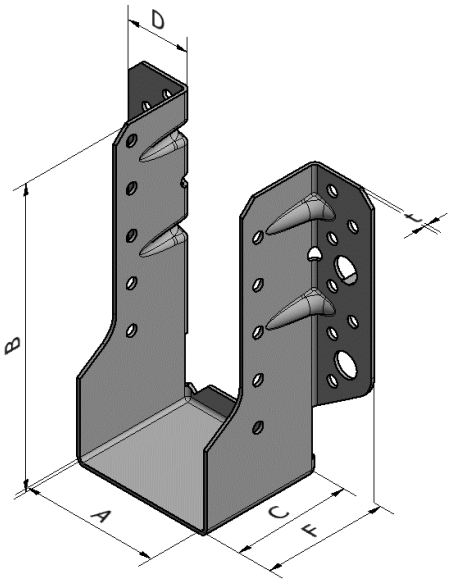
Model	Fasteners		Characteristic capacity [kN] - C24
	n_H	n_J	$R_{1,k}$
SAMI/4X	4 Ø10	10 CNA4.0x35	31.3

D39 SBE Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
SBE	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
230	32-65	(230-A)/2	52.5	29	54	1.5	12	Ø5	2	Ø11	6	Ø5
260	32-71	(260-A)/2	52.5	29	54	1.5	12	Ø5	2	Ø11	8	Ø5
320	32-81	(320-A)/2	52.5	29	54	1.5	14	Ø5	4	Ø11	10	Ø5
380	32-101	(380-A)/2	52.5	29	54	1.5	18	Ø5	4	Ø11	12	Ø5
440	32-121	(440-A)/2	52.5	29	54	1.5	22	Ø5	4	Ø11	14	Ø5
500	32-141	(500-A)/2	52.5	29	54	1.5	26	Ø5	4	Ø11	16	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger SBE - Full nailing - F1

	230		260		320		380		440		500	
	nH	nJ	nH	nJ	nH	nJ	nH	nJ	nH	nJ	nH	nJ
	12	6	12	8	14	10	18	12	22	14	26	16
A	B	kH,1	B	kH,1	B	kH,1	B	kH,1	B	kH,1	B	kH,1
32	99	19.4	114	24.1	144	37.2	174	56.1	204	78.9	234	104.4
36	97	18.6	112	23.3	142	36.3	172	54.9	202	77.5	232	102.7
40	95	17.8	110	22.5	140	35.4	170	53.7	200	76.1	230	101.1
44	93	17.0	108	21.7	138	34.4	168	52.5	198	74.6	228	99.4
48	91	16.3	106	20.9	136	33.5	166	51.4	196	73.2	226	97.8
52	89	15.5	104	20.1	134	32.6	164	50.2	194	71.8	224	96.2
56	87	14.8	102	19.4	132	31.7	162	49.0	192	70.4	222	94.6
60	85	14.0	100	18.6	130	30.8	160	47.9	190	69.0	220	92.9
64	83	13.3	98	17.8	128	29.9	158	46.8	188	67.6	218	91.3
65	83	13.1	98	17.7	128	29.6	158	46.5	188	67.3	218	90.9
68	-	-	96	17.1	126	29.0	156	45.6	186	66.3	216	89.7
71	-	-	95	16.5	125	28.3	155	44.8	185	65.2	215	88.5
75	-	-	-	-	123	27.4	153	43.6	183	63.9	213	86.9
76	-	-	-	-	122	27.2	152	43.4	182	63.5	212	86.5
80	-	-	-	-	120	26.3	150	42.2	180	62.2	210	85.0
81	-	-	-	-	120	26.1	150	42.0	180	61.8	210	84.6
85	-	-	-	-	-	-	148	40.9	178	60.5	208	83.0
89	-	-	-	-	-	-	146	39.8	176	59.1	206	81.4
93	-	-	-	-	-	-	144	38.7	174	57.8	204	79.9
97	-	-	-	-	-	-	142	37.6	172	56.5	202	78.3
100	-	-	-	-	-	-	140	36.774	170	55.5	200	77.2
101	-	-	-	-	-	-	139.5	36.507	170	55.1	200	76.8
105	-	-	-	-	-	-	-	-	168	53.8	198	75.2
109	-	-	-	-	-	-	-	-	166	52.5	196	73.7
113	-	-	-	-	-	-	-	-	164	51.2	194	72.2
117	-	-	-	-	-	-	-	-	162	50.0	192	70.7
121	-	-	-	-	-	-	-	-	160	48.7	190	69.2
125	-	-	-	-	-	-	-	-	-	-	188	67.7
129	-	-	-	-	-	-	-	-	-	-	186	66.3
133	-	-	-	-	-	-	-	-	-	-	184	64.8
137	-	-	-	-	-	-	-	-	-	-	182	63.3
141	-	-	-	-	-	-	-	-	-	-	180	61.9

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,1}$ for Joist Hanger SBE - Partial nailing - F1

	230		260		320		380		440		500	
	nH	nJ	nH	nJ	nH	nJ	nH	nJ	nH	nJ	nH	nJ
	8	4	8	4	10	6	12	6	14	8	16	8
A	B	kH,1	B	kH,1	B	kH,1	B	kH,1	B	kH,1	H	kH,1
32	99	14.0	114	18.0	144	27.0	174	39.6	204.0	52.4	234	69.1
36	97	13.4	112	17.4	142	26.3	172	38.7	202.0	51.5	232	68.0
40	95	12.8	110	16.8	140	25.6	170	37.9	200.0	50.6	230	66.9
44	93	12.3	108	16.2	138	24.9	168	37.0	198.0	49.6	228	65.9
48	91	11.7	106	15.6	136	24.2	166	36.2	196.0	48.7	226	64.8
52	89	11.2	104	15.1	134	23.5	164	35.4	194.0	47.8	224	63.7
56	87	10.7	102	14.5	132	22.9	162	34.6	192.0	46.8	222.0	62.7
60	85	10.1	100	13.9	130	22.2	160	33.8	190.0	45.9	220	61.6
64	83	9.6	98	13.4	128	21.5	158	33.0	188.0	45.0	218.0	60.6
65	83	9.5	98	13.2	128	21.4	158	32.8	187.5	44.8	217.5	60.3
68	-	-	96	12.8	126	20.9	156	32.2	186.0	44.1	216	59.5
71	-	-	95	12.4	125	20.4	155	31.6	184.5	43.4	215	58.8
75	-	-	-	-	123	19.7	153	30.8	182.5	42.5	212.5	57.7
76	-	-	-	-	122	19.6	152	30.6	182.0	42.3	212.0	57.5
80	-	-	-	-	120	18.9	150	29.8	180.0	41.4	210.0	56.4
81	-	-	-	-	120	18.8	150	29.6	179.5	41.2	209.5	56.2
85	-	-	-	-	-	-	148	28.8	177.5	40.3	207.5	55.1
89	-	-	-	-	-	-	146	28.0	175.5	39.4	206	54.1
93	-	-	-	-	-	-	144	27.3	173.5	38.5	203.5	53.1
97	-	-	-	-	-	-	142	26.5	171.5	37.6	201.5	52.1
100	-	-	-	-	-	-	140	25.946	170.0	37.0	200.0	51.3
101	-	-	-	-	-	-	139.5	25.759	169.5	36.8	199.5	51.1
105	-	-	-	-	-	-	-	-	167.5	35.9	197.5	50.1
109	-	-	-	-	-	-	-	-	165.5	35.1	196	49.1
113	-	-	-	-	-	-	-	-	163.5	34.2	194	48.1
117	-	-	-	-	-	-	-	-	161.5	33.4	192	47.1
121	-	-	-	-	-	-	-	-	159.5	32.6	190	46.2
125	-	-	-	-	-	-	-	-	-	-	188	45.2
129	-	-	-	-	-	-	-	-	-	-	186	44.2
133	-	-	-	-	-	-	-	-	-	-	184	43.3
137	-	-	-	-	-	-	-	-	-	-	182	42.3
141	-	-	-	-	-	-	-	-	-	-	180	41.4

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.

$k_{H,2}$ for SBE - Full or partial nailing - F2

Blank	Total number of nails in the header		k_{H2}	
	Full nailing	Partial nailing	Full nailing	Partial nailing
230	12	8	15.3	10.3
260	12	8	15.3	10.3
320	14	10	19.2	15.2
380	18	12	28.9	20.9
440	22	14	40.4	27.6
500	26	16	56.1	35.2

$n_{j,ef,1}$, $n_{j,ef,2}$ and $l_{p,fl}$ for SBE - Full or partial nailing - F1 or F2 or F3

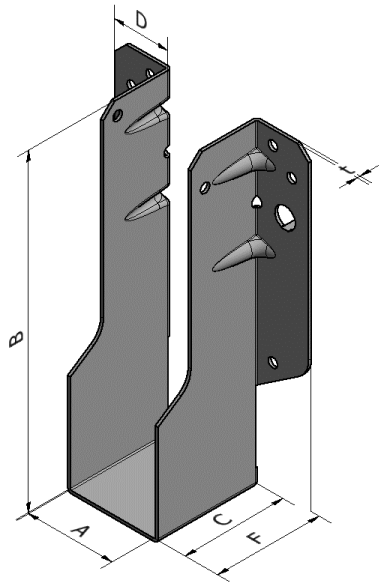
Blank	Total number of nails in the joist		F1		F2		F3	
	Full nailing	Partial nailing	Full nailing	Partial nailing	Full nailing	Partial nailing	Full nailing	Partial nailing
			$n_{J,ef,1}$	$n_{J,ef,1}$	$n_{J,ef,2}$	$n_{J,ef,2}$	$l_{p,fl}$	$l_{p,fl}$
230	6	4	2.71	2.66	2.44	2.22	2485	1667
260	8	4	4.95	2.19	4.41	1.4	2933	2000
320	10	6	7.74	5.36	6.62	4.04	5086	4000
380	12	6	10.7	5.36	8.91	4.59	8156	7000
440	14	8	13.7	8	11.21	6.59	15018	11200
500	16	8	16	8	13.48	6.23	25108	16800

D40 SBE45/168/TF Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
SBE45/168/TF	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]						Holes					
							Header				Joist	
	A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
SBE54/168/TF	45	168	52.5	29	54	1.5	6	Ø5	2	Ø11	2	Ø5
Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-



Characteristic capacity for SBE45/168/TF - Full nailing - F1 - timber to timber

Model	Fasteners - CNA4.0x35		Characteristic capacity [kN] - C24	
	n_H	n_J	$R_{1,k}$	$R_{2,k}$
SBE45/165/TF	6	2	6.0	2.7

To change the timber density instead of using the kdens factor use in this specific case:

Timber class	C18	C20	C22	C24
Factor	0.83	0.89	0.94	1.00

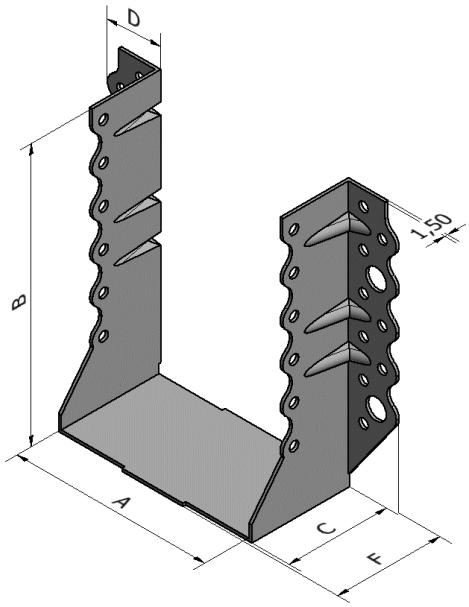
D41 SBG/SLE Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
SBG	Steel ref 1 - Steel ref 2	-
SLE	Steel ref 1 - Steel ref 2	-

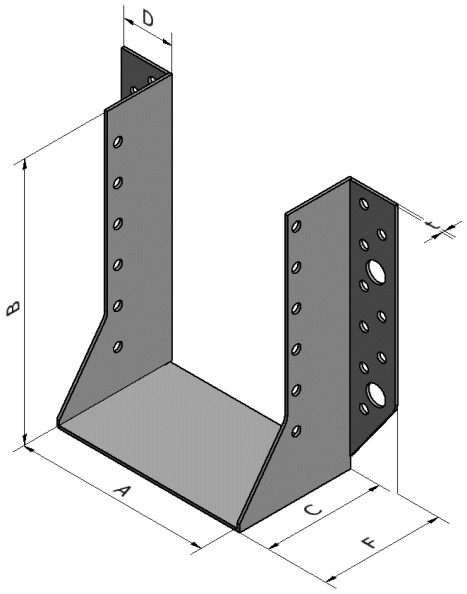
Dimensions

	Blank	Dimensions [mm]						Holes					
								Header				Joist	
		A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
SBG	230	38-52	(230-A)/2	51.5	27	55	1.5	8	Ø5	2	Ø11	6	Ø5
	260	38-64	(260-A)/2	51.5	27	55	1.5	12	Ø5	2	Ø11	6	Ø5
	320	38-80	(320-A)/2	51.5	27	55	1.5	16	Ø5	2	Ø11	10	Ø5
	380	38-100	(380-A)/2	51.5	27	55	1.5	18	Ø5	4	Ø11	12	Ø5
	440	38-120	(440-A)/2	51.5	27	55	1.5	22	Ø5	4	Ø11	14	Ø5
	500	38-140	(500-A)/2	51.5	27	55	1.5	26	Ø5	4	Ø11	16	Ø5
SLE	230	38-76	(230-A)/2	60	27	64	2	8	Ø5	2	Ø11	6	Ø5
	260	38-76	(260-A)/2	60	27	64	2	12	Ø5	2	Ø11	6	Ø5
	320	38-100	(320-A)/2	60	27	64	2	16	Ø5	2	Ø11	10	Ø5
	380	38-106	(380-A)/2	60	27	64	2	18	Ø5	4	Ø11	12	Ø5
	440	38-140	(440-A)/2	60	27	64	2	22	Ø5	4	Ø11	14	Ø5
	500	38-140	(500-A)/2	60	27	64	2	26	Ø5	4	Ø11	16	Ø5
	Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-

SBG



SLE



Parameters have to be used with equation in Annex C

$k_{H,1}$ for Joist Hanger SBG- SLE - Full nailing - F1

	230		260		320		380		440		500	
	nH	nJ	nH	nJ	nH	nJ	nH	nJ	nH	nJ	nH	nJ
	8	6	12	6	16	10	18	12	22	14	26	16
A	B	kH,1	B	kH,1	B	kH,1	B	kH,1	B	kH,1	B	kH,1
36	97	15.7	112	24.8	142	39.1	172	56.4	202	78.3	232	105.8
40	95	15.1	110	23.9	140	38.1	170	55.2	200	76.9	230	104.1
44	93	14.4	108	23.1	138	37.0	168	54.0	198	75.4	228	102.4
48	91	13.8	106	22.2	136	35.9	166	52.8	196	74.0	226	100.7
52	89	13.2	104	21.4	134	34.9	164	51.6	194	72.6	224	99.0
56	87	12.5	102	20.6	132	33.8	162	50.4	192	71.1	222	97.4
60	85	11.9	100	19.7	130	32.8	160	49.2	190	69.7	220	95.7
64	83	11.3	98	18.9	128	31.8	158	48.0	188	68.3	218	94.0
68	81	10.7	96	18.1	126	30.8	156	46.9	186	66.9	216	92.4
72	79	10.1	94	17.4	124	29.8	154	45.7	184	65.5	214	90.7
76	77	9.6	92	16.6	122	28.8	152	44.5	182	64.1	212	89.1
80					120	27.8	150	43.4	180	62.7	210	87.5
90					115	25.4	145	40.5	175	59.3	205	83.4
100					110	23.0	140	37.7	170	56.0	200	79.4
110									165	52.7	195	75.5
120									160	49.4	190	71.6
130									155	46.3	185	67.8
140									150	43,2	180	64.0

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.
For SBG: when t-t2 < 4 x d, don't use the holes in the joist, they are opposed. Then, the number of nails in the joist needs to be reduced in accordance with Eurocode 5, clause 8.3.1.1 (7)
$k_{H,1}$ value can be used both for column and beam

$k_{H,1}$ for Joist Hanger SBG-SLE - Partial nailing - F1

	230		260		320		380		440		500	
	nH	nJ	nH	nJ	nH	nJ	nH	nJ	nH	nJ	nH	nJ
	6	3	8	4	10	6	12	6	14	8	16	8
A	B	kH,1	B	kH,1	B	kH,1	B	kH,1	B	kH,1	H	kH,1
36	97	15.1	112	19.0	142	27.9	172	39.9	202	54.1	232	70.3
40	95	14.6	110	18.3	140	27.2	170	39.1	200	53.1	230	69.1
44	93	14.0	108	17.7	138	26.4	168	38.2	198	52.1	228	68.0
48	91	13.4	106	17.0	136	25.7	166	37.4	196	51.1	226	66.9
52	89	12.9	104	16.4	134	25.0	164	36.5	194	50.1	224	65.8
56	87	12.3	102	15.8	132	24.3	162	35.7	192	49.2	222	64.7
60	85	11.8	100	15.2	130	23.6	160	34.8	190	48.2	220	63.7
64	83	11.3	98	14.6	128	22.8	158	34.0	188	47.2	218	62.6
68	81	10.7	96	14.0	126	22.1	156	33.2	186	46.3	216	61.5
72	79	10.2	94	13.4	124	21.5	154	32.4	184	45.3	214	60.4
76	77	9.7	92	12.8	122	20.8	152	31.5	182	44.4	212	59.3
80					120	20.1	150	30.7	180	43.5	210	58.3
90					115	18.4	145	28.7	175	41.1	205	55.6
100					110	16.8	140	26.8	170	38.8	200	53.0
110									165	36.6	195	50.5
120									160	34.4	190	47.9
130									155	32.3	185	45.4
140									150	30.2	180	43.0

In the case of intermediate width, $k_{H,1}$ can be calculated by linear interpolation.
For SBG: when t-t2 < 4 x d, don't use the holes in the joist, they are opposed. Then, the number of nails in the joist needs to be reduced in accordance with Eurocode 5, clause 8.3.1.1 (7)
$k_{H,1}$ value can be used both for column and beam

$k_{H,2}$ for SBG-SLE - Full or partial nailing - F2

Blank	Total number of nails in the header		k_{H2}	
	Full nailing	Partial nailing	Full nailing	Partial nailing
230	8	6	9.6	6.7
260	12	8	15.9	10.7
320	16	10	25.6	15.7
380	18	12	29.9	21.7
440	22	14	44.3	28.6
500	26	16	58.1	36.4

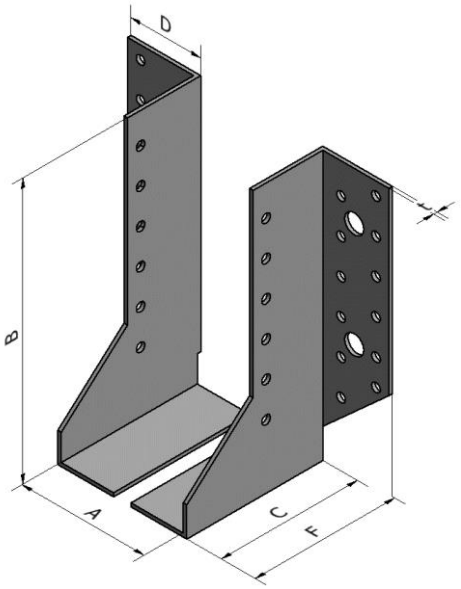
$k_{H,2}$ value can be used both for column and beam

D42 SDED/G and BNS2P Joist hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
SDED/G	Steel ref 1 - Steel ref 2	-
BSN2P	Steel ref 1 - Steel ref 2	-

Dimensions

	Blank	Dimensions [mm]						Holes					
								Header				Joist	
		A	B	C	D	F	t	Qty	size	Qty	size	Qty	size
SDED/G	300	60-250	118	84	41.5	86	2	2 x 9	Ø5	2 x 2	Ø13	2 x 5	Ø5
	340	60-250	138	84	41.5	86	2	2 x 11	Ø5	2 x 2	Ø13	2 x 6	Ø5
	380	60-250	158	84	41.5	86	2	2 x 11	Ø5	2 x 2	Ø13	2 x 6	Ø5
	440	60-250	188	84	41.5	86	2	2 x 14	Ø5	2 x 2	Ø13	2 x 7	Ø5
BSN2P	BSN2P30/98	60-200	98	70.5	39.5	72.5	2	2 x 8	Ø5	2 x 2	Ø9	2 x 4	Ø5
	BSN2P30/152	60-250	152	78	42	80	2	2 x 12	Ø5	2 x 2	Ø11	2 x 12	Ø5
	BSN2P30/180	60-250	180	85	44	87	2	2 x 13	Ø5	2 x 3	Ø11	2 x 7	Ø5
	Permitted deviation	-	-	±1.0	±1.0	±1.0	-	-	-	-	-	-	-



Parameters have to be used with equation in Annex C

$k_{H,1}$ and $k_{H,2}$ – SDED/G BSN2P - Full Nailing

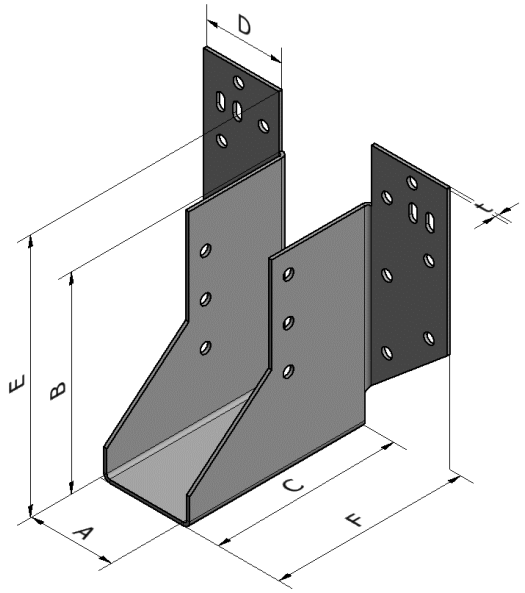
	Blank	Coefficients	
		$k_{H,1}$	$k_{H,2}$
SDED/G	300	24	19.9
	340	32.9	28.1
	380	38.6	28.1
	440	55.9	42.9
BSN2P	BSN2P30/98	17.7	16.6
	BSN2P30/152	51.7	32.8
	BSN2P30/180	73.4	37.6

D43 SHT Strap hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
SHT	Steel ref 1 - Steel ref 2	-

Dimensions

Reference	Dimensions [mm]							Holes			
								Header		Joist	
	A	B	C	D	E	F	t	Qty	size	Qty	size
SHT115/38	38	90	83.5	35.9	115	85	1.5	12	Ø5	6	Ø5
Permitted deviation	-	-	-	-	-	-	-	-	-	-	-



Characteristic Capacities for SHT - Timber to Timber – C24

Hanger Type	Installation Configuration	Fasteners - CNA 4.0 x 35			Characteristic capacity [kN] - C24	
		Supporting Timber Fasteners		Supported Timber Fasteners		
		Top	Face		$R_{1,k}$	$R_{2,k}$
SHT115/38	Face Fix	-	12	6	9.60	6.69
SHT115/38	Wrap Over	2	8	6	9.40	5.82

D44 TFU Joist hanger

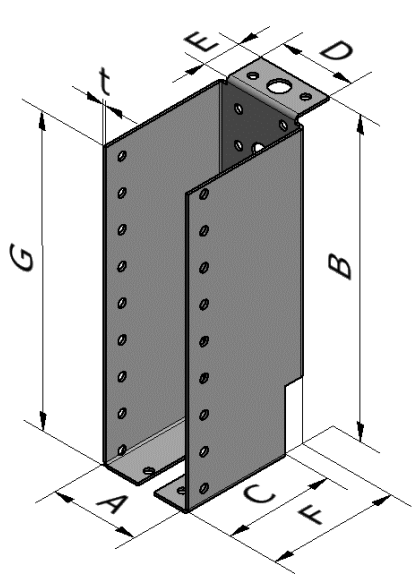
Product Name	Material reference acc. to clause II-1	Alternative Names
TFU	Steel ref 1 - Steel ref 2	-

Dimensions

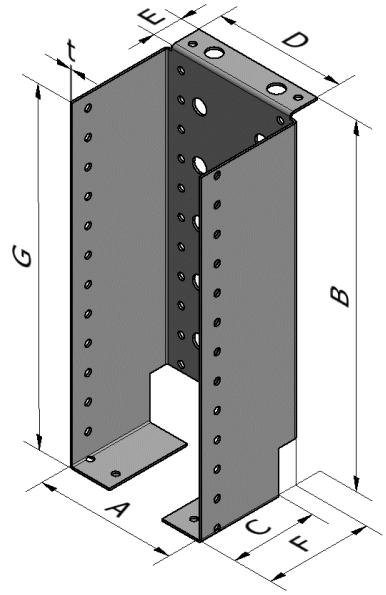
Blank	Dimensions [mm]								Holes					
									Header				Joist	
	A	B	C	D	E	F	G	t	Qty	size	Qty	size	Qty	size
TFU A/140	45-69	99-143	61	43	20	63-75	96-140	1.5	3	Ø11	12	Ø5	16*	Ø5
TFU A/180	45-69	144-183	61	43	20	63-75	141-180	1.5	4	Ø11	16	Ø5	20*	Ø5
TFU A/220	45-69	184-223	61	43	20	63-75	181-220	1.5	5	Ø11	20	Ø5	24*	Ø5
TFU A/260	45-69	224-263	61	43	20	63-75	221-260	1.5	6	Ø11	24	Ø5	28*	Ø5
TFU A/300	45-69	264-303	61	43	20	63-75	261-300	1.5	7	Ø11	28	Ø5	32*	Ø5
TFU A/140	70-94	103-143	61	68	20	63-75	100-140	1.5	3	Ø11	12	Ø5	16*	Ø5
TFU A/180	70-94	144-183	61	68	20	63-75	141-180	1.5	4	Ø11	16	Ø5	20*	Ø5
TFU A/220	70-94	184-223	61	68	20	63-75	181-220	1.5	5	Ø11	20	Ø5	24*	Ø5
TFU A/260	70-94	224-263	61	68	20	63-75	221-260	1.5	6	Ø11	24	Ø5	28*	Ø5
TFU A/300	70-94	264-303	61	68	20	63-75	261-300	1.5	7	Ø11	28	Ø5	32*	Ø5
TFU A/140	95-119	103-143	63.5	93	20	66-78	100-140	1.5	6	Ø11	12	Ø5	16	Ø5
TFU A/180	95-119	144-183	63.5	93	20	66-78	141-180	1.5	8	Ø11	16	Ø5	20	Ø5
TFU A/220	95-119	184-223	63.5	93	20	66-78	181-220	1.5	10	Ø11	20	Ø5	24	Ø5
TFU A/260	95-119	224-263	63.5	93	20	66-78	221-260	1.5	12	Ø11	24	Ø5	28	Ø5
TFU A/300	95-119	264-303	63.5	93	20	66-78	261-300	1.5	14	Ø11	28	Ø5	32	Ø5
TFU A/140	120-145	103-143	61	118	20	63-75	100-140	1.5	6	Ø11	12	Ø5	16	Ø5
TFU A/180	120-145	144-183	61	118	20	63-75	141-180	1.5	8	Ø11	16	Ø5	20	Ø5
TFU A/220	120-145	184-223	61	118	20	63-75	181-220	1.5	10	Ø11	20	Ø5	24	Ø5
TFU A/260	120-145	224-263	61	118	20	63-75	221-260	1.5	12	Ø11	24	Ø5	28	Ø5
TFU A/300	120-145	264-303	61	118	20	63-75	261-300	1.5	14	Ø11	28	Ø5	32	Ø5
Permitted deviation	-	±1.0	±1.0	±1.0	±1.0	±1.0	-	-	-	-	-	-	-	-

* up to this number

45<A<94



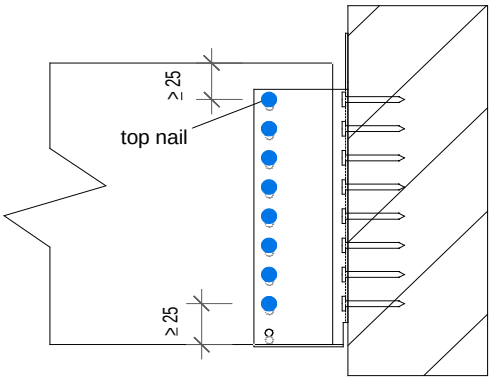
95<A<145

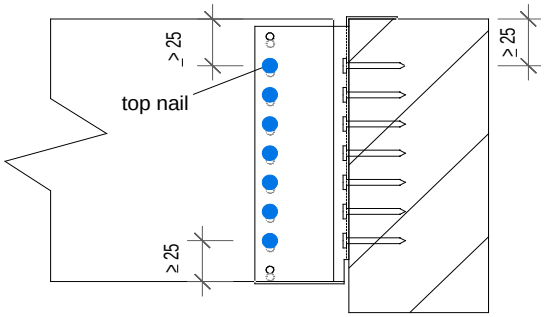


Characteristic capacity for TFU - Timber to Timber - C24

Model	Fasteners		$R_{1.k}$ and $R_{2.k}$ [kN]				$R_{3.k}$ [kN]
	nH	nJ	CNA4,0x35	CNA4,0x40	CNA4,0x50	CNA4,0x60	All nails
TFU A/100 (96)	6	6	3.4	3.9	4.8	5.6	6.31 / k_{mod}
TFU A/120	8	8	5.6	6.4	8	9.2	7.64 / k_{mod}
TFU A/141	10	10	8.3	9.4	11.8	13.5	8.97 / k_{mod}
TFU A/158	12	12	11.3	12.8	16	18.2	10.29 / k_{mod}
TFU A/181	14	14	14.7	16.6	20.7	23.4	11.62 / k_{mod}
TFU A/198	16	16	18.3	20.6	25.6	28.8	12.95 / k_{mod}
TFU A/221	18	18	22	24.8	30.7	34.4	14.28 / k_{mod}
TFU A/238	20	20	25.9	29.1	35.9	40.1	15.61 / k_{mod}
TFU A/261	22	22	29.9	33.5	41.3	45.8	16.94 / k_{mod}
TFU A/278	24	24	33.9	37.9	46.6	51.6	18.26 / k_{mod}
TFU A/300	26	26	38	42.4	52	57.3	19.59 / k_{mod}

Only the nails with a distance to the border according to EN1995-1 can be considered





Characteristic capacity for TFU - Timber to Rigid Support for A <70 and A ≥ 95mm

Model	Fasteners		$R_{1.k}$ and $R_{2.k}$ [kN] for A <70 and A ≥ 95mm				$R_{3.k}$ [kN]
	n_H	n_J	CNA4,0x35	CNA4,0x40	CNA4,0x50	CNA4,0x60	all
TFU A/100 (96)	1	6	min of: $3,9/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $4,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $4,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $4,2/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$2.65/k_{mod}$
TFU A/120	1	8	min of: $5,5/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $5,9/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $5,9/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $6,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$3.21/k_{mod}$
TFU A/141	2*	10	min of: $7,3/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $7,9/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $7,9/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $8,2/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$3.77/k_{mod}$
TFU A/158	2*	12	min of: $9,2/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $10,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $10,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $10,4/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$4.32/k_{mod}$
TFU A/181	2*	14	min of: $11,2/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $12,4/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $12,4/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $12,8/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$4.88/k_{mod}$
TFU A/198	2*	16	min of: $13,3/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $14,8/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $14,8/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $15,4/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$5.44/k_{mod}$
TFU A/221	2*	18	min of: $15,5/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $17,4/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $17,4/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $18,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$6,0/k_{mod}$
TFU A/238	2*	20	min of: $17,8/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $20,0/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $20,0/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $20,9/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$6.56/k_{mod}$
TFU A/261	2*	22	min of: $20,2/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $22,8/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $22,8/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $23,8/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$7.11/k_{mod}$
TFU A/278	2*	24	min of: $22,6/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $25,6/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $25,6/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $26,8/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$7.67/k_{mod}$
TFU A/300	2*	26	min of: $25,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $28,5/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $28,5/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $29,9/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$8.23/k_{mod}$

* up to, for lower load it´s an option to use only the bolts in the upper line ;
n_b = number of bolts

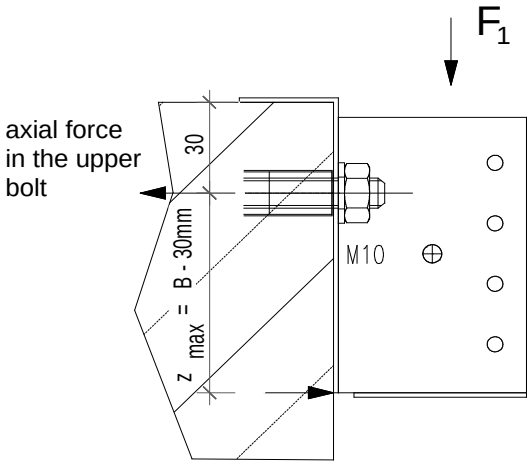
Characteristic capacity for TFU - Timber to Rigid Support for 70 ≤ A < 95mm

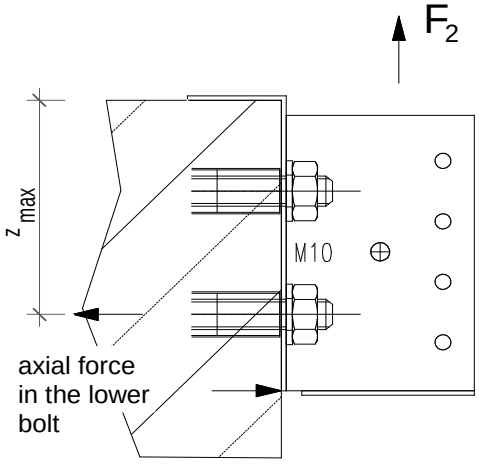
Model	Fasteners		$R_{1.k}$ and $R_{2.k}$ [kN] for 70 ≤ A < 95mm				$R_{3.k}$ [kN]
	n_H	n_J	CNA4,0x35	CNA4,0x40	CNA4,0x50	CNA4,0x60	all
TFU A/100 (96)	2	6	min of: $2,7/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $2,8/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $3,0/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $3,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$2.65/k_{mod}$
TFU A/120	2	8	min of: $3,9/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $4,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $4,5/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $4,7/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$3.21/k_{mod}$
TFU A/141	4*	10	min of: $5,3/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $5,6/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $6,2/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $6,4/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$3.77/k_{mod}$
TFU A/158	4*	12	min of: $6,8/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $7,2/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $8,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $8,4/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$4.32/k_{mod}$
TFU A/181	4*	14	min of: $8,5/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $9,0/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $10,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $10,6/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$4.88/k_{mod}$
TFU A/198	4*	16	min of: $10,2/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $10,8/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $12,3/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $12,9/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$5.44/k_{mod}$
TFU A/221	4*	18	min of: $12,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $15,0/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $14,6/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $15,4/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$6.0/k_{mod}$
TFU A/238	4*	20	min of: $14,0/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $17,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $17,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $18,0/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$6.56/k_{mod}$
TFU A/261	4*	22	min of: $16,0/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $19,4/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $19,7/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $20,7/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$7.11/k_{mod}$
TFU A/278	4*	24	min of: $18,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $21,8/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $22,4/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $23,6/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$7.67/k_{mod}$
TFU A/300	4*	26	min of: $20,3/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $25,1/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	min of: $26,5/k_{mod}^{0.5}$; $n_b x 5.8/k_{mod}$	$8.23/k_{mod}$

* up to, for lower load it´s an option to use only the bolts in the upper line ;
n_b = number of bolts

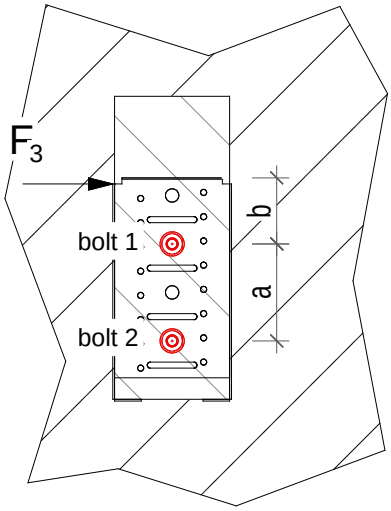
For uplift capacities F_2 for connection to rigid support: the lowermost bolt hole has to be use for fixing, in this case the same capacities as for download can be consider.

For connection with bolts have to check the capacities of the bolts too.
For F_1 and F_2 have to be check the lateral capacities of bolts:
n_b = number of bolts
Each bolt has to have a minimum capacity, which are able to absorb the following force:
$F_{lat.bolt} = F_{1.d} / n_b$ or $F_{lat.bolt} = F_{2.d} / n_b$
The axial force in the upper bolt / bolts have to be calculate as following:
$F_{lat.bolt} = F_{1.d} \times 25mm / z_{max}$ or $F_{lat.bolt} = F_{2.d} \times 25mm / z_{max}$
The bolts have to be check also for the load combination from axial and lateral, and the combination from F_1 and F_2 .





The forces in the bolts for F_3 have to be calculate as shown next.
An axial part for the bolts from the force F_3 can be neglected.

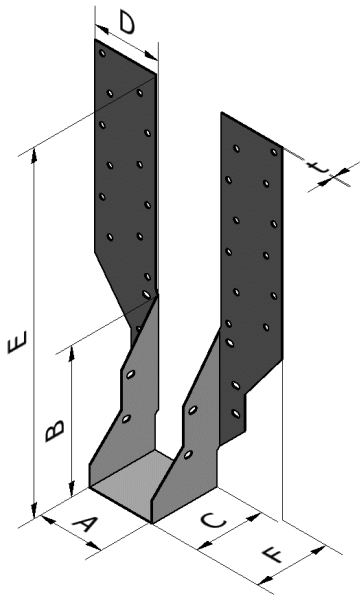


D45 THA Straps hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
THA	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]							Holes			
								Header		Joist	
	A	B	C	D	E	F	t	Qty	size	Qty	size
THA38	38	113.5	62.5	60.7	226	64.6	1.2	22	Ø4.1	6	Dome Holes
THA44	44	110.5	62.5	60.7	223	64.6	1.2	22	Ø4.1	6	Dome Holes
THA50	50	107.5	62.5	60.7	220	64.6	1.2	22	Ø4.1	6	Dome Holes
THA75	75	120	62.5	60.7	232.5	64.6	1.2	22	Ø4.1	6	Dome Holes
THA100	100	107.5	62.5	60.7	220	64.6	1.2	22	Ø4.1	6	Dome Holes
Permitted deviation	-	-	±1.0	±1.0		±1.0	-	-	-	-	-



Parameters have to be used with equation in Annex C

Parameters for THA - F1 - timber to timber

Model	l	l_{ef}	S	B_{eff}	a-0.5a_c	e	c_{hor}	kef	d	neff (per flange) round wire
THA38	59.5	109	40	93	114	34.5	10	0.35	1.2	7
THA44	59.5	113	40	93	114	34.5	10	0.35	1.2	7
THA50	59.5	115	40	93	114	34.5	10	0.35	1.2	7
THA75	59.5	120	40	85	114	34.5	10	0.35	1.2	7
THA100	59.5	120	40	77	114	34.5	10	0.35	1.2	7

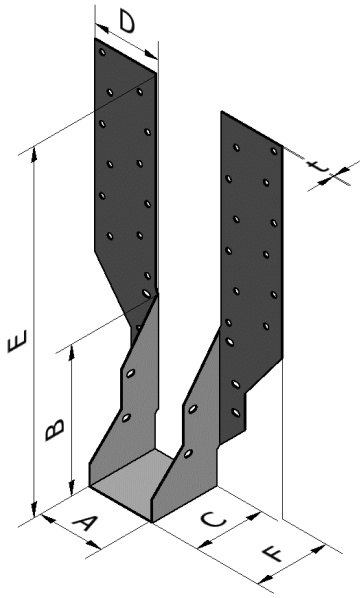
Hanger Type	Installation Configuration	Supporting Timber Fasteners		Supported Timber Fasteners	
		3.75 x 30 ST		ST 3.75 x 30	SS 3.75 x 75
		Top	Face		
THA	Face Fix	-	20	4	-
	Wrap Over	4	8	4	-
	Face Fix	-	20	-	4
	Wrap Over	4	8	-	4

D46 THAI Straps hanger

Product Name	Material reference acc. to clause II-1	Alternative Names
THAI	Steel ref 1 - Steel ref 2	-

Dimensions

Blank	Dimensions [mm]							Holes			
								Header		Joist	
	A	B	C	D	E	F	t	Qty	size	Qty	size
THAI222	40	238	57	58.2	580	65	1.2	60	Ø4	6	Closed Pan
THAI1.81/22	46	235	57	58.2	577	65	1.2	60	Ø4	6	Closed Pan
THAI3522	59	228	57	58.2	570	65	1.2	60	Ø4	6	Closed Pan
THAI322	65	225	57	58.2	567	65	1.2	60	Ø4	6	Closed Pan
THAI422	90	220	57	58.2	555	65	1.2	60	Ø4	6	Closed Pan
THAI-2	45 - 150	224	57	59	550	65	2	56	Ø4.34	2	Closed Pan
Permitted deviation	-	-	±1.0	±1.0		±1.0	-	-	-	-	-



Parameters have to be used with equation in Annex C

Parameters for THAI - F1 - timber to timber

Model	l	l_{ef}	S	B_{eff}	a-0.5a_c	e	c_{hor}	kef	d	neff (per flange) round wire	neff (per flange Ring Shank nails
THAI222	57	107	39	87	200	37	15	1	1.1	5	2.5
THAI1.81/22	57	110	39	87	200	37	15	1	1.1	5	2.5
THAI3522	57	117	39	84	200	37	15	1	1.1	5	2.5
THAI322	57	117	39	83	200	37	15	1	1.1	5	2.5
THAI422	57	117	39	76	200	37	15	1	1.1	5	2.5
THAI-2	63.5	124	49	85	200	37	15	1	1.1	5	2.5

Hanger Type	Installation Configuration	Supporting Timber Fasteners				Supported Timber Fasteners	
		SS 3.75 x 75		ARS 4.0x50		ST 3.75 x 30	SS 3.8x38
		Top	Face	Top	Face		
THAI	Face Fix	-	20	-	-	2	-
	Wrap Over	-	-	-	20	-	2
	Face Fix	4	2	-	-	2	-
	Wrap Over	-	-	4	2	-	2