# European Technical Assessment ETA-06/0270 of 2020/01/07

## 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<br>See type numbers in section II.1 of the ETA |
| **Product family to which the above construction product belongs:** | Three-dimensional nailing plate (Joist hanger for wood to wood connections and wood to concrete or steel connections) |
| **Manufacturer:** | SIMPSON STRONG-TIE Int. Ltd<br>For local branch refer to www.strongtie.eu |
| **Manufacturing plant:** | SIMPSON STRONG-TIE Manufacturing facilities |
| **This European Technical Assessment contains:** | 216 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 2018-02-13 |

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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, GLE-AL, GLI, GLI-AL, 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, SAEX, SAIX, SAMI/4X, SBE, SBE45/168/TF, SBG/SLE, SDED/G, BSN2P, SHT, SJH, TFU, THA, THAI.

Simpson Strong-Tie joist hangers type BSD, BSN, BSNN, BSIN, BSS, ETC, GBE, GBI, GLE, GLE-AL, GSE, GSE-AL, HGUQ, HGUS, LUP, MF, MH, SAE, SAE590, SAE620, SAE690, SAEL, SAEX, SBE, SBG/SLE, SJH 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, GLI-AL 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.

Some joist hangers may be produced from steel grade S235JR according to EN 10025-2 (named "Steel ref 3" in the rest of the document). In this case, an additional coating must be added such as hot dip galvanizing or painting. Some additional coatings allow to reach service class 3.

## 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 assessed |
| Ductility in cyclic testing | No performance assessed |
| **3.2 Safety in case of fire (BWR2)** | |
| Reaction to fire | The joist hangers are made from steel steel classified as class A1 in accordance with EN 13501-1 and Commission Delegated Regulation 2016/364 |
| **3.3 Hygiene, health and the environment (BWR3)** | |
| Influence on air quality | No performance assessed |
| **3.7 Sustainable use of natural resources (BWR7)** | No performance assessed |
| **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 $\gamma_M$ 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, SAEX, SAIX, SDED/G, GSE, GSE-AL, GSEXL, MF, SAMI/4X, GLE, GLE-AL, ETC, GBE, TFU, SBE, SBG, SLE and SJH 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, joist hangers have a zinc coating weight of min Z275. Steel employed is S250GD with min Z275 according to EN 10346:2009.

3.11.2 Corrosion protection in service class 3.
In accordance with Eurocode 5, 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, or made of S250GD steel with zinc coating ZM310 according to EN 10346:2009, 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, GLE-AL, GLI, GLI-AL, 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, SAEX, SAIX, SAMI/4X, SBE, SBE45/168/TF, SBG/SLE, SDED/G, BSN2P, SHT, SJH, 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.

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## 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 2020-01-07 by

Thomas Bruun
Managing Director, ETA-Danmark

# ANNEX A
# REVISION HISTORY

| Issue No. | Update |
|---|---|
| *Modifications and additions to the previous versions of ETA-06/0270* |
| 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 mm |
| | 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 $k_{H,2}$ and insertion of a line for 38 mm (full nailing) |
| | SBG – Correction of the value of $k_{H,2}$ 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<br>- Standard correction<br>- BNS2P<br>- BSD drawing<br>- 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-06/0270* |

| Issue No. | Update |
|---|---|
| 7.0 | Add ZM310 for service class 3 |
| | Add SSH/SSF screws nail pattern indications, specifications and capacities. Add also tables with SSH/SSF screws for BSNN, GLE, GSE, GSE-AL, SAE, SAEL and SBE joist hangers. |
| | Remove ARS 4,0x50 values table |
| | Indicate that the 3$^{rd}$ part of Eq.6 [7A √…] is in N |
| | Add BSNN to the header and below Eq.17 |
| | Add "$n_{H,eff}$ is the number of nails in the first row close to the bending line" below Eq.17 |
| | Add "$n_h$ the number of bolts on each flange on the header" below Eq.33 |
| | Add "when connected to timber, $z_{max}$ is reduced by 20 mm" below Eq.43 |
| | Add "$F_{anchor,Rk}$ is the resistance of the anchors group / bolts group in case of timber to timber connection" below Eq.46 |
| | Add "anchors/bolts" and for timber to timber connections via bolts, the centre of rotation is 20 mm above the bottom plate for Eq.53 |
| | BSIN – Add BSIN100/100 modified version and associated data |
| | BSN – Correct heights: for blank 280 mm, height B of 90 mm instead of 140 mm |
| | BSNN – Add blanks 300, 340 and 380 mm new version and associated data |
| | ETC – Correct number of header nails in the table of $F_k$ capacities: for ETC502 (a), 25 mm instead of 15 mm and for ETC502 (c), 15 instead of 25 mm |
| | ETC – Add ETC392 |
| | GBE – Update GBE parameters |
| | GLE / GLI – Add new blanks and dimensions |
| | Add GLE-AL and GLI-AL joist hangers |
| | GSE – Correct holes joist quantity of GSE900/2,5X and GSE900/4X from 38 to 36 |
| | GSI – Update dimension $A_{max}$ of GSI from 140 to 136 and dimension $A_{min}$ of GSI-AL from 135 to 137 |
| | SAE, SAEL, SAI and SAIL – Add a mention to partial nailing of posts |
| | SAEL – Correct SAEL width in dimensions table |
| | SAI – Correct width of SAI620-a and SAI620-b, respectively from 90 to 100 and from 101 to 200 mm |
| | SAIX – Add alternative name SAEX for external flanges joist hangers |
| | SAIX - Add ZM310 to SAEX and SAIX |
| | Add SJH joist hanger |
| | THAI – Add THAI1200 straps hanger |
| | Add fire resistance for GSE/4 on concrete |

| 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
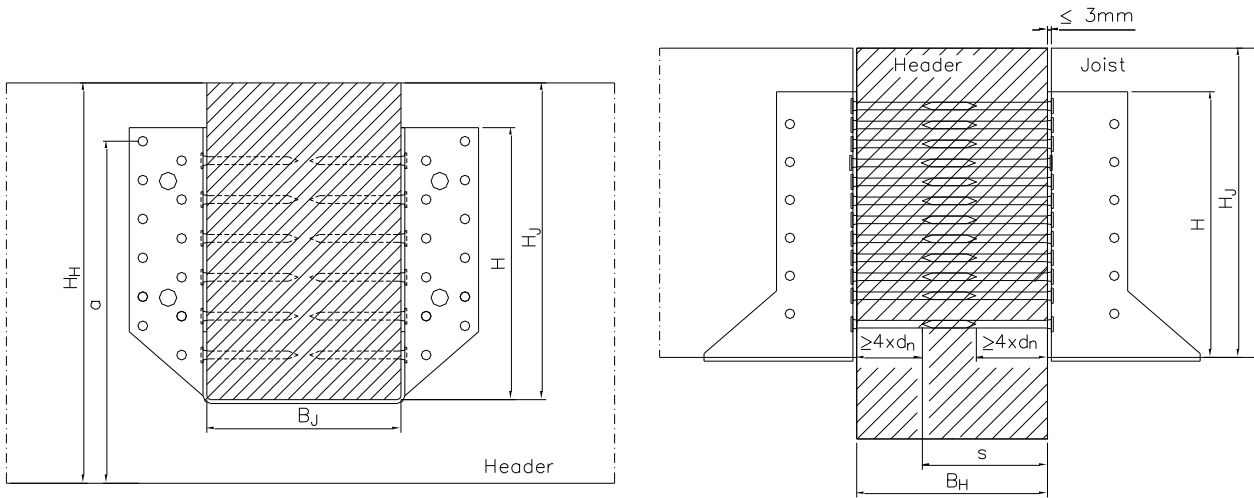


## B2 Joist hanger on rigid support



Washer min Ø18.

The washer have to follow the requirement of the anchor suppliers.
Always used the washer delivered with the anchor.

Holes for bolts
The bolts shall always be positionned symmetrically about the vertical axis of the joist hanger
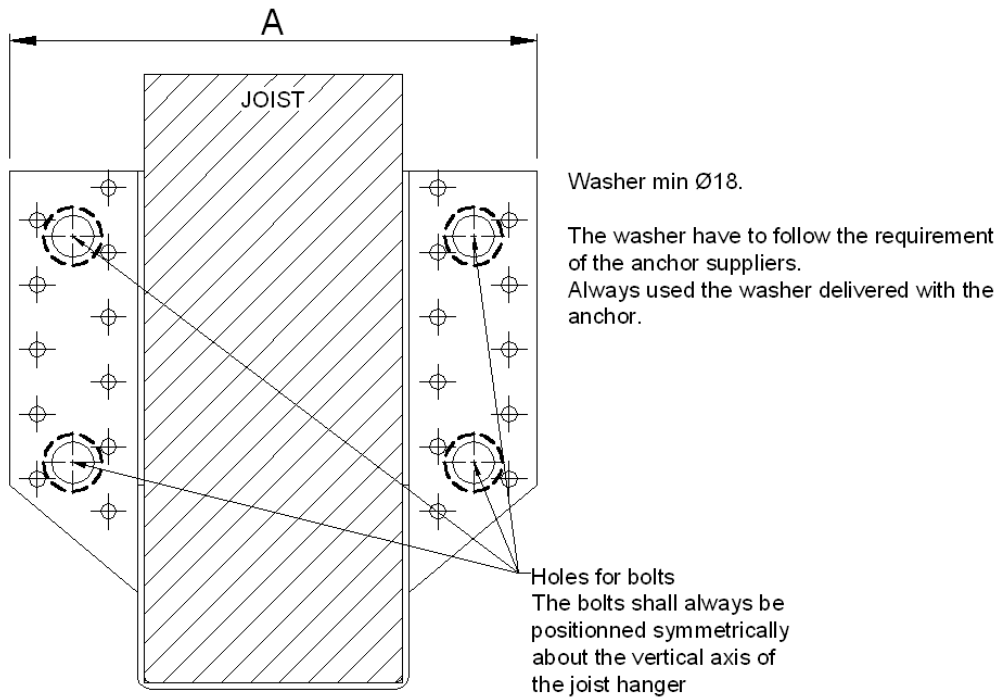
# B3 Nail Pattern

**Full nail fixing:**
*General application*
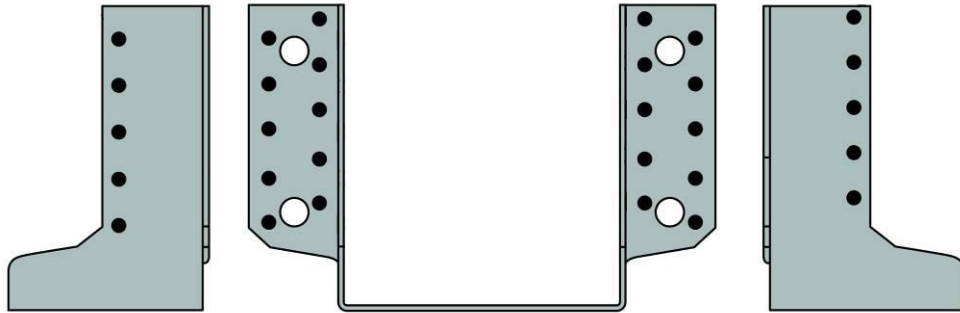
Fill it in all the holes with nails, on the face and the side flanges.

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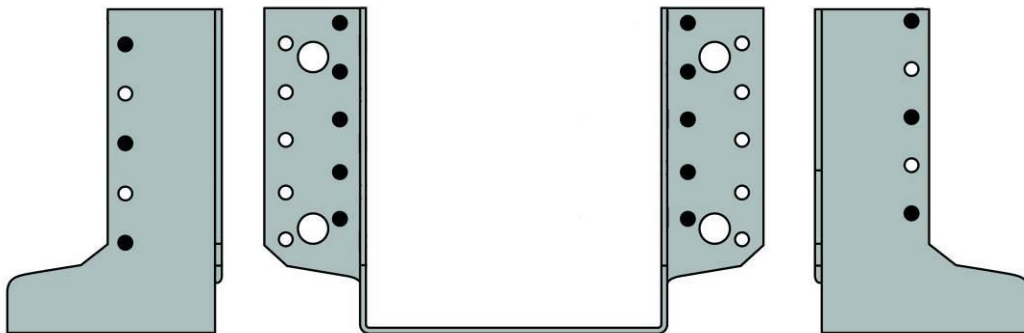
● *On the side flanges :* Place one nail out of two on each side flange, starting from the first hole on the top of the flange.
● *On the face flanges :* Place the nails on each face flange, on the vertical line next to the folding.

*Partial nailing for connection to column*
The distance between the nails in the direction of the fibre shall be at least 20 mm.
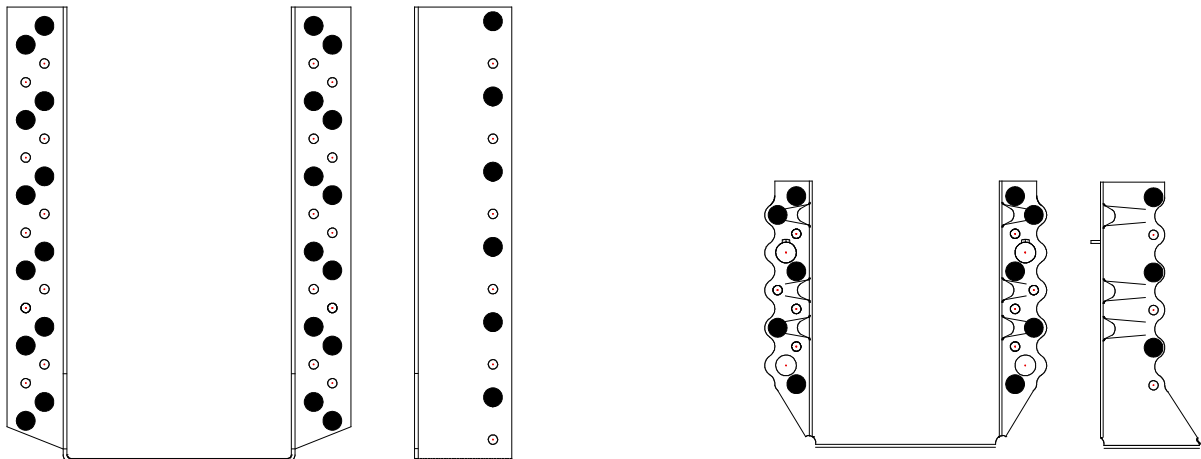
**Fixing with SSH or SSF connector screws:**
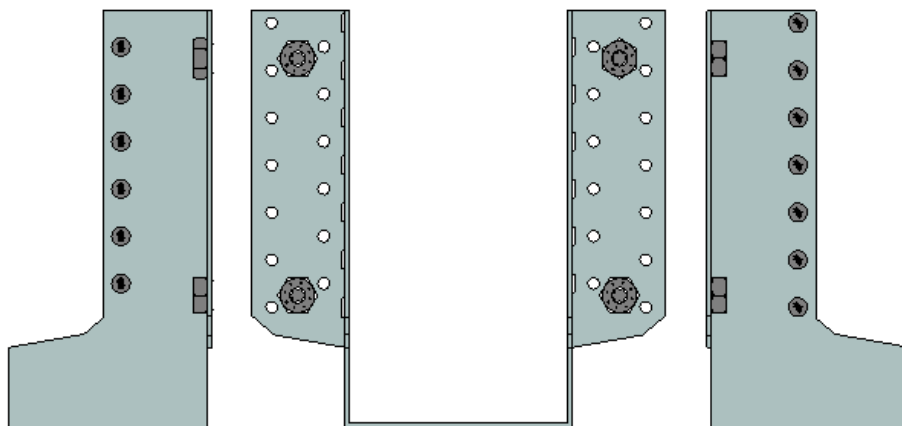


● *On the side flanges :* Fill with SSH or SSF connector screws in the face flanges all large holes that fulfil the minimum spacing stated in annex C3.
● *On the face flanges :* Fill all holes with Ø4 nails or Ø5 connector screws.

## 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.
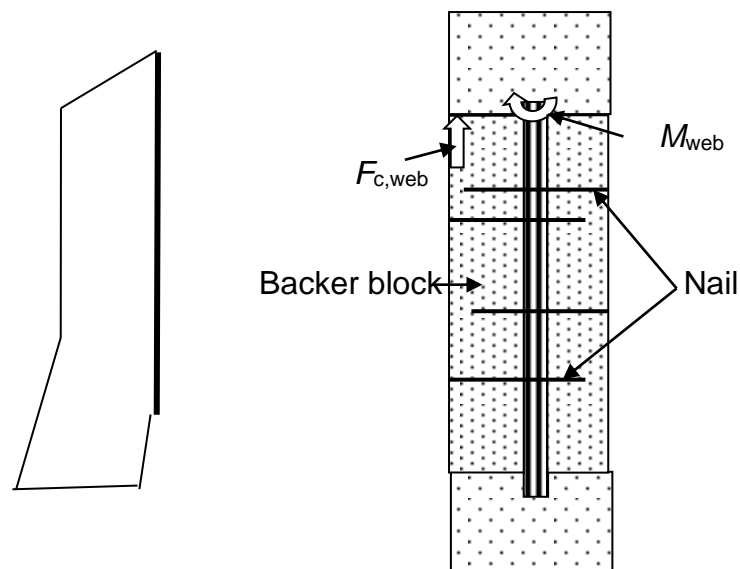


Static model for a vertical force downward. The header beam has been drawn a little away to the right to show the forces acting. The header is shown with the forces and moment acting on it.

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.
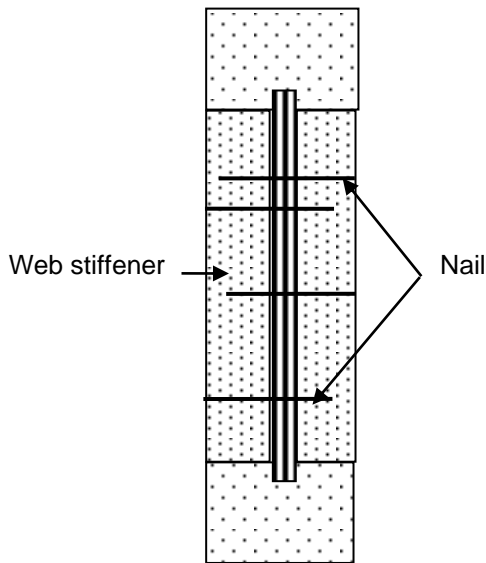


Web stiffeners on the joist at the joist hanger. The web stiffener shall fit to the bottom flange and have a width of 2/3 of the height between the inner sides of the flanges.

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.

## B6 SJH typical installation

Basic installation on timber, placed diagonally: 1 SJHR + 1 SJHR-F. SJHR shall be placed flush to joist surface.
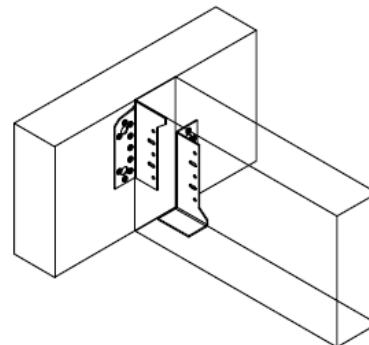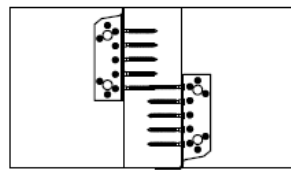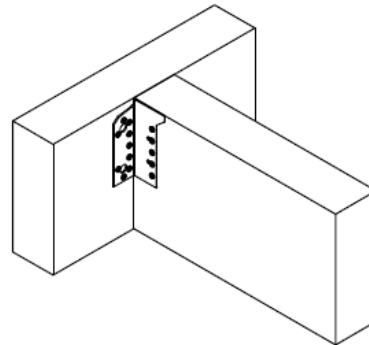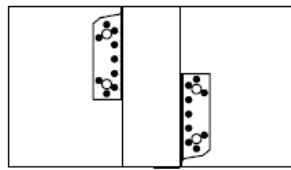
Installation with reinforcing full threaded screws when nails in joist does not overlap:
1 SJHR + 1 SJHR-F + 1 ESCRFTZ
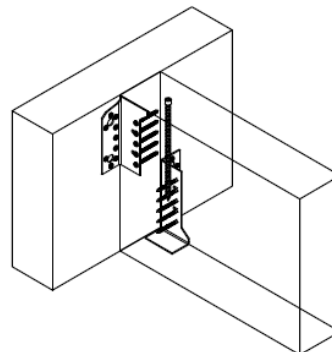
Other possible configurations:

1 SJHR + 1 SJHR-F + 1 SJHL + 1 SJHL-F                    SJHR + SJHR-F
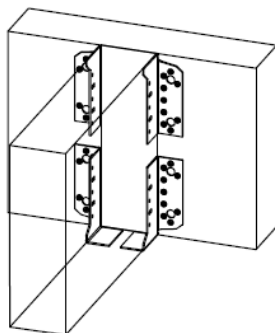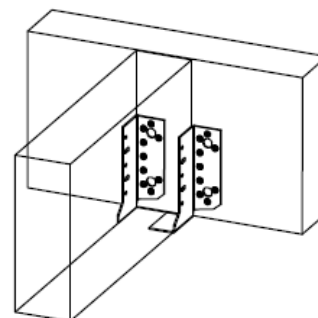
On rigid support, only configurations where half hangers are placed symmetrically is allowed.

# 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 |
| $a-0.5a_c$ | 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 |
| $F_{Hanger-Header}$ | Load transfer from the joist hanger to the header beam per flange (N) |
| $F_{Joist-Hanger}$ | 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<br>= 2,0 with 2 bolts in the SBG, SBE and SLE hanger<br>= 3,2 with 4 bolts in the SBG, SBE and SLE hanger |
| $n_{J,eff}$ | Effective number of nails in the joist $\left[ \text{round down}\left( \dfrac{n_j}{2} \right) \right] \times 2$ |
| $n_{H,eff}$ | 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:<br><br>- M10 maximum 11,0 kN<br>- M8 maximum 8,8 kN<br>For larger thicknesses, the capacity shall be the maximum of:<br>- 11,0 kN / 2,0 mm x thickness for an anchor size of M10 and accordingly<br>- 8,8 kN / 2,0 mm x thickness for an anchor size of M8<br>- divergent for type SBE, SBG and SLE:<br>    for downward and upward force:    $R_{bolt,lat,k} \leq 7,1$ kN<br>    for lateral force:    $R_{bolt,lat,k} \leq 12,0$ kN<br>- divergent for type SDED/G:<br>    for downward and upward force:    $R_{bolt,lat,k} \leq 9,51$ kN<br>- 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 |
| $\rho_k$ | Characteristic density of header or joist material (kg/m³) |

## 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.
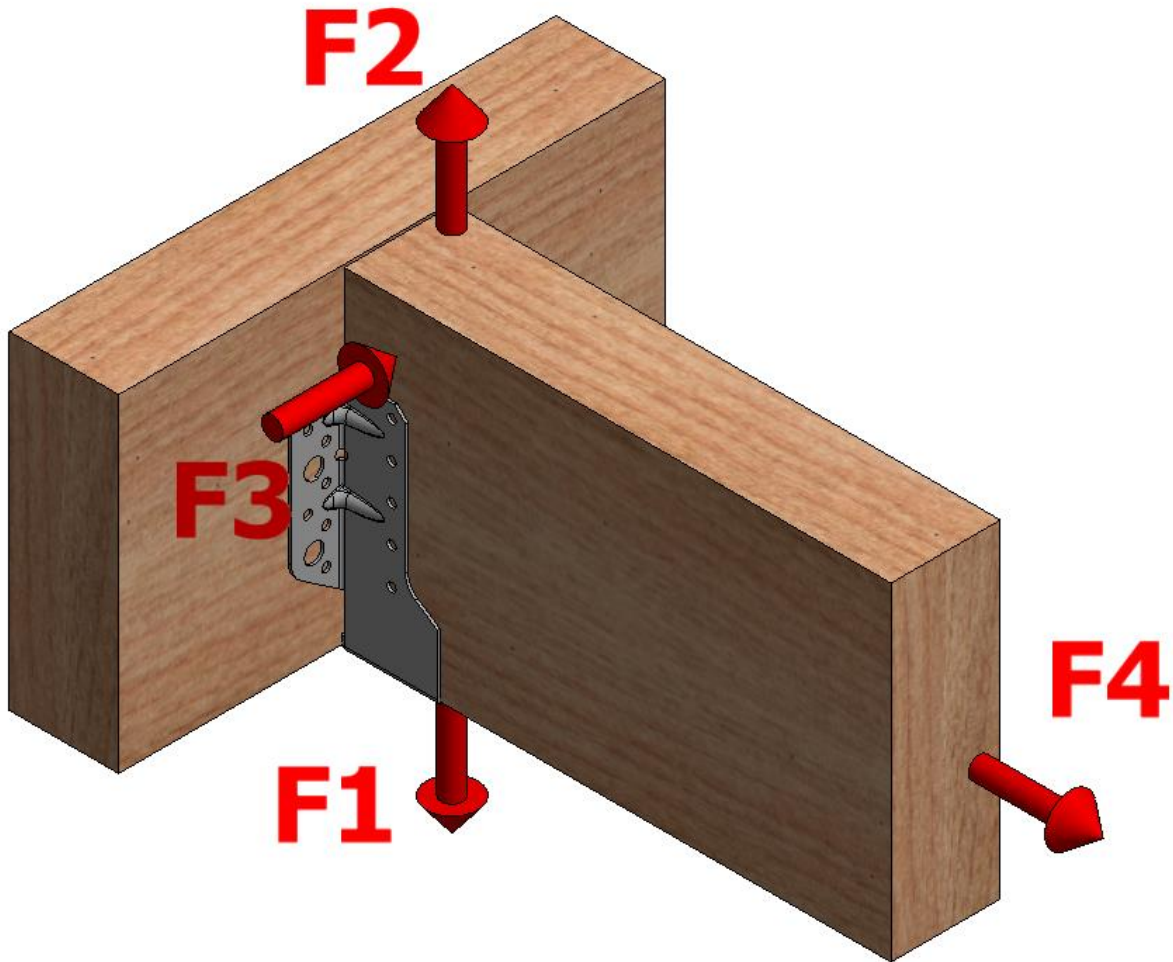


**Illustrations showing the position of the centre of gravity:**
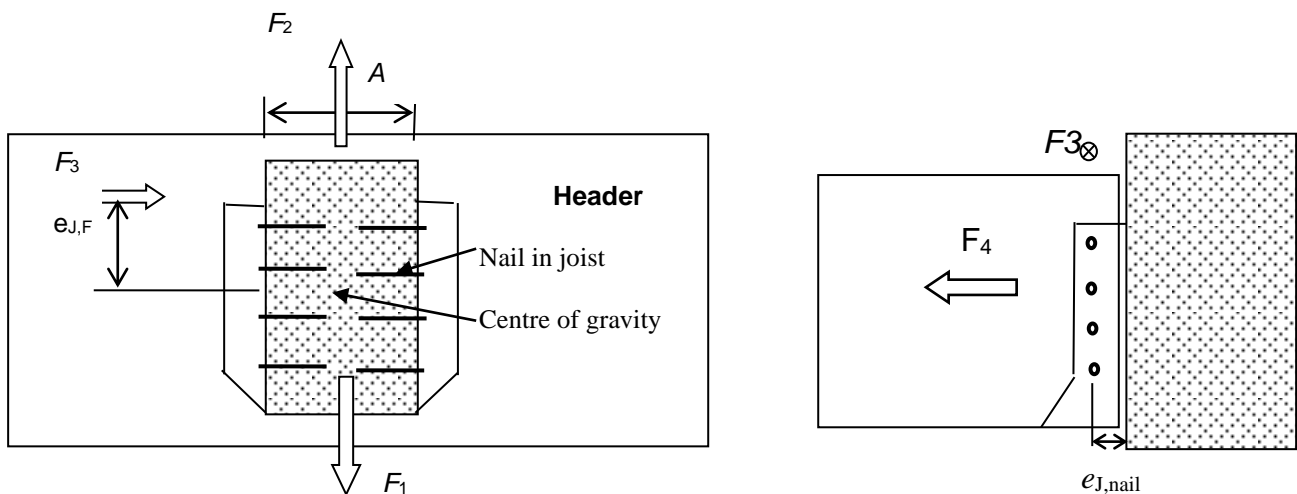


**Figure 1:** Definition of F$_1$, F$_2$, F$_3$, F$_4$, e$_{j,F}$ and e$_{j,nail}$
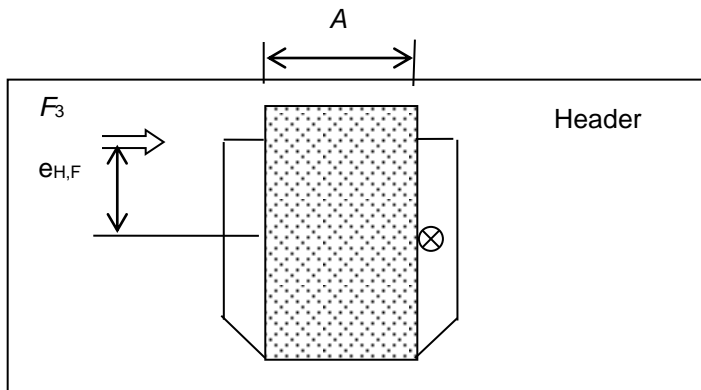
**Figure 2:** The lateral force $F_3$ acts with an eccentricity $e_{H,F}$ in relation to the centre of gravity of the header nails in one flange - marked by $\otimes$ - in the compressed side.

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 $M_v = F_d \cdot (A_H / 2 + 30 mm)$ shall be considered. The same applies when the header has joist hanger connections on both sides, but with vertical forces which differ more than 20%.

## 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/m³. For timber or wood based material with a lower density than 350 kg/m³ the load carrying capacities shall be reduced by the $K_{dens}$ factor:

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

where $\rho_k$ 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 |

| SCREWS 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 |
| 10.0 | 40 - 140 | Connector screw SSH/SSF in accordance with DoP-h17/0015 |
| 12.0 | 60 - 140 | Connector screw SSH/SSF in accordance with DoP-h17/0015 |

| 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, GLE-AL, GLI, GLI-AL, SAE, SAEL, SAI, SAIL, SAEX, 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, GLE-AL, SAE, SAEL, SAEX, 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 |
| SHT | ARS* | 4.0 | 35 | Full | - |
| SJH | ARS* | 4.0 | 35 – 50 | Full | M10-M12 |
| TFU | ARS* | 4.0 | 35-60 | Other | M10 |

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

## Typical Hanger Combinations with SSH/SSF

| Face Mount Hanger | Face flanges | | | Side flanges | | |
|---|---|---|---|---|---|---|
| | Type | Diameter | Length Min - Max | Type | Diameter | Length Min - Max |
| GSE,GSE-AL, GLE, GLE-AL, GLI, GLI-AL, SAE, SAEL, SBE | ARS* | 4 | 35-100 | SSH/SSF | 10 | 40 - 140 |
| | Screw | 5 | 35-100 | SSH/SSF | 12 | 60 - 140 |
| BSNN, SLE | ARS* | 4 | 35-100 | SSH/SSF | 10 | 50 - 140 |
| | Screw | 5 | 35-100 | | | |

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.
Capacities of combination with SSH/SSF connector screws are directly given in Annex D for each suitable hanger family.

## 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 SSH/SSF connector screws for plates thickness 1,5 ≤ t ≤ 3 mm*

| Large connector screws with plate thickness 1,5 ≤ t ≤ 3 mm | Characteristic shear capacities depending on characteristic density, load perpendicular to grain | | | | | |
|---|---|---|---|---|---|---|
| | 320 kg/m³ | | 350 kg/m³ | | 380 kg/m³ | |
| | $F_{ax,Rk}$ | $F_{lat,Rk}$ | $F_{ax,Rk}$ | $F_{lat,Rk}$ | $F_{ax,Rk}$ | $F_{lat,Rk}$ |
| | [N] | [N] | [N] | [N] | [N] | [N] |
| SSH8.0x40* | 2190 | 2770 | 2370 | 2920 | 2530 | 3050 |
| SSH8.0x50* | 4879 | 2770 | 5242 | 2920 | 5598 | 3050 |
| SSH8.0x80* | 4879 | 2770 | 5242 | 2920 | 5598 | 3050 |
| SSH10.0x40* | 2700 | 3440 | 2930 | 3610 | 3150 | 3780 |
| SSH10.0x50* | 5160 | 4740 | 5544 | 4720 | 5921 | 5220 |
| SSH10.0x80* | 5160 | 4740 | 5544 | 4720 | 5921 | 5220 |
| SSH12.0x60* | 5677 | 6170 | 6098 | 6240 | 6513 | 6780 |
| SSH12.0x80* | 5677 | 6170 | 6098 | 6240 | 6513 | 6780 |

*\*SSH can be replaced by SSF*

These capacities are valid only with the following minimum spacing and edge distances without predrilled holes:

| | Minimum distances [mm] | | | |
|---|---|---|---|---|
| | Spacing parallel to grain | Spacing perpendicular to grain | Loaded edge | Unloaded edge |
| Connector screw | $a_1$ | $a_2$ | $a_{2.t}$ | $a_{2.c}$ |
| SSH8.0x40* | 40 | 32 | 56 | 40 |
| SSH8.0x50* | 40 | 32 | 56 | 40 |
| SSH8.0x80* | 40 | 32 | 56 | 40 |
| SSH10.0x40* | 60 (40 if $a_2 \geq 60$) | 40 | 50 | 40 |
| SSH10.0x50* | 60 (40 if $a_2 \geq 60$) | 40 | 50 | 40 |
| SSH10.0x80* | 60 (40 if $a_2 \geq 60$) | 40 | 50 | 40 |
| SSH12.0x60* | 40 | 60 | 80 | 40 |
| SSH12.0x80* | 40 | 60 | 80 | 40 |

*\*SSH can be replaced by SSF*

*Capacities of SSH connector screws for plates 3 ≤ t ≤ 4 mm*

| Large connector screws with plate thickness 3 ≤ t ≤ 4 mm | Characteristic shear capacities depending on characteristic density, load perp. to grain | | | | | |
|---|---|---|---|---|---|---|
| | 320 kg/m³ | | 350 kg/m³ | | 380 kg/m³ | |
| | $F_{ax,Rk}$ | $F_{lat,Rk}$ | $F_{ax,Rk}$ | $F_{lat,Rk}$ | $F_{ax,Rk}$ | $F_{lat,Rk}$ |
| | [N] | [N] | [N] | [N] | [N] | [N] |
| SSH12.0x60* | 5677 | 4750 | 6098 | 5030 | 6513 | 5620 |
| SSH12.0x80* | 5677 | 4750 | 6098 | 5030 | 6513 | 5620 |

*\*SSH can be replaced by SSF*

These capacities are valid only with the following minimum spacing and edge distances without predrilled holes:

| | Minimum distances [mm] | | | |
|---|---|---|---|---|
| | Spacing parallel to grain | Spacing perpendicular to grain | loaded edge | unloaded edge |
| Connector screw | $a_1$ | $a_2$ | $a_{2.t}$ | $a_{2.c}$ |
| SSH12.0x60* | 60 | 70 | 100 | 50 |

*SSH can be replaced by SSF*

### Capacities of SSH connector screws for plates 1,5 ≤ t ≤ 4 mm and reduced distance to loaded edge.

| Large connector Screws with plate thickness 1,5 ≤ t ≤ 4 mm | Characteristic capacities depending on characteristic density | | | | | |
|---|---|---|---|---|---|---|
| | 320 kg/m³ | | 350 kg/m³ | | 380 kg/m³ | |
| | $F_{ax,Rk}$ | $F_{lat,Rk}$ | $F_{ax,Rk}$ | $F_{lat,Rk}$ | $F_{ax,Rk}$ | $F_{lat,Rk}$ |
| | [N] | [N] | [N] | [N] | [N] | [N] |
| SSH12.0x60* | 5677 | 4248 | 6098 | 4498 | 6513 | 5026 |
| SSH12.0x80* | 5677 | 4248 | 6098 | 4498 | 6513 | 5026 |

*SSH can be replaced by SSF*

These capacities are valid only with the following minimum spacing and edge distances without predrilled holes:

| | Minimum distances [mm] | | | |
|---|---|---|---|---|
| | Spacing parallel to grain | Spacing perpendicular to grain | Loaded edge | Unloaded edge |
| Connector screw | $a_1$ | $a_2$ | $a_{2.t}$ | $a_{2.c}$ |
| SSH12.0x60* | 60 | 70 (50 if $a_{2.t} \geq 80$) | 60 | 40 |

*SSH can be replaced by SSF*

For $a_{1.t}$ and $a_{2.c}$, rules from EN1995 apply.

The fastener shall be driven completely into the wood or wood based material, which shall have a thickness of at least the length of the fastener minus the head and connector thickness.

For other SSH/SSF sizes and lower distances, please refer to DoP-h17/0015 and EN1995 calculation rules.

# 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, smooth nails* and bolts | | | | Timber to rigid support Bolts, anchor bolts | | | | Smooth and ST3.75x30 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $F_1$ | $F_2$ | $F_3$ | $F_4$ | $F_1$ | $F_2$ | $F_3$ | $F_4$ | $F_1$ | $F_2$ |
| AG703 | Eq78 | Eq95 & Eq96 | - | - | - | - | - | - | - | - |
| AG713 | Eq78 | Eq95 & Eq96 | - | - | - | - | - | - | - | - |
| BSD | Eq1 | Eq5 | Eq11 & Eq12 | - | Eq40 | Eq58 | Eq65 & Eq66 & Eq67 | - | Eq18 | Eq19 |
| BSDI | Eq1 | Eq5 | Eq11 & Eq12 | - | - | - | - | - | Eq18 | Eq19 |
| BSN | Eq1 | Eq5 | Eq11 & Eq12 | - | Eq40 | Eq58 | Eq65 & Eq66 & Eq67 | - | Eq18 | Eq19 |
| BSNN | Eq1 | Eq6 | Eq13 | Eq17 | Eq40 | Eq59 | Eq65 & Eq66 & Eq67 | Eq71 | - | - |
| 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 | Eq56 & Eq57 | Eq63 & Eq64 | Eq31 | Eq74 & Eq75 | - | - |
| GBI | Eq24 & Eq26 | Eq27 & Eq28 | Eq31 | Eq35 & Eq39 | Eq56 & Eq57 | Eq63 & Eq64 | Eq31 | Eq74 & Eq75 | - | - |
| GLE, GLE-AL | Eq2 | Eq8 | Eq11 & Eq12 | Eq17 | Eq46 [1] | Eq61 & Eq62 [1] | Eq68 & Eq69 & Eq70 [1] | Eq71 & Eq72 [1] | - | - |
| GLI, GLI-AL | Eq2 | Eq8 | Eq11 & Eq12 | Eq17 | - | - | - | - | - | - |
| GSE | Eq1 | Eq5 | Eq11 & Eq12 | Eq17 | Eq42 & Eq46 [1] | Eq58 & Eq61 & Eq62 [1] | Eq68 & Eq69 & Eq70 [1] | Eq71 & Eq72 [1] | Eq18 | Eq19 |
| GSE-AL | Eq1 | Eq5 | Eq11 & Eq12 | Eq17 | Eq42 & Eq46 [1] | Eq58 & Eq61 & Eq62 [1] | Eq68 & Eq69 & Eq70 [1] | Eq71 & Eq72 [1] | Eq18 | Eq19 |
| GSEXL | - | - | - | - | Eq46 [1] | Eq61 [1] | Eq69 & Eq70 [1] | Eq72 [1] | | |
| 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 | Eq58 | Eq65 & Eq66 & Eq67 | Eq71 | Eq18 | Eq19 |
| SAE250/38/1.5 | v | v | v | - | v | V | V | - | - | - |
| SAE590,620,690 | Eq1 + v | Eq5 | Eq11 & Eq12 | Eq17 | Eq40 | Eq58 | Eq65 & Eq66 & | Eq71 | Eq18 | Eq19 |

|  |  |  |  |  |  |  | Eq67 |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
| SAEL | Eq1 | Eq5 | Eq11 & Eq12 | Eq17 | Eq40 | Eq58 | Eq65 & Eq66 & Eq67 | Eq71 | 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 | Eq58 | Eq65 & Eq66 & Eq67 | Eq71 | - | - |
| SAMI/4X | v | - | - | - | - | - | - | - | - | - |
| SBE | Eq1 | Eq6 | Eq13 | Eq17 | Eq40 | Eq59 | Eq65 & Eq66 & Eq67 | Eq71 | - | - |
| SBE45/168/TF | v | v | - | - | - | - | - | - | - | - |
| SBG/SLE | Eq1 | Eq6 | Eq13 | Eq17 | Eq40 | Eq59 | Eq65 & Eq66 & Eq67 | Eq71 | - | - |
| SDED/G, BNS2P | Eq2 | Eq7 | Eq16 | - | Eq41 | Eq60 | - | - | - | - |
| SHT | v | v | - | - | - | - | - | - | - | - |
| SJH | v | v | v | v | Eq47 | Eq65 | - | Eq69 ou 71 ? | - | - |
| TFU | v | v | v | - | v | v | v | - | - | - |
| THA | Eq78 | Eq95 & Eq96 | - | - | - | - | - | - | - | - |
| THAI | Eq78 | Eq95 & Eq96 | - | - | Eq101 | - | - | - | - | - |

*\* Smooth nails should be longer than 75 mm*

v: Characteristic values given in the product annex
[1]: These equations can also be used to calculate values for timber to timber application, with bolts
-: 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, GLE-AL, GLI, GLI-AL, HGUS and MF**

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

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

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

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

● **For HGUS**

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

$$R_{1,k} = \min \left[ 4{,}2 \cdot R_{lat,J,k} ; \frac{1}{\sqrt{\left(\dfrac{1}{n_H \cdot R_{lat,H,k}}\right)^2 + \left(\dfrac{1}{k_{H1} \cdot R_{ax,H,k}}\right)^2}} \right]$$ **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, GLE/I-AL, HGUS and MF**

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

**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:**

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

**Eq 6.**

With: $7A\sqrt{\frac{h_e}{1-\frac{h_e}{h}}}$ in N

- **For SDED/G, BSN2P**

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

**Eq 7.**

- **For GLE/I and GLE/I-AL**

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

**Eq 8.**

With: $c_3 = 0.9$

- **For HGUS**

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

**Eq 9.**

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

- **For MF**

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

**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

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

**Eq 11.**

The capacity from the nails in the header

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

**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:**

$$R_{3,k} = \frac{\frac{1}{2}n_H R_{lat,H,k}}{1 + \dfrac{n_H e_{H,F} y_{max}}{2I_{p,fl}}} = k_{lat} R_{lat,H,k}$$

**Eq 13.**
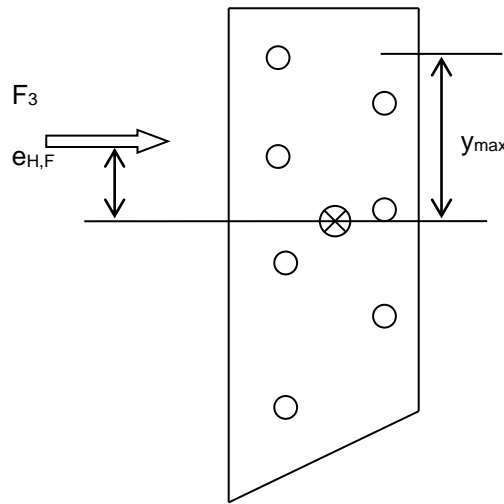


$$k_{lat} = \frac{n_H}{2 \times \left(1 + \dfrac{n_H \times e_{H,F} \times y_{max}}{2 \times I_{p,fl}}\right)}$$

**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:

$$R_{3,k} = \tfrac{1}{2} n_J R_{ax,J,k}$$ **Eq 15.**

● **For SDED/G, BSN2P**

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

$$R_{3,k} = \tfrac{1}{2} \times \left( n_H \times R_{lat,H,K} + n_J \times R_{ax,H,K} \right) \times \left( -\frac{22}{9} \times 10^{-3} \times \text{Blank} + 1,636 \right) \times 0,65$$ **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 BSNN, BSIN, SAE, SAIX, SAI, SBE, SBG, SLE, GSE, GSE-AL, GSI, GSI-AL, GLE, GLE-AL, GLI and GLI-AL**

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

For BSNN, BSIN, SAE, SAIX, SAI, SBE, SBG, SLE, GLE and GLI $c_4 = 0.85$
For others: $c_4 = 1$
$n_{H,eff}$ the number of nails in the first row close to the bending line

## C4.1.2 Square twist nails or smooth round nails

### C4.1.2.1 $F_1$ Load direction:
$$R_{1,k} = \min \{ n_{J,ef,1} \cdot R_{lat,J,k} ; n_H \cdot R_{lat,H,k} \}$$  **Eq 18.**

Where the following symbols, which have not been defined Annex C0 are:
$n_{J,ef,1}$ the effective number of nails in the side of the joist

### C4.1.2.2 $F_2$ Load direction:
$$R_{2,k} = \min \{ n_{J,ef,2} \cdot R_{lat,J,k} ; n_H \cdot R_{lat,H,k} \}$$  **Eq 19.**

Where the following symbols, which have not been defined in Annex C0 are:
$n_{J,ef,2}$ the 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)**

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

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

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

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

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

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

$F_{tot.h.bear.k} = 2 \times n_h \times F_{bear.h.k}$  **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:

$\gamma_s$ 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)**

$$F_{j.lat.k} = n_j \times F_{b.lat.k.j} \qquad \text{Eq 32.}$$

With:

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

$$F_{h.ax.k} = 2 \times n_h \times F_{ax.h.k} \qquad \text{Eq 33.}$$

With:

$n_h$ the number of bolts on each flange of the header
$F_{ax.h.k}$ the axial capacity of the bolt on the header

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

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

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

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

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

$$\mathbf{F_{h.ax.k} = 2 \times n_h \times F_{ax.h.k}} \qquad \text{Eq 37.}$$

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

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

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

## 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
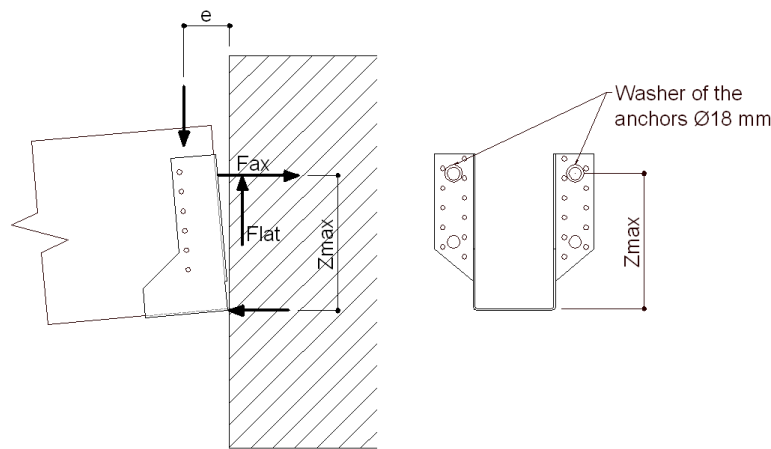


#### C4.2.2.1 F₁ load direction

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**

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

**Eq 40.**

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

- **For SDED/G and BSN2P**

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

**Eq 41.**

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

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

**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 :

$$F_{ax,bolt} = \frac{F_1 \cdot e}{2 \cdot z_{max}}$$

**Eq 43.**

When connected to timber, $z_{max}$ is reduced by 20 mm.

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:

$$F_{lat,bolt} = F_1 \big/ n_{bolt}$$

**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 :

$$R_{bear,k} = n_{bolt} \cdot f_{u,k} \cdot d_{hole} \cdot t_p$$

**Eq 45.**

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

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

$$F_{1,k} = \min \left\{ F_{v,StT,Rk}; F_{Anet,Rk}; F_{v,sp,Rk}; F_{anchor,Rk} \right\}$$

**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 anchors group / bolts group in case of timber to timber connection

To find the design value, $k_{mod}$ and $\gamma_M$ 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.

- **For a pair of half joist hangers SJH**

**Eq 47.**

$$R_{1,k} = \min[n_j \times R_{f,lat,j,k}; \ R_{bear,k}]$$

On rigid support, the half hangers shall be set symmetrically on the joist.
The bearing resistance between the bolt and the plate of the face mount hanger is given by the following equation.

**Eq 48.**

$$R_{bear,k} = n_{bolt} \cdot f_{u,k} \cdot d_{hole} \cdot t_p$$

It must be checked that the combination of lateral and axial forces in the anchor bolt can be carried by these forces. It can be done with *Anchor Designer* by applying $F_{1.d}$ ($F_{2.d}$) and a moment $M_{1.d} = F_{1.d}*e$ ($M_{2.d} = F_{2.d}*e$) at rotation point at the lower (upper) edge of joist.
On the safe side, it can be considered that the maximum withdrawal force on an upper bolt can be calculated according to Eq 45 and Eq 46.

**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:

$$F_{v,StT,Rk} = n_J \cdot F_{v,f,Rk} + F_{c,Rk}$$

**Eq 49.**

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:

$$F_{c,Rk} = 4\sqrt{M_{y,Rk} \cdot A \cdot k_{c,90} \cdot f_{c,90,k}} \text{ with } M_{y,Rk} = \frac{f_{u,k} \cdot A \cdot t_p^{\,2}}{4}$$  **Eq 50.**

For GLE-AL with width > 200 m, the width considered in the calculation is limited to 200 mm

## 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:
$$A_{net,ef} = 2 \cdot (2.e_2 - d_0 + 60) \cdot t_{cor}$$  **Eq 51.**

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 52.**

## Failure mode: Anchor failure

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

The forces in the anchors/bolts 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 53.**

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. For timber to timber connections via bolts, the centre of rotation is 20 mm above the bottom plate.
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 54.**

- **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 55.**

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 56.**
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 57.**

## 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, GLE-AL and GSEXL**

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

**Eq 58.**

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

The minimum of following formulas (Eq 37 + Eq 38)
If there is no reinforcing for splittering, the following formula is applied:

$$R_{2,k} = 7 \times A_{eff} \times \sqrt{\frac{h_e}{1 - \frac{h_e}{h}}}$$

**Eq 59.**

The result of this calculation is in N.

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

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

**Eq 60.**

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

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

**Eq 61.**

$c_6 = 0.8$

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

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

**Eq 62.**

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)**

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

**Eq 63.**

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

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

**Eq 64.**

- **For a pair of half joist hanger SJH**

**Eq 65.**

$$R_{2.k} = \min[n_j \times R_{f.lat.j.k} ; R_{bear.k}]$$

On rigid support, the half hangers shall be set symmetrically on the joist.
The bearing resistance between the bolt and the plate of the face mount hanger is given by the following equation.

**Eq 66.**

$$R_{bear,k} = n_{bolt} \cdot f_{u,k} \cdot d_{hole} \cdot t_p$$

Transversal tension in timber shall be checked according to Eq 59.

### 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, GLE-AL and GSEXL**
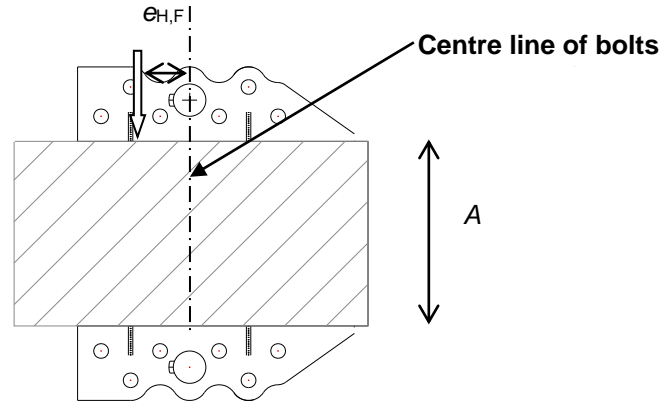


The minimum value of the following formulas and also formula [Eq.6] for the characteristic lateral load-carrying capacity of the joist hanger connection applies to a joist hanger with 2 bolts.

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

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

**Eq 67.**

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

$$R_{3,k} = \frac{\tfrac{1}{2}An_J R_{lat,J,k}}{e_{H,F}}$$

**Eq 68.**

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 23

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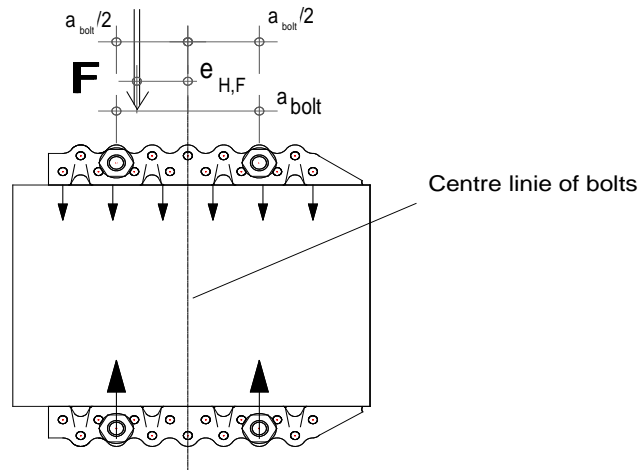


For a lateral force the formula for the characteristic load-carrying capacity of the joist hanger connection with 4 Ø10 mm bolts is:

$$R_{3,k} = \frac{a_{bolt} \times R_{bolt,lat,k}}{e_{H,F} + \frac{1}{2} a_{bolt}} + \frac{1}{2} n_J \times R_{ax,J,k}$$  **Eq 69.**

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, GLE-AL with 2 bolts**
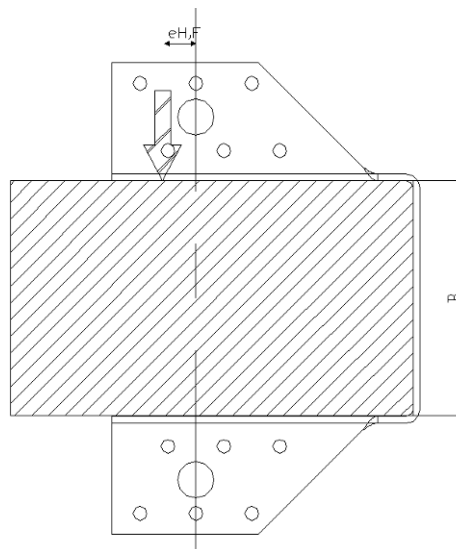


Provided the joist is prevented from rotation around its own axis, i.e. the force is acting right at the anchor bolts with $e_{H,F}$ = 0 mm the characteristic lateral load-carrying capacity of the joist hanger connection with 2 Ø12 mm bolts is:

$R_{3,k} = R_{bolt,lat,k}$  **Eq 70.**

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

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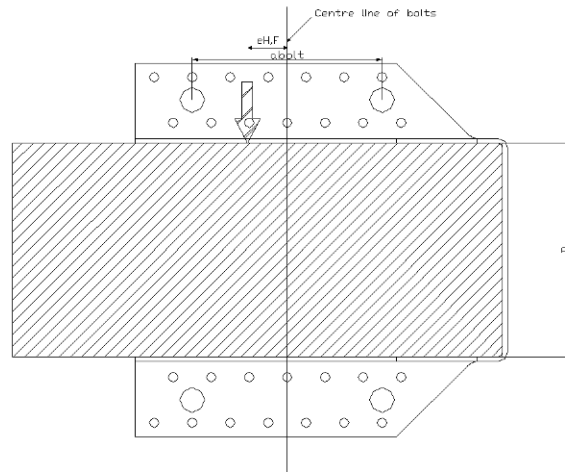


Provided the force is acting between the anchors bolts the characteristic lateral load-carrying capacity of the joist hanger connection with 4 Ø12 mm bolts is:

$$R_{3,k} = \frac{a_{bolt}}{e_{H,F} + \frac{1}{2} a_{bolt}} R_{bolt,lat,k}$$

**Eq 71.**

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, GLE-AL and GSEXL with 6 and 8 bolts:**
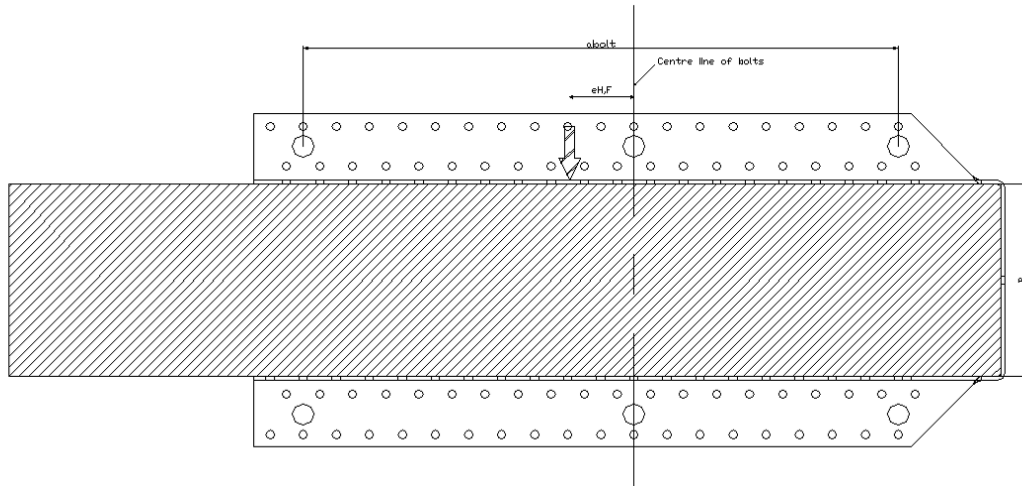


Provided the force is acting between the outer anchor bolts and the force is acting $e_{H,F}$ from the middle anchor bolt the characteristic lateral load-carrying capacity of the joist hanger connection with 6 12 mm bolts is:

$$R_{3,k} = \frac{R_{bolt,lat,k}}{\frac{1}{3} + e_{H,F} / a_{bolt}} \text{ (6 bolts)} \qquad R_{3,} = \frac{R_{bolt,lat,k}}{1/4 + e_{H,F} / a_{bolt}} \text{ ( 8 bolts)}$$

**Eq 72.**

- **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 (2.5 mm thick) and GLE (2.5 mm thick)**

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

**Eq 73.**

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

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

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

**Eq 74.**

$c_7 = 0.8$

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 75.**

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 76.**

- **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 77.**

## 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

$$\left(\frac{F_{1,d}}{R_{1,d}}\right)^2 + \left(\frac{F_{3,d}}{R_{3,d}}\right)^2 \leq 1,0$$

**Eq 78.**

### C4.3.2 – $F_2$ load direction and $F_3$ load direction

$$\left(\frac{F_{2,d}}{R_{2,d}}\right)^2 + \left(\frac{F_{3,d}}{R_{3,d}}\right)^2 \leq 1,0$$

**Eq 79.**

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

$$\left(\frac{F_{1,d}}{R_{1,d}}\right)^2 + \left(\frac{F_{3,d}}{R_{3,d}}\right)^2 + \left(\frac{F_{4,d}}{R_{4,d}}\right)^2 \leq 1,0$$

**Eq 80.**

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

$$\left(\frac{F_{2,d}}{R_{2,d}}\right)^2 + \left(\frac{F_{3,d}}{R_{3,d}}\right)^2 + \left(\frac{F_{4,d}}{R_{4,d}}\right)^2 \leq 1,0$$

**Eq 81.**

Factors $k_{H,1}$, $k_{H,2}$, $n_{J,ef,1}$ and $n_{J,ef,2}$ will be detailed in <u>Annex D</u> 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:

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

**Eq 82.**

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

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

$$F_{Joist-Hanger} = \frac{C_{eff} \times A \times f_{c,90,k*}}{2}$$

**Eq 83.**

Where from Eurocode 5

$$f_{c,90,k*} = k_{c,90,joist} \times f_{c,90,joist} \qquad (k_{c,90,joist} = 1.5)$$

**Eq 84.**

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

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

**Eq 85.**

## 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:

$$F_{Hanger,Tension} = \frac{S \times t_p \times f_{u,k}}{d}$$

**Eq 86.**

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

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

**Eq 87.**

$F_{Hanger, Tension}$ 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:

$$F_{Hanger\text{-}Header} = Min \begin{Bmatrix} F_{Lat,nail} \\ F_{Ax,nail} \end{Bmatrix}$$

**Eq 88.**

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

$$F_{Lat,nail} = n_{h, sidenail} \times F_{v,Rk,header}$$

**Eq 89.**

The axial force per flange in the nails is:

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

**Eq 90.**

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

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

**Eq 91.**

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

$$\left( \frac{F_{Lat,nail}}{F_{v,Rk,header}} \right) \leq 1 \quad \text{and} \quad \left( \frac{F_{Ax,nail}}{F_{ax,Rk,header}} \right) \leq 1$$

**Eq 92.**

Ring shank nails shall fulfil the following criterion:

$$\left( \frac{F_{Lat,nail}}{F_{v,Rk,header}} \right)^2 + \left( \frac{F_{Ax,nail}}{F_{ax,Rk,header}} \right)^2 \leq 1$$

**Eq 93.**

## 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:

$$F_{\text{Hanger-Header}} = k_{ef}\left(F_c + F_r\right) + n_{h,\text{sidenail}} \times F_{v,Rk,\text{header}}$$

**Eq 94.**

Where

$$F_c = t_p \sqrt{\frac{f_{u,k} \times f_{c,90,k^*} \times l \times l_{eff}}{3}}$$

**Eq 95.**

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

**Eq 96.**

From Eurocode 5

$$f_{c,90,*} = k_{c,90,header} \times f_{c,90,header} \qquad (k_{c,90,header} = 1.0)$$

**Eq 97.**

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

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

**Eq 98.**

## 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:

$$F_{2,k} = 0{,}6 \times n_J \times F_{Lat,RK,Joist}$$

**Eq 99.**

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

$$F_{2,k} = \frac{n_{skewnail} \times F_{Lat,RK,Joist}}{3}$$

**Eq 100.**

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:

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

## C4.5 Straps hangers on rigid support

### C4.5.1 Basis of Design

The design method detailed below for the THAI1200 joist hangers has been validated by calculation assisted by testing method as defined in ETAG 015.

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

The designation of symbol is in Annex C0.

### C4.5.2 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.

### C4.5.3 Hanger Characteristics

Hanger characteristics are given in Annex C4.

### C4.5.4 $F_1$ load direction – Face fix installation

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:

**Eq 101.**

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

With:
$F_{jois-hanger}$ calculated from Eq83.
$F_{hanger-Tension}$ calculated from Eq86.
$F_{Hanger-Header}$ checked by the user by checking that the anchor bolts can carry the combination of axial and lateral forces.

Maximum withdrawal force in a upper bolt can be calculated as follows:

**Eq 102.**

$$F_{ax.bolt} = \frac{F_1 \times e}{2 \times z_{max}}$$

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

**Eq 103.**

$$F_{lat.bolt} = \frac{F_1}{n_{bolt}}$$

# 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 | - | - | - | - | - |
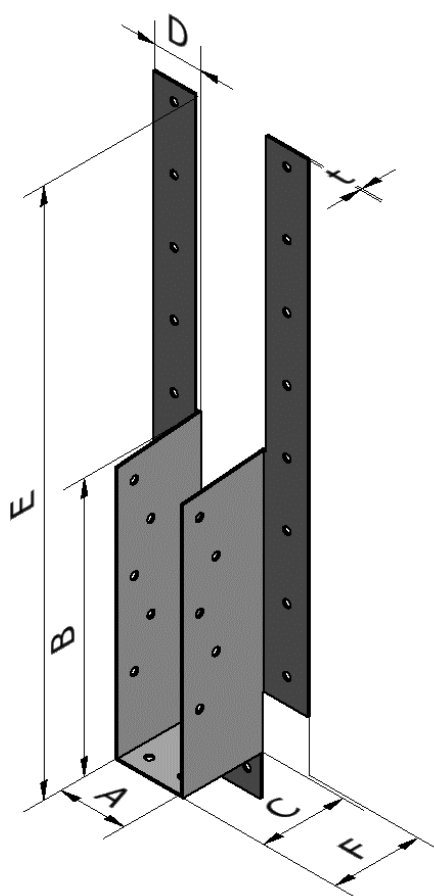


Parameters have to be used with equation in Annex C

**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 | - | - | - | - | - |
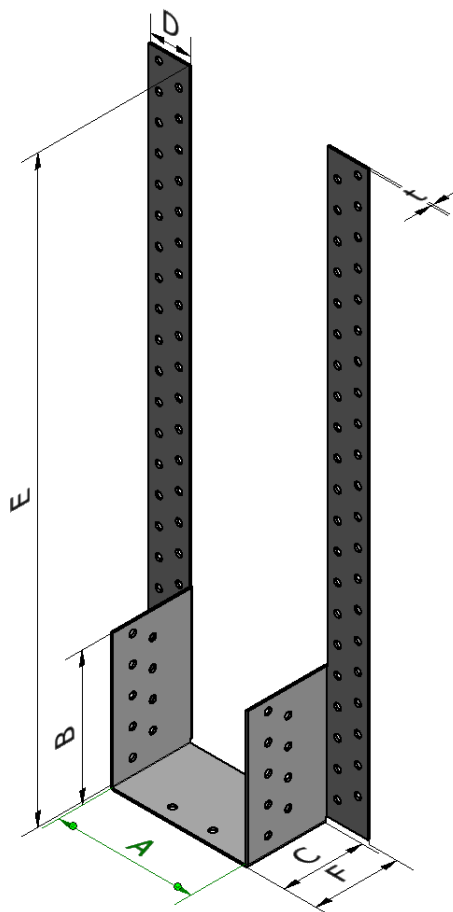


Parameters have to be used with equation in Annex C.

**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 | | | 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 | special | up to Ø13 | 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
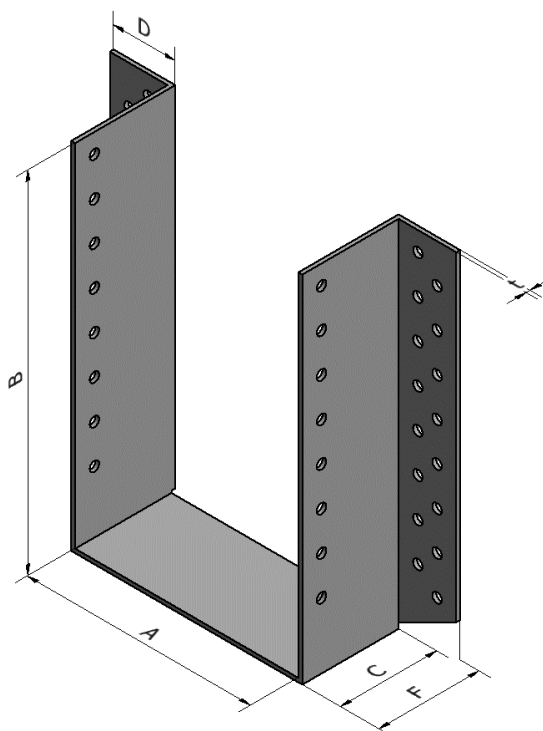
Special version - bolt holes, holes in the seat, asymmetric holes in the sides

Asymmetric nail pattern
on the sides

16

min 30

Holes Ø13
are optionnal
When bolt holes in
the flanges, holes
Ø5 can be removed

min 30

Holes in the seat
are optionnal

Some cutted holes may appear at the bottom and top of the flanges. They are not used for fasteners
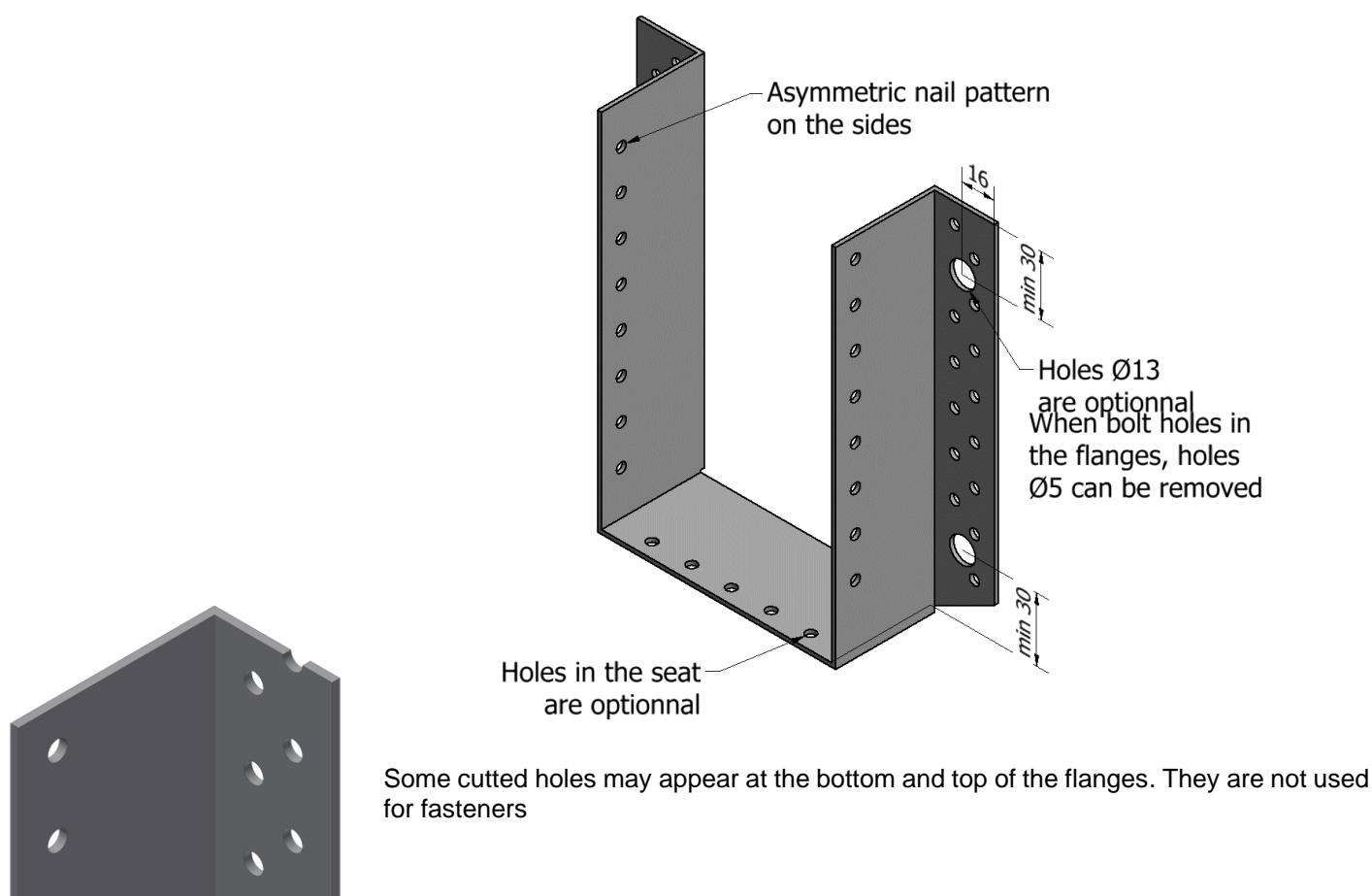
Parameters have to be used with equation in Annex C.

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

| B | 50 mm ≤ A ≤ 250 mm 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.

| B | 34 mm ≤ A ≤ 250 mm asymmetric nail pattern | | | |
| | $k_{H,1}$ | $n_H$ | $n_J$ | $R^1$ |
|---|---|---|---|---|
| 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

| B | 50 mm ≤ A ≤ 250 mm symmetric nail pattern | | | |
| | $k_{H,1}$ | $n_H$ | $n_J$ | $R^1$ |
|---|---|---|---|---|
| 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.

| B | 34 mm ≤ A ≤ 250 mm asymmetric nail pattern | | | |
| | $k_{H,1}$ | $n_H$ | $n_J$ | $R^1$ |
|---|---|---|---|---|
| 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 ≤ 250 mm - 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
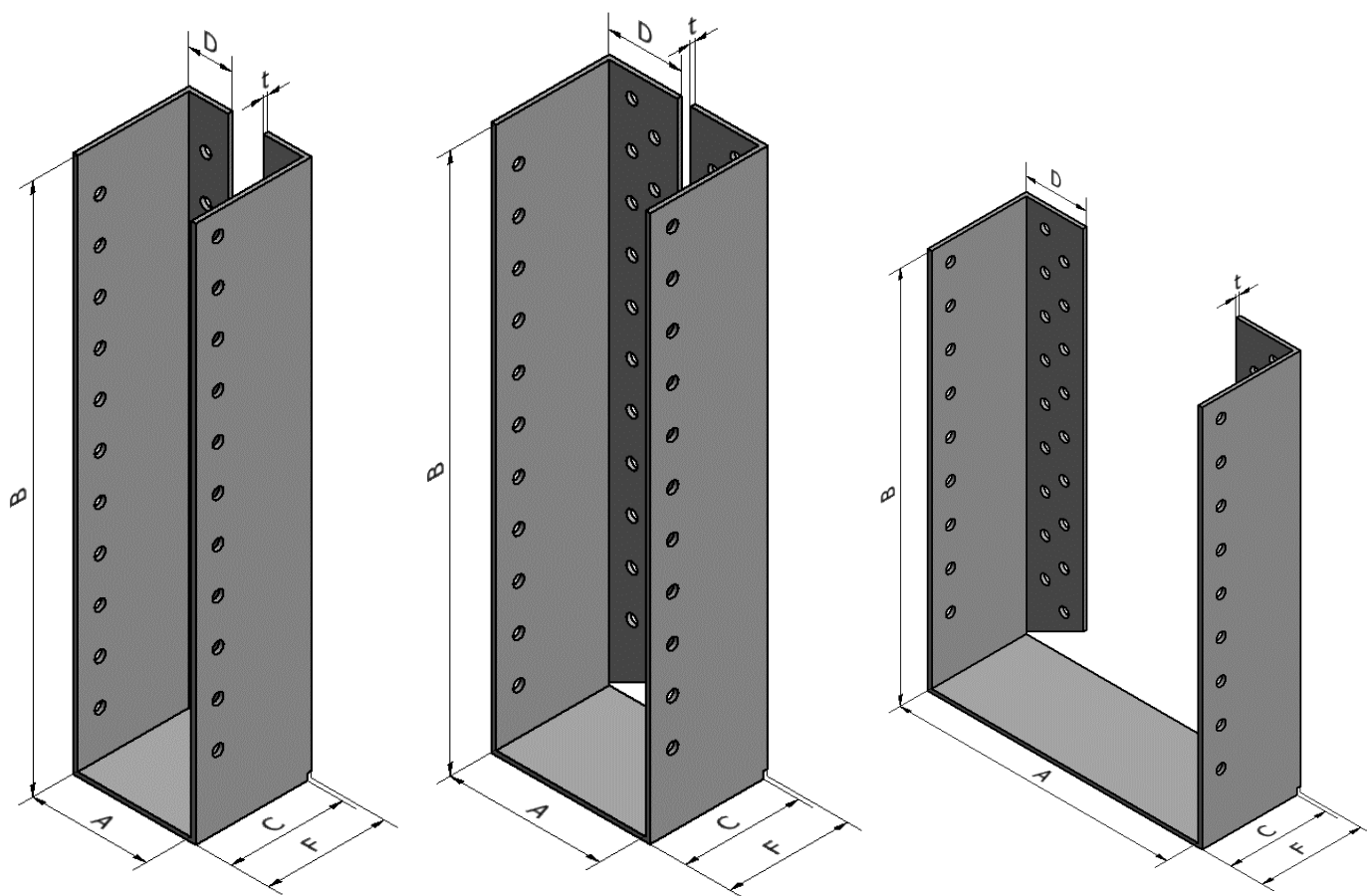
Parameters have to be used with equation in Annex C.

### 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

### k$_{H,2}$ for BSDI - Full or partial nailing - F2

See Annex D3 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
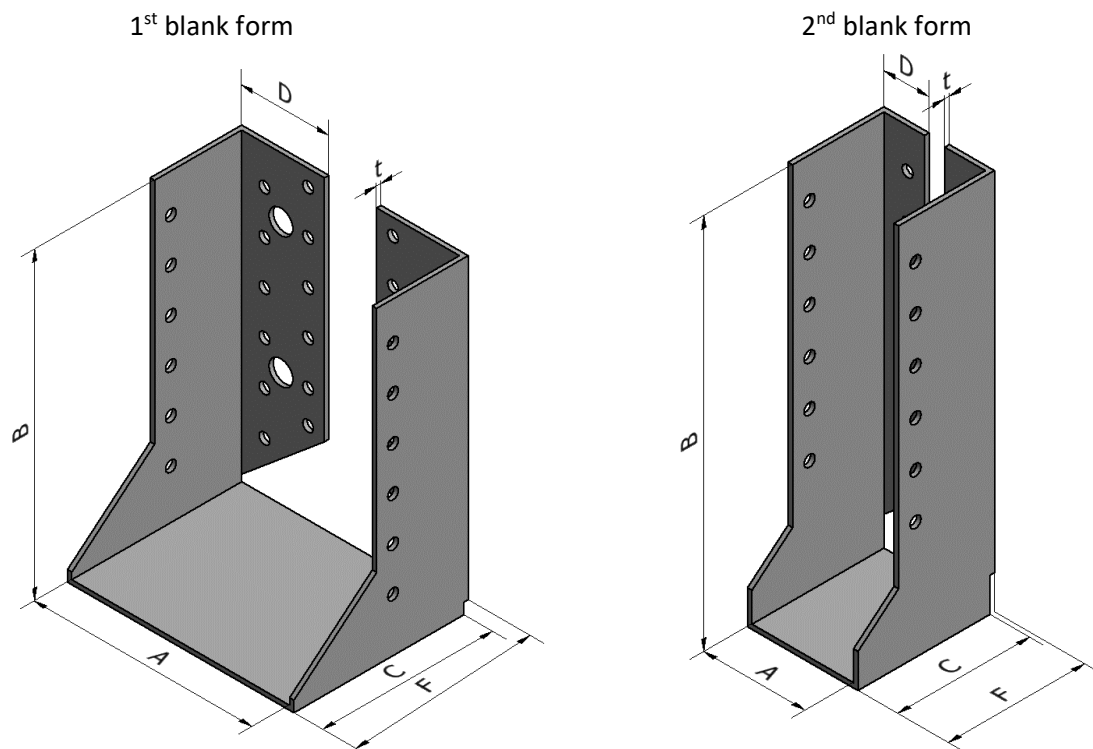
2nd blank form
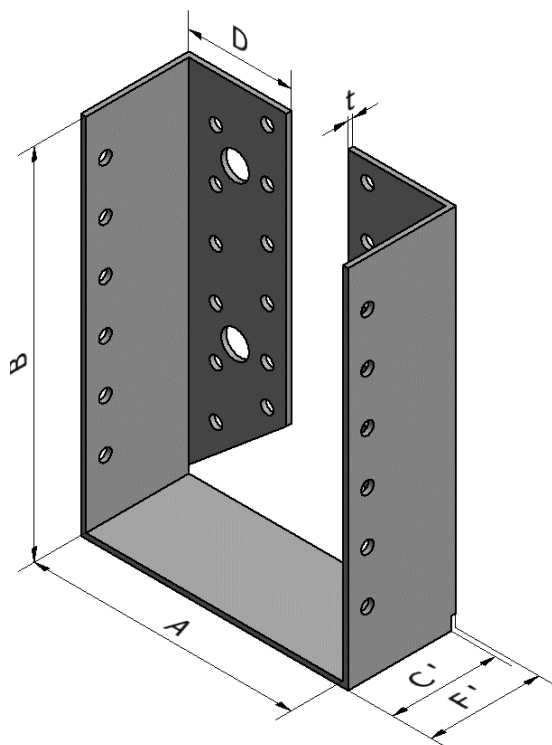
1st Alternative Blank Form                    2nd Alternative Blank Form
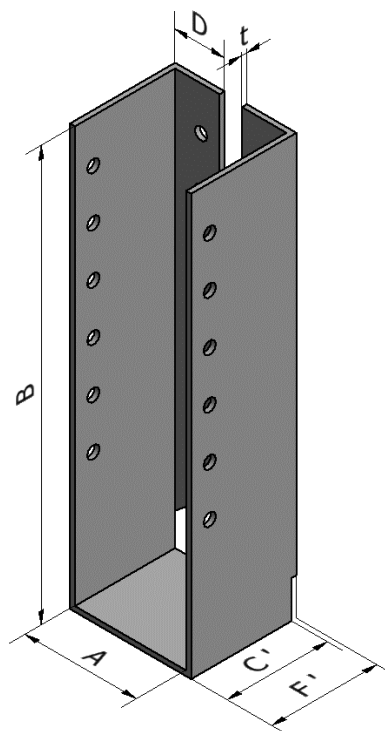
Parameters have to be used with equation in Annex C.

**$k_{H,1}$ 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 |
| BSIN100/100 | 5th blank model | 100 | 100 | 76 | 34.0 | 80 | 2 | 12 | Ø5 | 4 | Ø12 | 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                      5th 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 1$^{st}$ 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**

| Type | $k_{H,1}$ | | $k_{H,2}$ | | $n_H$ | | $n_J$ | |
|---|---|---|---|---|---|---|---|---|
| | 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 |
| BSIN100/100* | 14.5 | 10.9 | 10.6 | 7.8 | 12 | 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 |

*$5^{th}$ blank model*

## 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 | - | - | - | - | - |
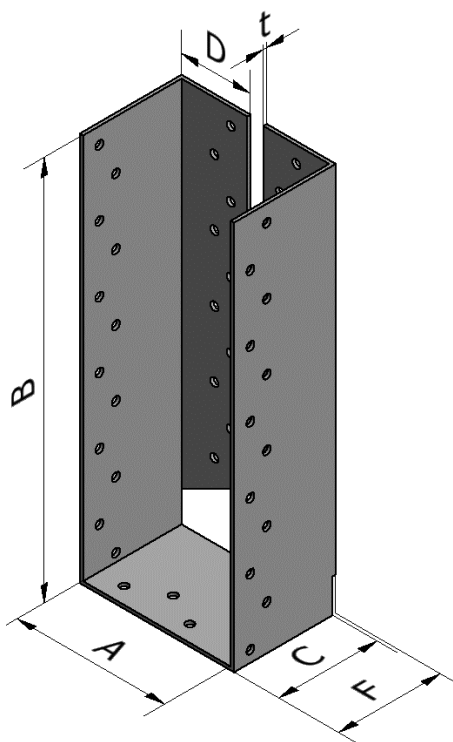


Parameters have to be used with equation in Annex C.

**$k_{H,1}$ 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 | 90 | 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
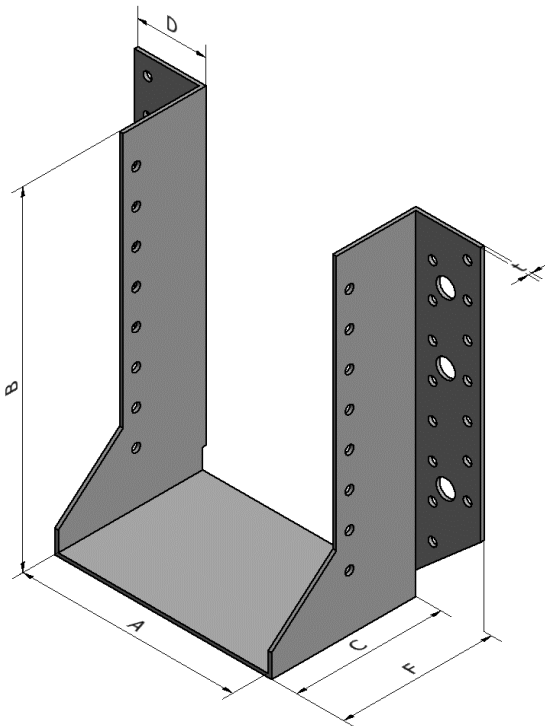
Alternative BSN
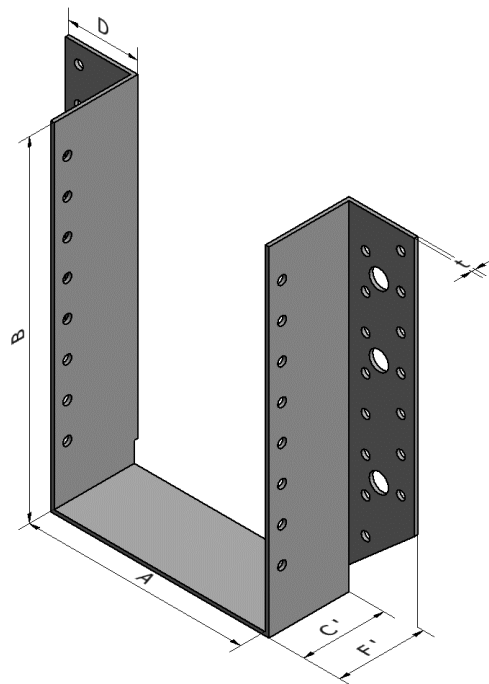
Parameters have to be used with equation in Annex C

## $k_{H,1}$ 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 |
| 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 |
| Specific sizes | | | | | | | | | | | | |
| BSNN100/100 | 100 | 100 | 60 | 27 | 64 | 2 | 14 | Ø5 | 2 | Ø11 | 8 | Ø5 |
| BSNN120/110 | 120 | 110 | 60 | 27 | 64 | 2 | 12 | Ø5 | 2 | Ø11 | 8 | Ø5 |
| BSNN140/120 | 140 | 120 | 60 | 27 | 64 | 2 | 16 | Ø5 | 2 | Ø11 | 10 | Ø5 |
| Permitted deviation | - | - | ±1.0 | ±1.0 | ±1.0 | - | - | - | - | - | - | - |
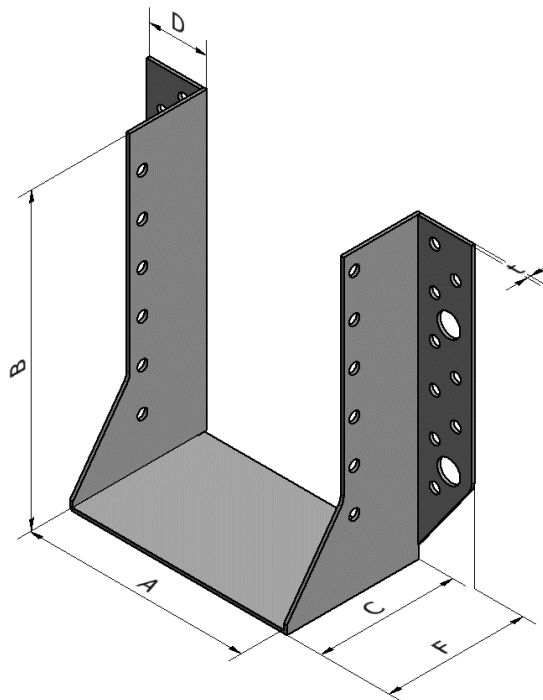
Parameters have to be used with equation in [Annex C](#).

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

| | 230 | | 260 | | 320 | | 380 | | 440 | | 500 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ |
| | 8 | 6 | 12 | 6 | 16 | 10 | 18 | 12 | 22 | 14 | 26 | 16 |
| **A** | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ |
| 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 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ |
| | 6 | 3 | 8 | 4 | 10 | 6 | 12 | 6 | 14 | 8 | 16 | 8 |
| A | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ | H | $k_{H,1}$ |
| 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

## $k_{H,1}$ and $k_{H,2}$ for specific sizes of BSNN

| Type | $k_{H,1}$ | | $k_{H,2}$ | | $n_H$ | | $n_J$ | |
|---|---|---|---|---|---|---|---|---|
| | Full nailing | Partial nailing | Full nailing | Partial nailing | Full nailing | Partial nailing | Full nailing | Partial nailing |
| BSNN100/100 | 18 | 14,4 | 21,3 | 13,0 | 14 | 8 | 8 | 4 |
| BSNN120/110 | 23 | 17,3 | 15,9 | 10,7 | 12 | 8 | 8 | 4 |
| BSNN140/120 | 29,7 | 19,5 | 23,9 | 15,7 | 16 | 10 | 10 | 6 |

**Characteristic capacities for BSNN - with connector screw SSH/SSF**

| Blank | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Header | | Joist | | $R_{1.k}$ | | | | $R_{2.k}$ | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| BSNN230 | 2 | SSH10.0x50[1] | 6 | CNA* | 7.83 | 8.49 | 9.04 | 9.17 | 7.81 | 8.28 | 8.89 | 9.06 |
| BSNN260 | 2 | SSH10.0x50[1] | 6 | CNA* | 7.83 | 8.49 | 9.04 | 9.17 | 7.84 | 8.59 | 9.11 | 9.22 |
| BSNN320 | 2 | SSH10.0x50[1] | 10 | CNA* | 9.43 | 9.43 | 9.43 | 9.43 | 9.43 | 9.43 | 9.43 | 9.43 |
| BSNN380 | 4 | SSH10.0x50[1] | 12 | CNA* | 15.57 | 16.26 | 16.61 | 16.61 | 15.69 | 16.38 | 16.61 | 16.61 |
| BSNN440 | 4 | SSH10.0x50[1] | 14 | CNA* | 16.56 | 16.61 | 16.61 | 16.61 | 16.57 | 16.61 | 16.61 | 16.61 |
| BSNN500 | 4 | SSH10.0x50[1] | 16 | CNA* | 17.49 | 17.49 | 17.49 | 17.49 | 17.49 | 17.49 | 17.49 | 17.49 |

Product capacities - Timber to Timber - Large connector screw

[1]*SSH can be replaced by SSF*

| Blank | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Header | | Joist | | $R_{3.k}$ | | | | $R_{4.k}$ | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| BSNN230 | 2 | SSH10.0x50[1] | 6 | CNA* | 2.47 | 2.88 | 3.55 | 4.23 | 5.00 | 5.00 | 5.00 | 5.00 |
| BSNN260 | 2 | SSH10.0x50[1] | 6 | CNA* | 1.88 | 1.98 | 2.49 | 3.02 | 5.00 | 5.00 | 5.00 | 5.00 |
| BSNN320 | 2 | SSH10.0x50[1] | 10 | CNA* | 1.40 | 1.48 | 1.88 | 2.32 | 5.00 | 5.00 | 5.00 | 5.00 |
| BSNN380 | 4 | SSH10.0x50[1] | 12 | CNA* | 2.62 | 2.71 | 3.19 | 3.71 | 10.00 | 10.00 | 10.00 | 10.00 |
| BSNN440 | 4 | SSH10.0x50[1] | 14 | CNA* | 2.14 | 2.21 | 2.61 | 3.04 | 10.00 | 10.00 | 10.00 | 10.00 |
| BSNN500 | 4 | SSH10.0x50[1] | 16 | CNA* | 2.13 | 2.18 | 2.49 | 2.84 | 10.00 | 10.00 | 10.00 | 10.00 |

Product capacities - Timber to Timber - Large connector screw

[1]*SSH can be replaced by SSF*

The user shall verify the transversal tension in timber which is not included in these capacities.
*Refer to *Characteristic Capacities* table columns for type of fasteners that can be used on the joist. Capacities vary depending on fastener type used.

## 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
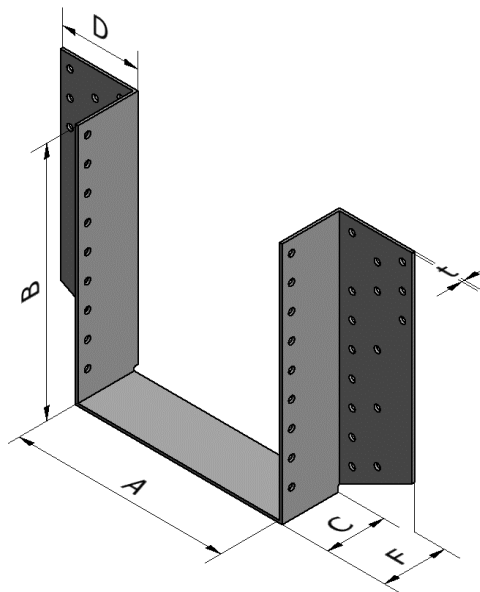
Parameters have to be used with equation in Annex C.

## $k_{H,1}$ 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
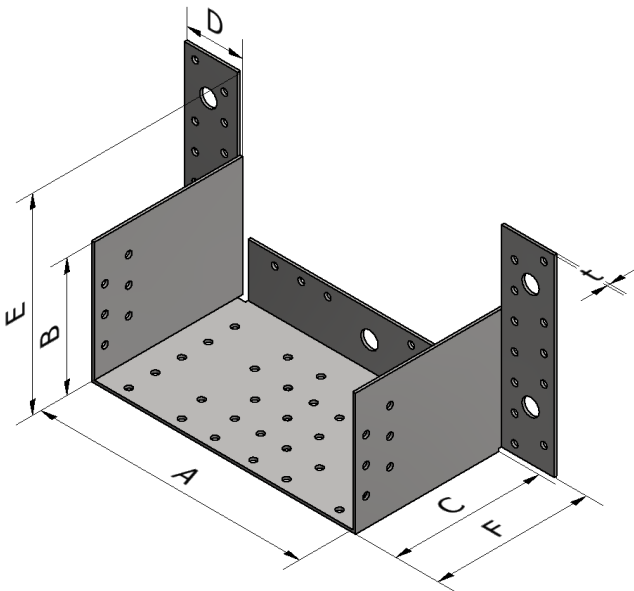
ETC502
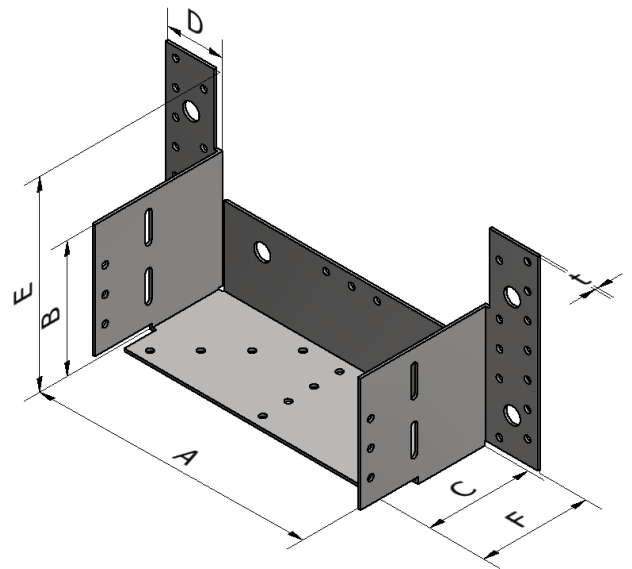
**Characteristic capacity for ETC - Full nailing - F1, F2 - timber to timber**

| Model | Fasteners - CNA4.0x35 | | | | | | | Characteristic capacity [kN] - C24 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Header | | Hip | | | Jack | | | | | | | |
| | Timber | Rigid support | Type | Side | Bottom | Side | Bottom | R1,k | | | R2,k | | |
| | | | | | | | | 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] | 25 | - | 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] | 15 | - | 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 > 147 mm and Joist > 95mm
[1] Header and Joist ≥ 97 mm
[a] Header and Joist allow full nailing so Header > 195 mm and Joist > 95 mm
[b] Header and Joist allow full nailing so Header > 145 mm and Joist > 95 mm
[c] Header and Joist allow full nailing so Header ≥ 97 mm and Joist > 95 mm
[d] Header and Joist allow full nailing so Header > 200 mm and Joist > 95 mm

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 fullfill the need.

The nails in the hips are placed between 0° and ~ 20° - see picture:
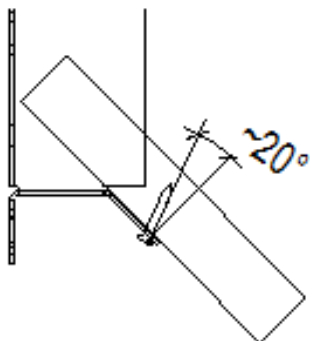
**Nail pattern**
*ETC485R Hangers*
*Single jack and double hips*

Ring Shank Nails Ø4.0x35
3 on the hip

Ring Shank Nails Ø4.0x35
30 on the header face

Ring Shank Nails Ø4.0x35
6 on the Jack

Ring shank nails Ø4.0x35
5 on the jack

Ring shank nails Ø4.0x35
7 on the double hip
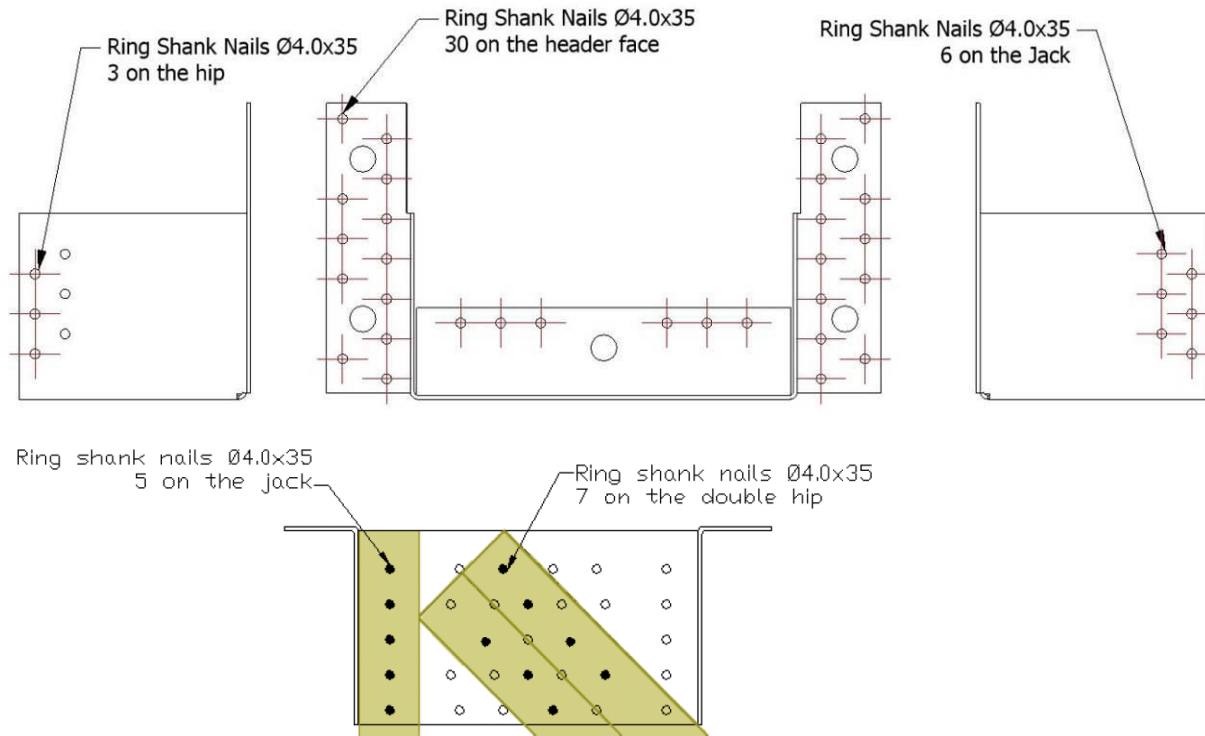
*ETC 502 Hanger*
*Single jack and double hip*

header 73x195
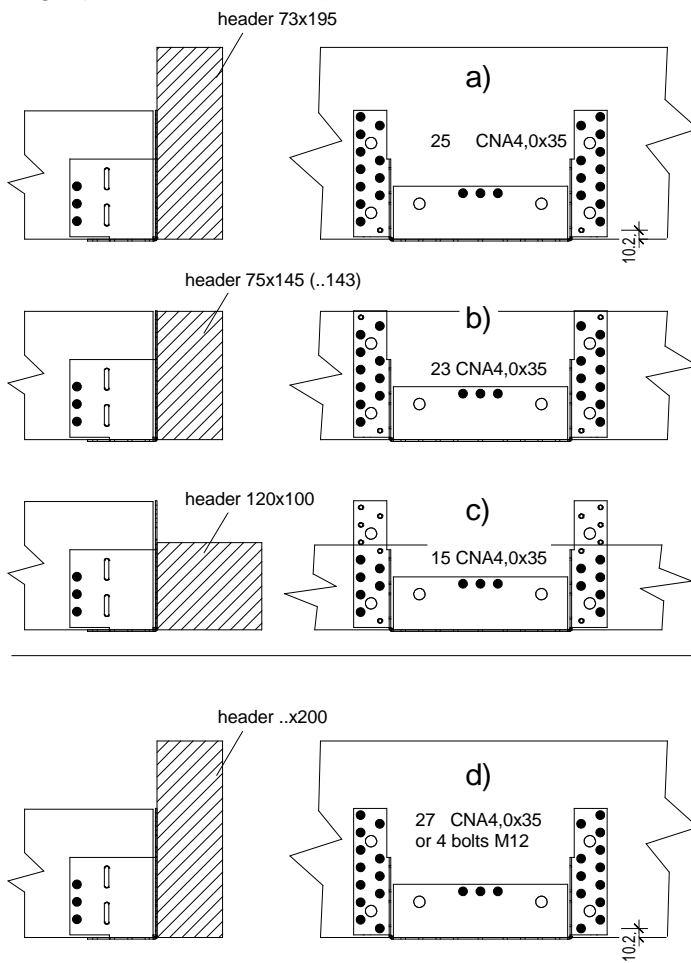
Nailing of the HIP and the JACK

a)

25  CNA4,0x35

10,2

header 75x145 (..143)

b)

23 CNA4,0x35

gap between surface of header
to the end of the joists

3+3 CNA4,0x35

3+3 CNA4,0x35

hip

hip

4 CNA4,0x35

jack

30% of load       40% of load       30% of load

header 120x100

c)

15 CNA4,0x35

header ..x200

d)

27   CNA4,0x35
or 4 bolts M12

10,2

gap between surface of header
to the end of the joists

3+3 CNA4,0x35

3+3 CNA4,0x35

hip

hip

4 CNA4,0x35

jack

40% of load       20% of load       40% of load

## D12   ETC392 Truss Connector

| Product Name | Material reference acc. to clause II-1 | Alternative Names |
|---|---|---|
| ETC392 | 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 |
| ETC392 | 38 | 195 | 68 | 54 | 239 | 102 | 2 | 26 | Ø5 | 20 | Ø5 |
| Permitted deviation | - | - | ±1.0 | ±1.0 | ±1.0 | ±1.0 | - | - | - | - | - |
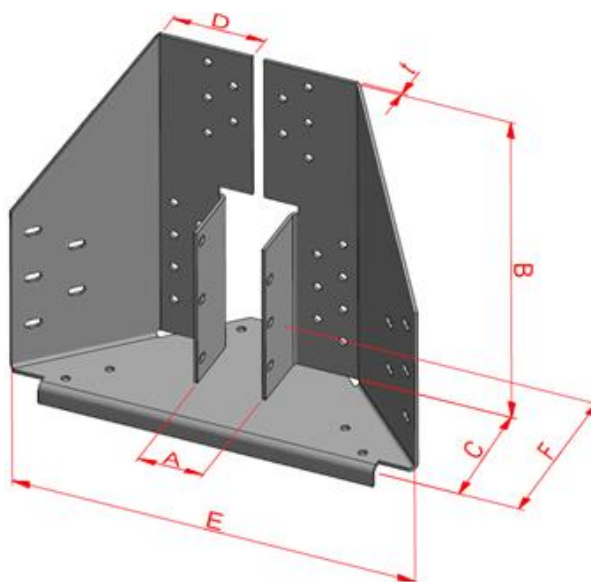


**Characteristic capacity for ETC - Full nailing - F1, F2 - timber to timber - 1 jack + 2 hips**

| Model | Fasteners - CNA4.0x35 | | | | | | | | Characteristic capacity [kN] Timber C24 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Header | | | Hip | | | Jack | | $R_{1,k}$ | | | $R_{2,k}$ | | |
| | Type | Face | Bottom | Type | Side | Bottom | Type | Side | Hip | Jack | Total | Hip | Jack | Total |
| ETC392 | 1 Ply | 24 | 2 | 1 Ply | 5 | 2 | 1 Ply | 6 | 8.78 | 4.39 | 21.96 | 6.64 | 3.32 | 16.60 |

[1] *Header and Joist depth ≥ 97 mm*

[2] *Header member can be made of 2 plies 38 x 220 mm. When the header is composed of 2 plies of 38x97 mm, it requires the installation of a 1 ply vertical member (king post) of a minimum width of 97 mm, directly above the header.*

All joists members shall be installed ensuring a symmetrical configuration.

Spacings and edge distances shall be checked for the group of 10 nails located in the upper part of the hanger depending on the header depth and the vertical member dimension.

The resistance of the supporting and supported members shall be checked, in particular the *tension perpendicular to the grain*.

The nails in the central joist member are installed at approximately 20° - *See image below*.
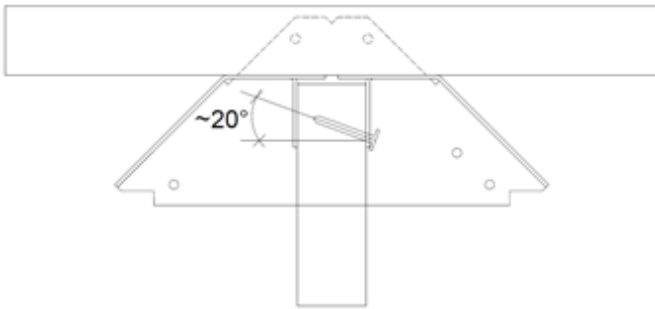


**Nail pattern**
*ETC392*
*Nailing of the hips and jack - 1 jack + 2 hips*

● Header is made of 2 plys of 38 x 220 mm.

● Header is made of 2 plys of 38 x 97 mm + a king post of 38 x 97 mm.



**Characteristic capacity for ETC - Full nailing - F1, F2 - timber to timber - 1 jack + 1 hip**

| Model | Fasteners - CNA4.0x35 | | | | | | | | Characteristic capacity [kN] Timber C24 | | | | | |
| | Header | | | Hip | | | Jack | | $R_{1,k}$ | | | $R_{2,k}$ | | |
| | Type | Face | Bottom | Type | Side | Bottom | Type | Side | Hip | Jack | Total | Hip | Jack | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ETC392 | 1 Ply | 24 | 2 | 1 Ply | 5 | 2 | 1 Ply | 6 | 10.92 | 5.46 | 16.39 | 6.45 | 3.25 | 9.70 |

[1] *Header and Joist height ≥ 97 mm*

[2] *Header member can be made of 2 plies 38 x 220 mm. When the header is composed of 2 plies of 38x97 mm, it requires the installation of a 1 ply vertical member (king post) of minimum width of 97 mm, directly above the header.*

Spacings and edge distances shall be checked for the group of 10 nails located in the upper part of the hanger depending on the header depth and the vertical member dimension.

The resistance of the supporting and supported members shall be checked, in particular the *tension perpendicular to the grain*.

The nails in the central joist member are installed at approximately 20° - *See image below*.

**Nail pattern**
*ETC392*
*Nailing of the hips and jack - 1 jack + 1 hip*

● Header is made of 2 plys of 38 x 220 mm.

● Header is made of 2 plys of 38 x 97 mm + a king post of 38 x 97 mm.



**Characteristic capacity for ETC - Full nailing - F1, F2 - timber to timber - 2 hips**

| Model | Fasteners - CNA4.0x35 | | | | | | | | Characteristic capacity [kN] - Timber C24 | | | | | |
| | Header | | | Hip | | | Jack | | $R_{1,k}$ | | | $R_{2,k}$ | | |
| | Type | Face | Bottom | Type | Side | Bottom | Type | Side | Hip | Jack | Total | Hip | Jack | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ETC392 | 1 Ply | 24 | 2 | 1 Ply | 5 | 2 | - | - | 9.54 | - | 19.09 | 5.80 | - | 11.61 |

[1] *Header and Joist height ≥ 97 mm*
[2] *Header member can be made of 2 plies of 38 x 220 mm. When the header is composed of 2 plies of 38x97 mm, it requires the installation of a 1 ply vertical member (king post) of minimum width of 97 mm, directly above the header.*

Spacings and edge distances shall be checked for the group of 10 nails located in the upper part of the hanger depending on the header depth and the vertical member dimension.

The resistance of the supporting and supported members shall be checked, in particular the *tension perpendicular to the grain*.

The nails in the central joist member are installed at approximately 20° - *See image below*.
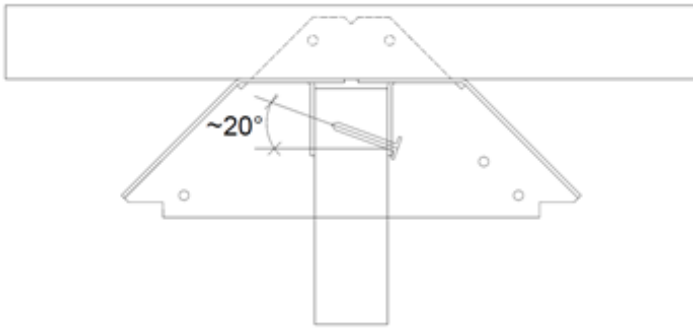


**Nail pattern**
*ETC392*
*Nailing of the hips and jack - 2 hips*

● Header is made of 2 plys of 38 x 220 mm.
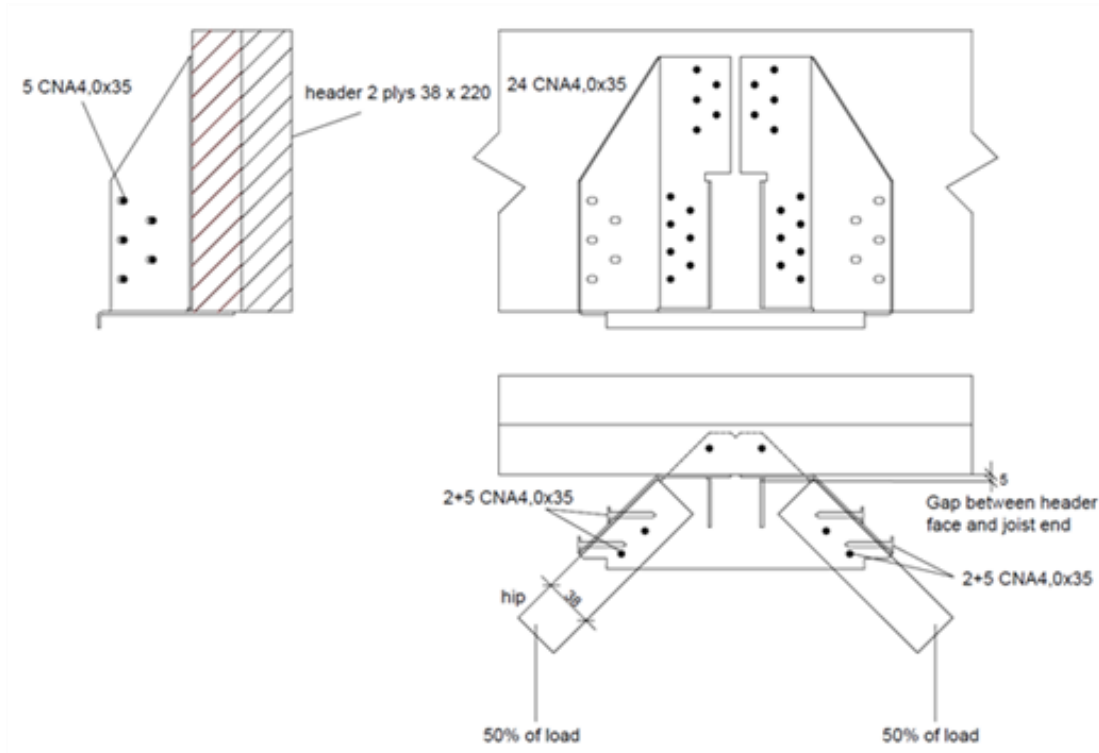
● Header is made of 2 plys of 38 x 97 mm + a king post of 38 x 97 mm.
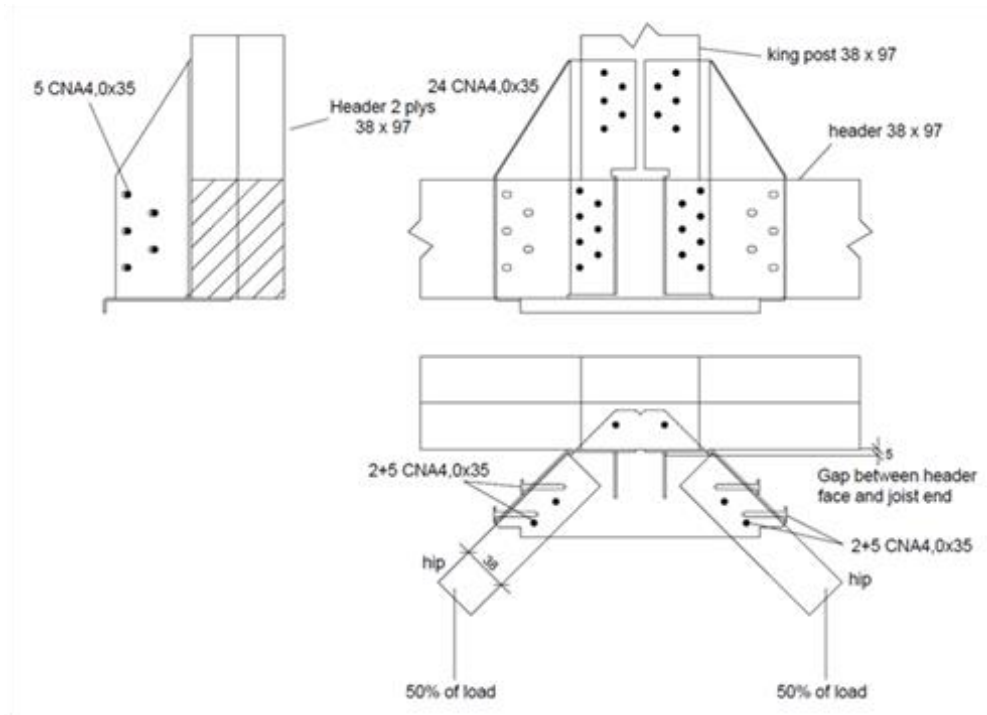
## D13   ETC G/D Truss Connector

| 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
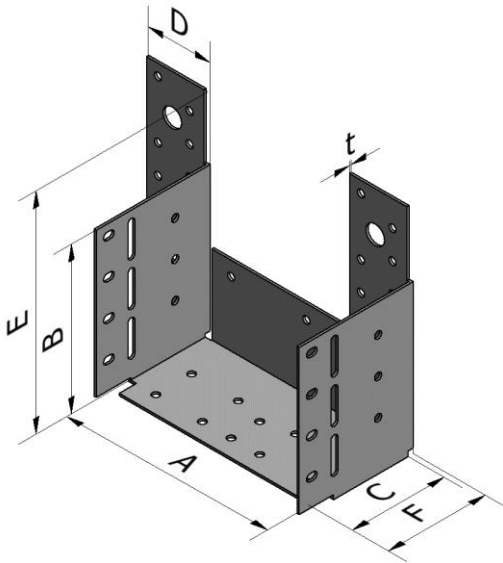
ETC434D
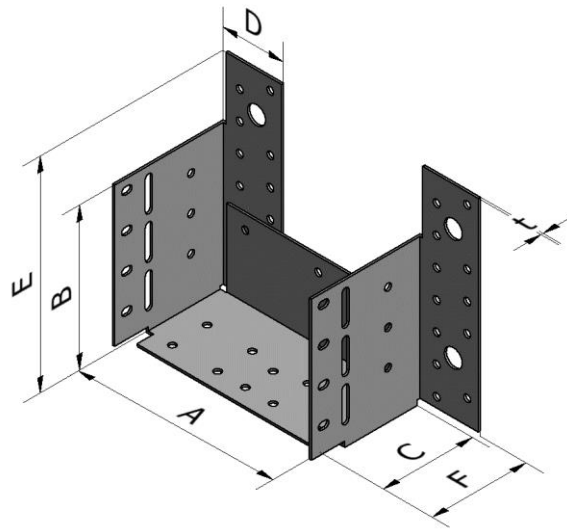


ETC485RG
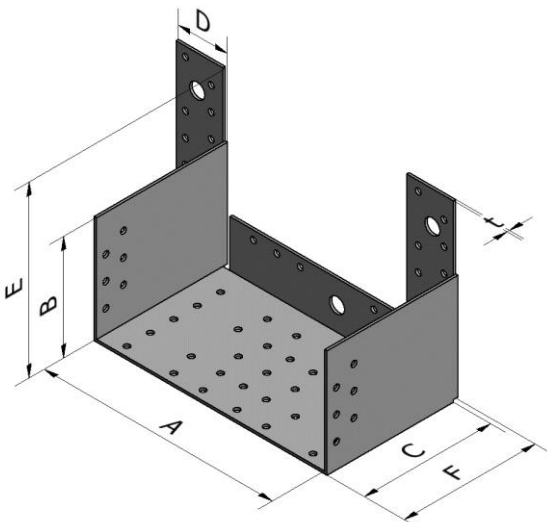
ETC485RD
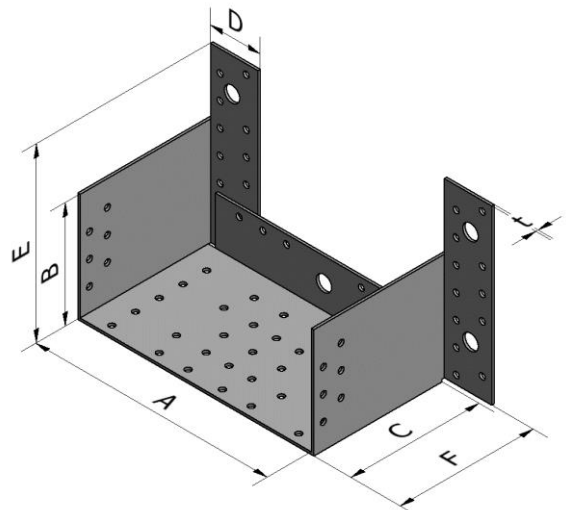
**Characteristic capacity for ETC G/D - Full nailing - F1 - timber to timber**

| 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.
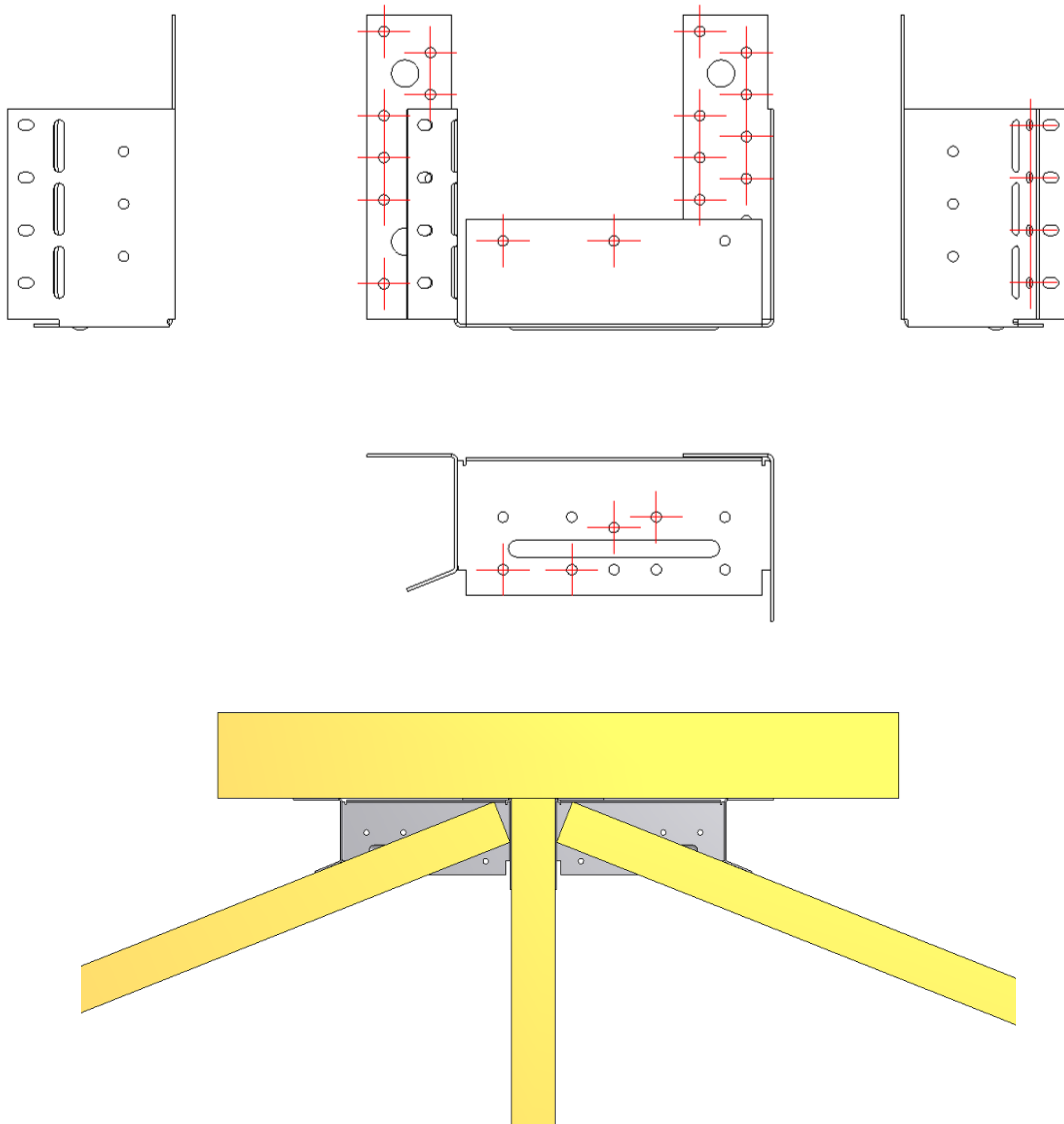
## *ETC485RG + ETC485RD Hangers*

*Single Jack and two single hips*
For ETC485RD it is a mirror of the nail pattern presented just below.
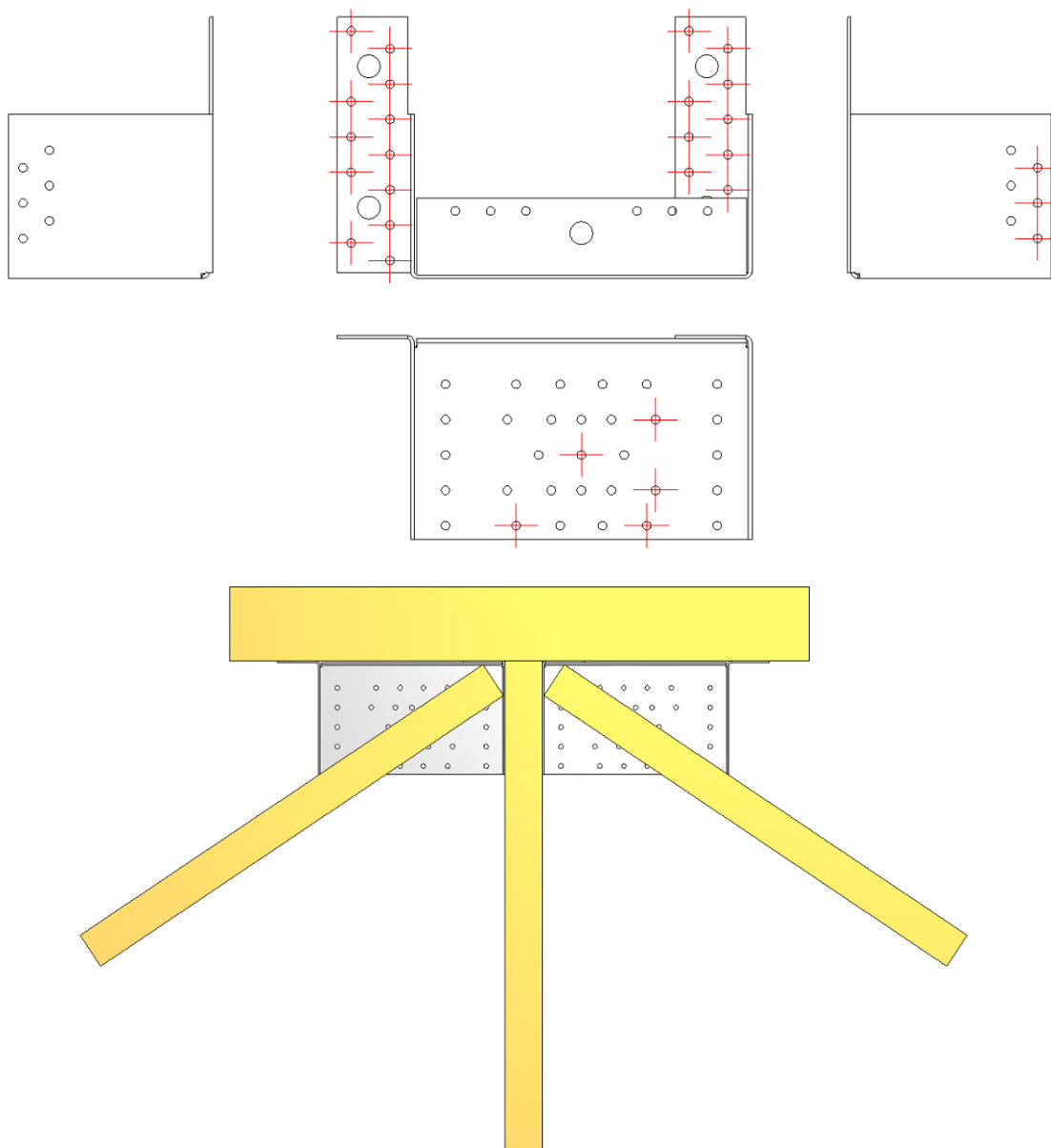
## D14   GBE Joist hanger

| Product Name | Material reference acc. to clause II-1 | Alternative Names |
|---|---|---|
| GBE | Steel ref 1 - Steel ref 2 - Steel ref 3 | - |

**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 | - | - | - | - | - | - | - |
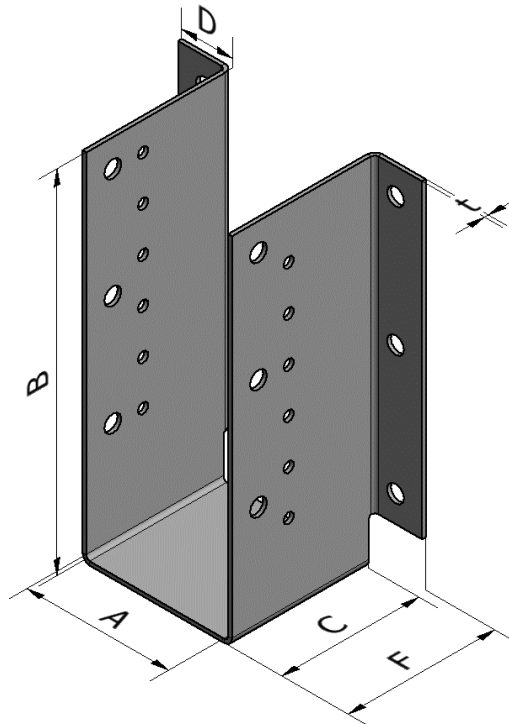


**Options:**
- Holes for screws are optional
- The number and position of holes per flange can vary
- Bolts can be in class 4.6 to 10.9

Parameters have to be used with equation in Annex C.

**Parameters for Joist Hanger GBE**

Standard GBE are as described in the table below :

| Blank model | Qty of bolts/flange | Spacing of bolts on the header | Qty of bolts/joist | Spacing of bolts in the joist | Qty of screws in the joist | Spacing of screws in the joist | γ | γs | kb.h | a |
|---|---|---|---|---|---|---|---|---|---|---|
| 600 | 2 | 122.5 | 2 | 90 | 3 | 48 | 0.332 | 0.325 | 0.70 | 60 |
| 750 | 2 | 197.5 | 2 | 165 | 4 | 48 | 0.542 | 0.395 | 0.70 | 60 |
| 900 | 3 | 136 | 3 | 120 | 6 | 48 | 0.530 | 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 | 0.710 | 0.687 | 0.95 | 60 |
| 1500 | 5 | 143 | 5 | 135 | 12 | 48 | 0.726 | 0.745 | 0.95 | 60 |

For other cases, calculation is made using following parameters :

| Qty bolts/flange | kb.h |
|---|---|
| 2 | 0,7 |
| 3 | 0,85 |
| 4 | 0,95 |
| 5 | 0,95 |

The table below gives values of γ depending of the number of bolts on the joist and the spacing of these bolts.

| Qty of bolts in the joist | γ factor depending of the spacing bolt joist [mm] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 90 | 100 | 120 | 140 | 160 | 180 | 200 | 250 | 300 |
| 2 | 0,33 | 0,36 | 0,42 | 0,48 | 0,53 | 0,58 | 0,62 | 0,70 | 0,76 |
| 3 | 0,42 | 0,46 | 0,53 | 0,59 | 0,64 | 0,68 | 0,72 | 0,79 | 0,84 |
| 4 | 0,51 | 0,55 | 0,62 | 0,67 | 0,72 | 0,76 | 0,79 | 0,85 | 0,89 |
| 5 | 0,58 | 0,62 | 0,68 | 0,74 | 0,78 | 0,81 | 0,84 | 0,89 | 0,92 |

Additional information :
- The minimum number of bolts per flange is equal to 2
- The distance of the holes to the top of the flange shall fulfill : 28 mm ≤ $at$ ≤ 50 mm
- The distance of the holes to the bottom of the flange shall fulfill : 28 mm ≤ $ab$ ≤ 50 mm
- The distance of the holes to the top of the side shall fulfill : 28 mm ≤ $bt$ ≤ 50 mm
- The number of bolts on the joist and per flange should be the same
- The bolt on the joist must be inserted starting from the lowest and going up
- The same number of bolts must be inserted in each flange and positioned symmetrically
- Minimum spacing between bolts on the header *"as"* is equal to 120 mm
- Minimum spacing between bolts on the joist *"bs"* is equal to 60 mm
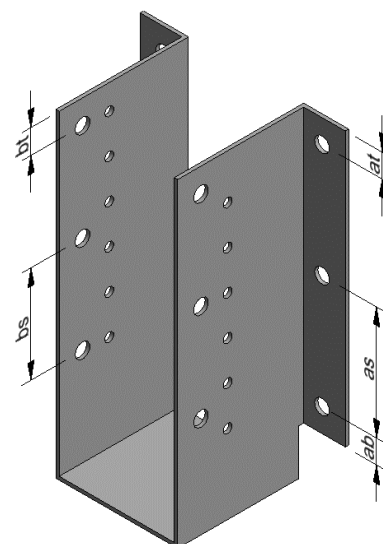
## D15   GBI Joist hanger

| 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
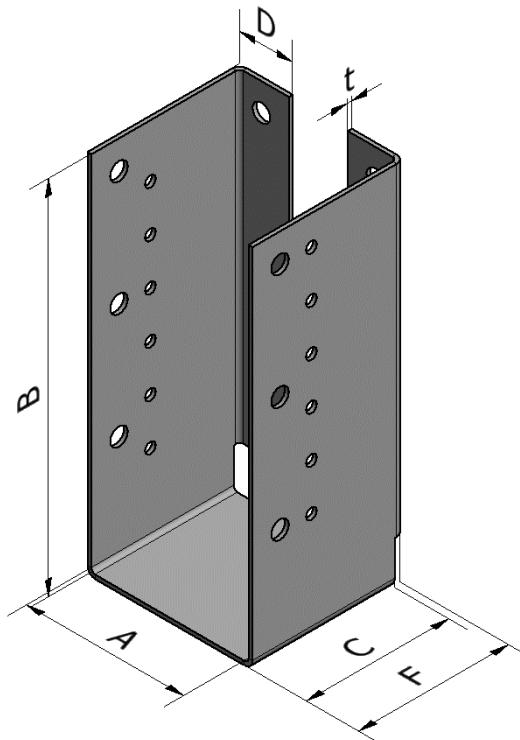


**Options:**
- Holes for screws are optional
- The number and position of holes per flange can vary.
- Bolts can be in class 4.6 to 10.9

Parameters have to be used with equation in <u>Annex C</u>

## 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 | $\gamma$ | $\gamma_s$ | $k_{b.h}$ | 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.
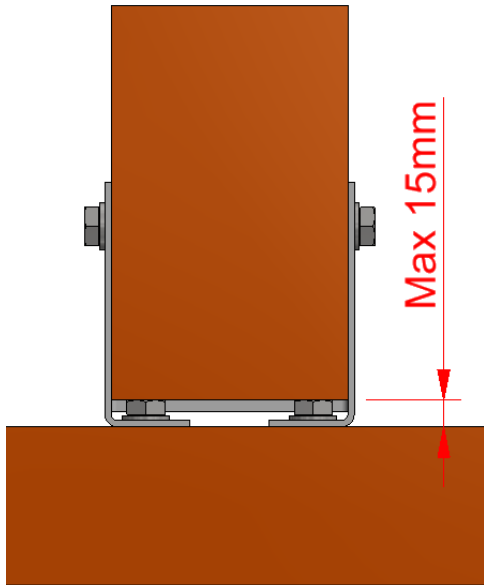
## D16 GLE Joist hanger

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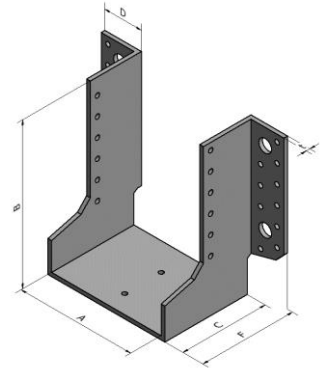
**Dimensions**

| 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 |
| 780/2.5X | 32-160 | (780-A)/2 | 90 | 38.5 | 95 | 2.5 | 48 | Ø5 | 6 | Ø14 | 29 | Ø5 |
| 840/2.5X | 32-160 | (840-A)/2 | 90 | 38.5 | 95 | 2.5 | 54 | Ø5 | 6 | Ø14 | 32 | Ø5 |
| 900/2.5X | 32-160 | (900-A)/2 | 90 | 38.5 | 95 | 2.5 | 60 | Ø5 | 6 | Ø14 | 35 | Ø5 |
| 960/2.5X | 32-160 | (960-A)/2 | 90 | 38.5 | 95 | 2.5 | 64 | Ø5 | 8 | Ø14 | 38 | Ø5 |
| 1020/2.5X | 32-160 | (1020-A)/2 | 90 | 38.5 | 95 | 2.5 | 70 | Ø5 | 8 | Ø14 | 41 | 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 |
| 780/4X | 32-160 | (780-A)/2 | 90 | 40 | 98 | 4 | 48 | Ø5 | 6 | Ø14 | 29 | Ø5 |
| 840/4X | 32-160 | (840-A)/2 | 90 | 40 | 98 | 4 | 54 | Ø5 | 6 | Ø14 | 32 | Ø5 |
| 900/4X | 32-160 | (900-A)/2 | 90 | 40 | 98 | 4 | 60 | Ø5 | 6 | Ø14 | 35 | Ø5 |
| 960/4X | 32-160 | (960-A)/2 | 90 | 40 | 98 | 4 | 64 | Ø5 | 8 | Ø14 | 38 | Ø5 |
| 1020/4X | 32-160 | (1020-A)/2 | 90 | 40 | 98 | 4 | 70 | Ø5 | 8 | Ø14 | 41 | Ø5 |
| Permitted deviation | - | - | ±1.0 | ±1.0 | ±1.0 | - | - | - | - | - | - | - |

Parameters have to be used with equation in <u>Annex C</u>

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

| | Full nailing | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Blank Model | | | | | | | | | | | | | |
| | 300 | | 340 | | 380 | | 440 | | 500 | | 540 | | 600 | |
| | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ |
| | 12 | 7 | 16 | 9 | 20 | 11 | 20 | 12 | 26 | 15 | 30 | 17 | 36 | 20 |
| A | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 |
| 32 | 134 | 24,2 | 154 | 33,1 | 174 | 43,3 | 204 | 55,8 | 234 | 78,4 | 254 | 94,3 | 284 | 121,7 |
| 34 | 133 | 23,9 | 153 | 32,7 | 173 | 42,9 | 203 | 55,3 | 233 | 77,8 | 253 | 93,6 | 283 | 120,8 |
| 36 | 132 | 23,5 | 152 | 32,3 | 172 | 42,4 | 202 | 54,8 | 232 | 77,1 | 252 | 92,9 | 282 | 120,0 |
| 38 | 131 | 23,2 | 151 | 31,9 | 171 | 41,9 | 201 | 54,3 | 231 | 76,5 | 251 | 92,2 | 281 | 119,2 |
| 40 | 130 | 22,9 | 150 | 31,5 | 170 | 41,4 | 200 | 53,8 | 230 | 75,9 | 250 | 91,5 | 280 | 118,4 |
| 42 | 129 | 22,5 | 149 | 31,1 | 169 | 40,9 | 199 | 53,3 | 229 | 75,3 | 249 | 90,8 | 279 | 117,6 |
| 44 | 128 | 22,2 | 148 | 30,7 | 168 | 40,4 | 198 | 52,8 | 228 | 74,7 | 248 | 90,1 | 278 | 116,8 |
| 46 | 127 | 21,9 | 147 | 30,3 | 167 | 39,9 | 197 | 52,3 | 227 | 74,0 | 247 | 89,4 | 277 | 115,9 |
| 48 | 126 | 21,6 | 146 | 29,9 | 166 | 39,5 | 196 | 51,8 | 226 | 73,4 | 246 | 88,7 | 276 | 115,1 |
| 50 | 125 | 21,3 | 145 | 29,5 | 165 | 39,0 | 195 | 51,3 | 225 | 72,8 | 245 | 88,0 | 275 | 114,3 |
| 52 | 124 | 20,9 | 144 | 29,1 | 164 | 38,5 | 194 | 50,8 | 224 | 72,2 | 244 | 87,3 | 274 | 113,5 |
| 54 | 123 | 20,6 | 143 | 28,7 | 163 | 38,0 | 193 | 50,3 | 223 | 71,6 | 243 | 86,6 | 273 | 112,7 |
| 56 | 122 | 20,3 | 142 | 28,3 | 162 | 37,6 | 192 | 49,8 | 222 | 70,9 | 242 | 85,9 | 272 | 111,9 |
| 58 | 121 | 20,0 | 141 | 27,9 | 161 | 37,1 | 191 | 49,3 | 221 | 70,3 | 241 | 85,3 | 271 | 111,1 |
| 60 | 120 | 19,7 | 140 | 27,5 | 160 | 36,6 | 190 | 48,8 | 220 | 69,7 | 240 | 84,6 | 270 | 110,3 |
| 62 | 119 | 19,3 | 139 | 27,1 | 159 | 36,1 | 189 | 48,3 | 219 | 69,1 | 239 | 83,9 | 269 | 109,5 |
| 64 | 118 | 19,0 | 138 | 26,7 | 158 | 35,7 | 188 | 47,8 | 218 | 68,5 | 238 | 83,2 | 268 | 108,7 |
| 66 | 117 | 18,7 | 137 | 26,3 | 157 | 35,2 | 187 | 47,3 | 217 | 67,9 | 237 | 82,5 | 267 | 107,9 |
| 68 | 116 | 18,4 | 136 | 25,9 | 156 | 34,7 | 186 | 46,9 | 216 | 67,3 | 236 | 81,8 | 266 | 107,1 |
| 70 | 115 | 18,1 | 135 | 25,5 | 155 | 34,3 | 185 | 46,4 | 215 | 66,7 | 235 | 81,1 | 265 | 106,3 |
| 72 | 114 | 17,8 | 134 | 25,1 | 154 | 33,8 | 184 | 45,9 | 214 | 66,1 | 234 | 80,5 | 264 | 105,5 |
| 74 | 113 | 17,5 | 133 | 24,7 | 153 | 33,4 | 183 | 45,4 | 213 | 65,5 | 233 | 79,8 | 263 | 104,7 |
| 76 | 112 | 17,1 | 132 | 24,4 | 152 | 32,9 | 182 | 44,9 | 212 | 64,9 | 232 | 79,1 | 262 | 103,9 |
| 78 | 111 | 16,8 | 131 | 24,0 | 151 | 32,5 | 181 | 44,4 | 211 | 64,3 | 231 | 78,4 | 261 | 103,1 |
| 80 | 110 | 16,5 | 130 | 23,6 | 150 | 32,0 | 180 | 43,9 | 210 | 63,7 | 230 | 77,7 | 260 | 102,3 |
| 82 | 109 | 16,2 | 129 | 23,2 | 149 | 31,5 | 179 | 43,5 | 209 | 63,1 | 229 | 77,1 | 259 | 101,6 |
| 84 | 108 | 15,9 | 128 | 22,8 | 148 | 31,1 | 178 | 43,0 | 208 | 62,5 | 228 | 76,4 | 258 | 100,8 |
| 86 | 107 | 15,6 | 127 | 22,5 | 147 | 30,6 | 177 | 42,5 | 207 | 61,9 | 227 | 75,7 | 257 | 100,0 |
| 88 | 106 | 15,3 | 126 | 22,1 | 146 | 30,2 | 176 | 42,0 | 206 | 61,3 | 226 | 75,1 | 256 | 99,2 |
| 90 | 105 | 15,0 | 125 | 21,7 | 145 | 29,8 | 175 | 41,6 | 205 | 60,7 | 225 | 74,4 | 255 | 98,4 |
| 92 | 104 | 14,7 | 124 | 21,3 | 144 | 29,3 | 174 | 41,1 | 204 | 60,1 | 224 | 73,7 | 254 | 97,6 |
| 94 | 103 | 14,4 | 123 | 21,0 | 143 | 28,9 | 173 | 40,6 | 203 | 59,5 | 223 | 73,1 | 253 | 96,9 |
| 96 | 102 | 14,1 | 122 | 20,6 | 142 | 28,4 | 172 | 40,1 | 202 | 58,9 | 222 | 72,4 | 252 | 96,1 |
| 98 | 101 | 13,8 | 121 | 20,2 | 141 | 28,0 | 171 | 39,7 | 201 | 58,3 | 221 | 71,7 | 251 | 95,3 |
| 100 | 100 | 13,5 | 120 | 19,9 | 140 | 27,6 | 170 | 39,2 | 200 | 57,7 | 220 | 71,1 | 250 | 94,6 |
| 102 | 99 | 13,3 | 119 | 19,5 | 139 | 27,1 | 169 | 38,7 | 199 | 57,2 | 219 | 70,4 | 249 | 93,8 |
| 104 | 98 | 13,0 | 118 | 19,2 | 138 | 26,7 | 168 | 38,3 | 198 | 56,6 | 218 | 69,8 | 248 | 93,0 |
| 106 | 97 | 12,7 | 117 | 18,8 | 137 | 26,3 | 167 | 37,8 | 197 | 56,0 | 217 | 69,1 | 247 | 92,3 |
| 108 | 96 | 12,4 | 116 | 18,4 | 136 | 25,9 | 166 | 37,3 | 196 | 55,4 | 216 | 68,5 | 246 | 91,5 |
| 110 | 95 | 12,1 | 115 | 18,1 | 135 | 25,4 | 165 | 36,9 | 195 | 54,8 | 215 | 67,8 | 245 | 90,7 |
| 112 | - | - | - | - | - | - | 164 | 36,4 | 194 | 54,3 | 214 | 67,2 | 244 | 90,0 |
| 114 | - | - | - | - | - | - | 163 | 35,9 | 193 | 53,7 | 213 | 66,5 | 243 | 89,2 |
| 116 | - | - | - | - | - | - | 162 | 35,5 | 192 | 53,1 | 212 | 65,9 | 242 | 88,5 |
| 118 | - | - | - | - | - | - | 161 | 35,0 | 191 | 52,6 | 211 | 65,2 | 241 | 87,7 |
| 120 | - | - | - | - | - | - | 160 | 34,6 | 190 | 52,0 | 210 | 64,6 | 240 | 87,0 |
| 122 | - | - | - | - | - | - | 159 | 34,1 | 189 | 51,4 | 209 | 63,9 | 239 | 86,2 |
| 124 | - | - | - | - | - | - | 158 | 33,7 | 188 | 50,9 | 208 | 63,3 | 238 | 85,5 |
| 126 | - | - | - | - | - | - | 157 | 33,2 | 187 | 50,3 | 207 | 62,7 | 237 | 84,7 |
| 128 | - | - | - | - | - | - | 156 | 32,8 | 186 | 49,7 | 206 | 62,0 | 236 | 84,0 |
| 130 | - | - | - | - | - | - | 155 | 32,3 | 185 | 49,2 | 205 | 61,4 | 235 | 83,2 |
| 132 | - | - | - | - | - | - | 154 | 31,9 | 184 | 48,6 | 204 | 60,8 | 234 | 82,5 |
| 134 | - | - | - | - | - | - | 153 | 31,4 | 183 | 48,1 | 203 | 60,2 | 233 | 81,8 |
| 136 | - | - | - | - | - | - | 152 | 31,0 | 182 | 47,5 | 202 | 59,5 | 232 | 81,0 |
| 138 | - | - | - | - | - | - | 151 | 30,6 | 181 | 47,0 | 201 | 58,9 | 231 | 80,3 |
| 140 | - | - | - | - | - | - | 150 | 30,1 | 180 | 46,4 | 200 | 58,3 | 230 | 79,6 |
| 142 | - | - | - | - | - | - | 149 | 29,7 | 179 | 45,9 | 199 | 57,7 | 229 | 78,9 |
| 144 | - | - | - | - | - | - | 148 | 29,3 | 178 | 45,3 | 198 | 57,1 | 228 | 78,1 |
| 146 | - | - | - | - | - | - | 147 | 28,8 | 177 | 44,8 | 197 | 56,4 | 227 | 77,4 |
| 148 | - | - | - | - | - | - | 146 | 28,4 | 176 | 44,3 | 196 | 55,8 | 226 | 76,7 |
| 150 | - | - | - | - | - | - | 145 | 28,0 | 175 | 43,7 | 195 | 55,2 | 225 | 76,0 |
| 152 | - | - | - | - | - | - | 144 | 27,6 | 174 | 43,2 | 194 | 54,6 | 224 | 75,3 |
| 154 | - | - | - | - | - | - | 143 | 27,1 | 173 | 42,7 | 193 | 54,0 | 223 | 74,6 |
| 156 | - | - | - | - | - | - | 142 | 26,7 | 172 | 42,1 | 192 | 53,4 | 222 | 73,9 |
| 158 | - | - | - | - | - | - | 141 | 26,3 | 171 | 41,6 | 191 | 52,8 | 221 | 73,2 |
| 160 | - | - | - | - | - | - | 140 | 25,9 | 170 | 41,1 | 190 | 52,2 | 220 | 72,5 |

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

## kH,1 for Joist Hanger GLE and GLI - Full nailing - F1

| | Full nailing | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Blank Model | | | | | | | | | | | | |
| | 660 | | 720 | | 780 | | 840 | | 900 | | 960 | | 1020 | |
| | nH | nJ | nH | nJ | nH | nJ | nH | nJ | nH | nJ | nH | nJ | nH | nJ |
| | 40 | 23 | 46 | 26 | 48 | 29 | 54 | 32 | 60 | 35 | 64 | 38 | 70 | 41 |
| A | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 |
| 32 | 314 | 142,9 | 344 | 176,8 | 374 | 208,4 | 404 | 247,3 | 434 | 287,1 | 464 | 323,5 | 494 | 369,8 |
| 34 | 313 | 142,0 | 343 | 175,8 | 373 | 207,4 | 403 | 246,1 | 433 | 285,8 | 463 | 322,2 | 493 | 368,3 |
| 36 | 312 | 141,1 | 342 | 174,8 | 372 | 206,3 | 402 | 244,9 | 432 | 284,5 | 462 | 320,8 | 492 | 366,9 |
| 38 | 311 | 140,2 | 341 | 173,8 | 371 | 205,2 | 401 | 243,7 | 431 | 283,2 | 461 | 319,5 | 491 | 365,4 |
| 40 | 310 | 139,3 | 340 | 172,8 | 370 | 204,2 | 400 | 242,6 | 430 | 282,0 | 460 | 318,1 | 490 | 364,0 |
| 42 | 309 | 138,4 | 339 | 171,9 | 369 | 203,1 | 399 | 241,4 | 429 | 280,7 | 459 | 316,8 | 489 | 362,5 |
| 44 | 308 | 137,6 | 338 | 170,9 | 368 | 202,1 | 398 | 240,2 | 428 | 279,4 | 458 | 315,4 | 488 | 361,0 |
| 46 | 307 | 136,7 | 337 | 169,9 | 367 | 201,0 | 397 | 239,0 | 427 | 278,1 | 457 | 314,1 | 487 | 359,6 |
| 48 | 306 | 135,8 | 336 | 168,9 | 366 | 200,0 | 396 | 237,9 | 426 | 276,8 | 456 | 312,7 | 486 | 358,1 |
| 50 | 305 | 134,9 | 335 | 167,9 | 365 | 198,9 | 395 | 236,7 | 425 | 275,6 | 455 | 311,4 | 485 | 356,7 |
| 52 | 304 | 134,1 | 334 | 166,9 | 364 | 197,8 | 394 | 235,5 | 424 | 274,3 | 454 | 310,1 | 484 | 355,2 |
| 54 | 303 | 133,2 | 333 | 165,9 | 363 | 196,8 | 393 | 234,4 | 423 | 273,0 | 453 | 308,7 | 483 | 353,8 |
| 56 | 302 | 132,3 | 332 | 164,9 | 362 | 195,7 | 392 | 233,2 | 422 | 271,7 | 452 | 307,4 | 482 | 352,3 |
| 58 | 301 | 131,5 | 331 | 164,0 | 361 | 194,7 | 391 | 232,1 | 421 | 270,5 | 451 | 306,0 | 481 | 350,9 |
| 60 | 300 | 130,6 | 330 | 163,0 | 360 | 193,6 | 390 | 230,9 | 420 | 269,2 | 450 | 304,7 | 480 | 349,4 |
| 62 | 299 | 129,7 | 329 | 162,0 | 359 | 192,6 | 389 | 229,7 | 419 | 267,9 | 449 | 303,4 | 479 | 348,0 |
| 64 | 298 | 128,9 | 328 | 161,0 | 358 | 191,5 | 388 | 228,6 | 418 | 266,7 | 448 | 302,0 | 478 | 346,5 |
| 66 | 297 | 128,0 | 327 | 160,0 | 357 | 190,5 | 387 | 227,4 | 417 | 265,4 | 447 | 300,7 | 477 | 345,1 |
| 68 | 296 | 127,1 | 326 | 159,1 | 356 | 189,5 | 386 | 226,3 | 416 | 264,1 | 446 | 299,4 | 476 | 343,7 |
| 70 | 295 | 126,3 | 325 | 158,1 | 355 | 188,4 | 385 | 225,1 | 415 | 262,9 | 445 | 298,0 | 475 | 342,2 |
| 72 | 294 | 125,4 | 324 | 157,1 | 354 | 187,4 | 384 | 224,0 | 414 | 261,6 | 444 | 296,7 | 474 | 340,8 |
| 74 | 293 | 124,6 | 323 | 156,2 | 353 | 186,3 | 383 | 222,8 | 413 | 260,4 | 443 | 295,4 | 473 | 339,4 |
| 76 | 292 | 123,7 | 322 | 155,2 | 352 | 185,3 | 382 | 221,7 | 412 | 259,1 | 442 | 294,1 | 472 | 337,9 |
| 78 | 291 | 122,9 | 321 | 154,2 | 351 | 184,3 | 381 | 220,5 | 411 | 257,8 | 441 | 292,8 | 471 | 336,5 |
| 80 | 290 | 122,0 | 320 | 153,3 | 350 | 183,2 | 380 | 219,4 | 410 | 256,6 | 440 | 291,4 | 470 | 335,1 |
| 82 | 289 | 121,2 | 319 | 152,3 | 349 | 182,2 | 379 | 218,2 | 409 | 255,3 | 439 | 290,1 | 469 | 333,6 |
| 84 | 288 | 120,3 | 318 | 151,4 | 348 | 181,2 | 378 | 217,1 | 408 | 254,1 | 438 | 288,8 | 468 | 332,2 |
| 86 | 287 | 119,5 | 317 | 150,4 | 347 | 180,1 | 377 | 216,0 | 407 | 252,9 | 437 | 287,5 | 467 | 330,8 |
| 88 | 286 | 118,6 | 316 | 149,5 | 346 | 179,1 | 376 | 214,8 | 406 | 251,6 | 436 | 286,2 | 466 | 329,4 |
| 90 | 285 | 117,8 | 315 | 148,5 | 345 | 178,1 | 375 | 213,7 | 405 | 250,4 | 435 | 284,9 | 465 | 328,0 |
| 92 | 284 | 117,0 | 314 | 147,6 | 344 | 177,1 | 374 | 212,6 | 404 | 249,1 | 434 | 283,6 | 464 | 326,5 |
| 94 | 283 | 116,1 | 313 | 146,6 | 343 | 176,0 | 373 | 211,4 | 403 | 247,9 | 433 | 282,3 | 463 | 325,1 |
| 96 | 282 | 115,3 | 312 | 145,7 | 342 | 175,0 | 372 | 210,3 | 402 | 246,6 | 432 | 281,0 | 462 | 323,7 |
| 98 | 281 | 114,4 | 311 | 144,7 | 341 | 174,0 | 371 | 209,2 | 401 | 245,4 | 431 | 279,7 | 461 | 322,3 |
| 100 | 280 | 113,6 | 310 | 143,8 | 340 | 173,0 | 370 | 208,0 | 400 | 244,2 | 430 | 278,4 | 460 | 320,9 |
| 102 | 279 | 112,8 | 309 | 142,8 | 339 | 172,0 | 369 | 206,9 | 399 | 243,0 | 429 | 277,1 | 459 | 319,5 |
| 104 | 278 | 112,0 | 308 | 141,9 | 338 | 170,9 | 368 | 205,8 | 398 | 241,7 | 428 | 275,8 | 458 | 318,1 |
| 106 | 277 | 111,1 | 307 | 141,0 | 337 | 169,9 | 367 | 204,7 | 397 | 240,5 | 427 | 274,5 | 457 | 316,7 |
| 108 | 276 | 110,3 | 306 | 140,0 | 336 | 168,9 | 366 | 203,6 | 396 | 239,3 | 426 | 273,2 | 456 | 315,3 |
| 110 | 275 | 109,5 | 305 | 139,1 | 335 | 167,9 | 365 | 202,4 | 395 | 238,0 | 425 | 271,9 | 455 | 313,9 |
| 112 | 274 | 108,7 | 304 | 138,2 | 334 | 166,9 | 364 | 201,3 | 394 | 236,8 | 424 | 270,6 | 454 | 312,5 |
| 114 | 273 | 107,9 | 303 | 137,2 | 333 | 165,9 | 363 | 200,2 | 393 | 235,6 | 423 | 269,3 | 453 | 311,1 |
| 116 | 272 | 107,0 | 302 | 136,3 | 332 | 164,9 | 362 | 199,1 | 392 | 234,4 | 422 | 268,0 | 452 | 309,7 |
| 118 | 271 | 106,2 | 301 | 135,4 | 331 | 163,9 | 361 | 198,0 | 391 | 233,2 | 421 | 266,8 | 451 | 308,3 |
| 120 | 270 | 105,4 | 300 | 134,5 | 330 | 162,9 | 360 | 196,9 | 390 | 232,0 | 420 | 265,5 | 450 | 307,0 |
| 122 | 269 | 104,6 | 299 | 133,6 | 329 | 161,9 | 359 | 195,8 | 389 | 230,8 | 419 | 264,2 | 449 | 305,6 |
| 124 | 268 | 103,8 | 298 | 132,6 | 328 | 160,9 | 358 | 194,7 | 388 | 229,5 | 418 | 262,9 | 448 | 304,2 |
| 126 | 267 | 103,0 | 297 | 131,7 | 327 | 159,9 | 357 | 193,6 | 387 | 228,3 | 417 | 261,7 | 447 | 302,8 |
| 128 | 266 | 102,2 | 296 | 130,8 | 326 | 158,9 | 356 | 192,5 | 386 | 227,1 | 416 | 260,4 | 446 | 301,4 |
| 130 | 265 | 101,4 | 295 | 129,9 | 325 | 157,9 | 355 | 191,4 | 385 | 225,9 | 415 | 259,1 | 445 | 300,1 |
| 132 | 264 | 100,6 | 294 | 129,0 | 324 | 156,9 | 354 | 190,3 | 384 | 224,7 | 414 | 257,9 | 444 | 298,7 |
| 134 | 263 | 99,8 | 293 | 128,1 | 323 | 155,9 | 353 | 189,2 | 383 | 223,5 | 413 | 256,6 | 443 | 297,3 |
| 136 | 262 | 99,0 | 292 | 127,2 | 322 | 155,0 | 352 | 188,1 | 382 | 222,3 | 412 | 255,3 | 442 | 295,9 |
| 138 | 261 | 98,2 | 291 | 126,3 | 321 | 154,0 | 351 | 187,0 | 381 | 221,1 | 411 | 254,1 | 441 | 294,6 |
| 140 | 260 | 97,4 | 290 | 125,4 | 320 | 153,0 | 350 | 185,9 | 380 | 220,0 | 410 | 252,8 | 440 | 293,2 |
| 142 | 259 | 96,7 | 289 | 124,5 | 319 | 152,0 | 349 | 184,9 | 379 | 218,8 | 409 | 251,6 | 439 | 291,9 |
| 144 | 258 | 95,9 | 288 | 123,6 | 318 | 151,0 | 348 | 183,8 | 378 | 217,6 | 408 | 250,3 | 438 | 290,5 |
| 146 | 257 | 95,1 | 287 | 122,7 | 317 | 150,1 | 347 | 182,7 | 377 | 216,4 | 407 | 249,1 | 437 | 289,1 |
| 148 | 256 | 94,3 | 286 | 121,9 | 316 | 149,1 | 346 | 181,6 | 376 | 215,2 | 406 | 247,8 | 436 | 287,8 |
| 150 | 255 | 93,5 | 285 | 121,0 | 315 | 148,1 | 345 | 180,5 | 375 | 214,0 | 405 | 246,6 | 435 | 286,4 |
| 152 | 254 | 92,8 | 284 | 120,1 | 314 | 147,2 | 344 | 179,5 | 374 | 212,9 | 404 | 245,3 | 434 | 285,1 |
| 154 | 253 | 92,0 | 283 | 119,2 | 313 | 146,2 | 343 | 178,4 | 373 | 211,7 | 403 | 244,1 | 433 | 283,7 |
| 156 | 252 | 91,2 | 282 | 118,3 | 312 | 145,2 | 342 | 177,3 | 372 | 210,5 | 402 | 242,8 | 432 | 282,4 |
| 158 | 251 | 90,5 | 281 | 117,5 | 311 | 144,3 | 341 | 176,3 | 371 | 209,3 | 401 | 241,6 | 431 | 281,1 |
| 160 | 250 | 89,7 | 280 | 116,6 | 310 | 143,3 | 340 | 175,2 | 370 | 208,2 | 400 | 240,4 | 430 | 279,7 |

In the case of intermediate width, kH,1 can be calculated by linear interpolation.

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

| Width | 300 $n_H$=6 B | 300 $n_J$=4 kh,1 | 340 $n_H$=8 B | 340 $n_J$=5 kh,1 | 380 $n_H$=10 B | 380 $n_J$=6 kh,1 | 440 $n_H$=8 B | 440 $n_J$=6 kh,1 | 500 $n_H$=12 B | 500 $n_J$=8 kh,1 | 540 $n_H$=14 B | 540 $n_J$=9 kh,1 | 600 $n_H$=16 B | 600 $n_J$=10 kh,1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | 134 | 13,2 | 154 | 17,6 | 174 | 22,7 | 204 | 32,2 | 234 | 39,1 | 254 | 47,2 | 284 | 59,8 |
| 34 | 133 | 13,1 | 153 | 17,4 | 173 | 22,5 | 203 | 32,0 | 233 | 38,8 | 253 | 46,9 | 283 | 59,4 |
| 36 | 132 | 12,9 | 152 | 17,2 | 172 | 22,2 | 202 | 31,7 | 232 | 38,5 | 252 | 46,5 | 282 | 59,0 |
| 38 | 131 | 12,7 | 151 | 17,0 | 171 | 21,9 | 201 | 31,5 | 231 | 38,2 | 251 | 46,2 | 281 | 58,7 |
| 40 | 130 | 12,5 | 150 | 16,8 | 170 | 21,7 | 200 | 31,2 | 230 | 37,9 | 250 | 45,8 | 280 | 58,3 |
| 42 | 129 | 12,4 | 149 | 16,6 | 169 | 21,4 | 199 | 31,0 | 229 | 37,6 | 249 | 45,5 | 279 | 57,9 |
| 44 | 128 | 12,2 | 148 | 16,3 | 168 | 21,2 | 198 | 30,8 | 228 | 37,3 | 248 | 45,1 | 278 | 57,5 |
| 46 | 127 | 12,0 | 147 | 16,1 | 167 | 20,9 | 197 | 30,5 | 227 | 37,0 | 247 | 44,8 | 277 | 57,1 |
| 48 | 126 | 11,8 | 146 | 15,9 | 166 | 20,7 | 196 | 30,3 | 226 | 36,7 | 246 | 44,4 | 276 | 56,7 |
| 50 | 125 | 11,7 | 145 | 15,7 | 165 | 20,4 | 195 | 30,1 | 225 | 36,4 | 245 | 44,1 | 275 | 56,3 |
| 52 | 124 | 11,5 | 144 | 15,5 | 164 | 20,2 | 194 | 29,8 | 224 | 36,1 | 244 | 43,7 | 274 | 55,9 |
| 54 | 123 | 11,3 | 143 | 15,3 | 163 | 19,9 | 193 | 29,6 | 223 | 35,8 | 243 | 43,4 | 273 | 55,5 |
| 56 | 122 | 11,1 | 142 | 15,1 | 162 | 19,7 | 192 | 29,4 | 222 | 35,4 | 242 | 43,0 | 272 | 55,1 |
| 58 | 121 | 11,0 | 141 | 14,8 | 161 | 19,4 | 191 | 29,1 | 221 | 35,1 | 241 | 42,7 | 271 | 54,7 |
| 60 | 120 | 10,8 | 140 | 14,6 | 160 | 19,2 | 190 | 28,9 | 220 | 34,8 | 240 | 42,4 | 270 | 54,4 |
| 62 | 119 | 10,6 | 139 | 14,4 | 159 | 18,9 | 189 | 28,7 | 219 | 34,5 | 239 | 42,0 | 269 | 54,0 |
| 64 | 118 | 10,4 | 138 | 14,2 | 158 | 18,7 | 188 | 28,4 | 218 | 34,2 | 238 | 41,7 | 268 | 53,6 |
| 66 | 117 | 10,3 | 137 | 14,0 | 157 | 18,4 | 187 | 28,2 | 217 | 33,9 | 237 | 41,3 | 267 | 53,2 |
| 68 | 116 | 10,1 | 136 | 13,8 | 156 | 18,2 | 186 | 28,0 | 216 | 33,6 | 236 | 41,0 | 266 | 52,8 |
| 70 | 115 | 9,9 | 135 | 13,6 | 155 | 17,9 | 185 | 27,7 | 215 | 33,3 | 235 | 40,7 | 265 | 52,4 |
| 72 | 114 | 9,8 | 134 | 13,4 | 154 | 17,7 | 184 | 27,5 | 214 | 33,1 | 234 | 40,3 | 264 | 52,0 |
| 74 | 113 | 9,6 | 133 | 13,2 | 153 | 17,4 | 183 | 27,3 | 213 | 32,8 | 233 | 40,0 | 263 | 51,7 |
| 76 | 112 | 9,4 | 132 | 13,0 | 152 | 17,2 | 182 | 27,0 | 212 | 32,5 | 232 | 39,7 | 262 | 51,3 |
| 78 | 111 | 9,3 | 131 | 12,8 | 151 | 17,0 | 181 | 26,8 | 211 | 32,2 | 231 | 39,3 | 261 | 50,9 |
| 80 | 110 | 9,1 | 130 | 12,6 | 150 | 16,7 | 180 | 26,6 | 210 | 31,9 | 230 | 39,0 | 260 | 50,5 |
| 82 | 109 | 9,0 | 129 | 12,4 | 149 | 16,5 | 179 | 26,3 | 209 | 31,6 | 229 | 38,6 | 259 | 50,1 |
| 84 | 108 | 8,8 | 128 | 12,2 | 148 | 16,3 | 178 | 26,1 | 208 | 31,3 | 228 | 38,3 | 258 | 49,8 |
| 86 | 107 | 8,6 | 127 | 12,0 | 147 | 16,0 | 177 | 25,9 | 207 | 31,0 | 227 | 38,0 | 257 | 49,4 |
| 88 | 106 | 8,5 | 126 | 11,8 | 146 | 15,8 | 176 | 25,6 | 206 | 30,7 | 226 | 37,7 | 256 | 49,0 |
| 90 | 105 | 8,3 | 125 | 11,6 | 145 | 15,6 | 175 | 25,4 | 205 | 30,4 | 225 | 37,3 | 255 | 48,6 |
| 92 | 104 | 8,2 | 124 | 11,4 | 144 | 15,3 | 174 | 25,2 | 204 | 30,1 | 224 | 37,0 | 254 | 48,2 |
| 94 | 103 | 8,0 | 123 | 11,2 | 143 | 15,1 | 173 | 24,9 | 203 | 29,8 | 223 | 36,7 | 253 | 47,9 |
| 96 | 102 | 7,8 | 122 | 11,0 | 142 | 14,9 | 172 | 24,7 | 202 | 29,5 | 222 | 36,3 | 252 | 47,5 |
| 98 | 101 | 7,7 | 121 | 10,8 | 141 | 14,6 | 171 | 24,5 | 201 | 29,2 | 221 | 36,0 | 251 | 47,1 |
| 100 | 100 | 7,5 | 120 | 10,6 | 140 | 14,4 | 170 | 24,3 | 200 | 29,0 | 220 | 35,7 | 250 | 46,7 |
| 102 | 99 | 7,4 | 119 | 10,4 | 139 | 14,2 | 169 | 24,0 | 199 | 28,7 | 219 | 35,4 | 249 | 46,4 |
| 104 | 98 | 7,2 | 118 | 10,3 | 138 | 14,0 | 168 | 23,8 | 198 | 28,4 | 218 | 35,0 | 248 | 46,0 |
| 106 | 97 | 7,1 | 117 | 10,1 | 137 | 13,7 | 167 | 23,6 | 197 | 28,1 | 217 | 34,7 | 247 | 45,6 |
| 108 | 96 | 6,9 | 116 | 9,9 | 136 | 13,5 | 166 | 23,3 | 196 | 27,8 | 216 | 34,4 | 246 | 45,3 |
| 110 | 95 | 6,8 | 115 | 9,7 | 135 | 13,3 | 165 | 23,1 | 195 | 27,5 | 215 | 34,1 | 245 | 44,9 |
| 112 | - | - | - | - | - | - | 164 | 22,9 | 194 | 27,3 | 214 | 33,7 | 244 | 44,5 |
| 114 | - | - | - | - | - | - | 163 | 22,7 | 193 | 27,0 | 213 | 33,4 | 243 | 44,2 |
| 116 | - | - | - | - | - | - | 162 | 22,4 | 192 | 26,7 | 212 | 33,1 | 242 | 43,8 |
| 118 | - | - | - | - | - | - | 161 | 22,2 | 191 | 26,4 | 211 | 32,8 | 241 | 43,4 |
| 120 | - | - | - | - | - | - | 160 | 22,0 | 190 | 26,1 | 210 | 32,5 | 240 | 43,1 |
| 122 | - | - | - | - | - | - | 159 | 21,8 | 189 | 25,9 | 209 | 32,2 | 239 | 42,7 |
| 124 | - | - | - | - | - | - | 158 | 21,5 | 188 | 25,6 | 208 | 31,8 | 238 | 42,3 |
| 126 | - | - | - | - | - | - | 157 | 21,3 | 187 | 25,3 | 207 | 31,5 | 237 | 42,0 |
| 128 | - | - | - | - | - | - | 156 | 21,1 | 186 | 25,0 | 206 | 31,2 | 236 | 41,6 |
| 130 | - | - | - | - | - | - | 155 | 20,9 | 185 | 24,8 | 205 | 30,9 | 235 | 41,2 |
| 132 | - | - | - | - | - | - | 154 | 20,6 | 184 | 24,5 | 204 | 30,6 | 234 | 40,9 |
| 134 | - | - | - | - | - | - | 153 | 20,4 | 183 | 24,2 | 203 | 30,3 | 233 | 40,5 |
| 136 | - | - | - | - | - | - | 152 | 20,2 | 182 | 23,9 | 202 | 30,0 | 232 | 40,2 |
| 138 | - | - | - | - | - | - | 151 | 20,0 | 181 | 23,7 | 201 | 29,7 | 231 | 39,8 |
| 140 | - | - | - | - | - | - | 150 | 19,7 | 180 | 23,4 | 200 | 29,4 | 230 | 39,5 |
| 142 | - | - | - | - | - | - | 149 | 19,5 | 179 | 23,1 | 199 | 29,1 | 229 | 39,1 |
| 144 | - | - | - | - | - | - | 148 | 19,3 | 178 | 22,9 | 198 | 28,7 | 228 | 38,8 |
| 146 | - | - | - | - | - | - | 147 | 19,1 | 177 | 22,6 | 197 | 28,4 | 227 | 38,4 |
| 148 | - | - | - | - | - | - | 146 | 18,9 | 176 | 22,3 | 196 | 28,1 | 226 | 38,1 |
| 150 | - | - | - | - | - | - | 145 | 18,6 | 175 | 22,1 | 195 | 27,8 | 225 | 37,7 |
| 152 | - | - | - | - | - | - | 144 | 18,4 | 174 | 21,8 | 194 | 27,5 | 224 | 37,4 |
| 154 | - | - | - | - | - | - | 143 | 18,2 | 173 | 21,6 | 193 | 27,2 | 223 | 37,0 |
| 156 | - | - | - | - | - | - | 142 | 18,0 | 172 | 21,3 | 192 | 27,0 | 222 | 36,7 |
| 158 | - | - | - | - | - | - | 141 | 17,8 | 171 | 21,0 | 191 | 26,7 | 221 | 36,3 |
| 160 | - | - | - | - | - | - | 140 | 17,5 | 170 | 20,8 | 190 | 26,4 | 220 | 36,0 |

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

## kH,1 for Joist Hanger GLE and GLI - Partial nailing - F1

| Partial nailing | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Blank Model | | | | | | | | | | | | | | |
| | 660 | | 720 | | 780 | | 840 | | 900 | | 960 | | 1020 | |
| | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ |
| | 18 | 12 | 20 | 14 | 22 | 15 | 24 | 16 | 28 | 18 | 28 | 20 | 32 | 21 |
| Width | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 |
| 32 | 314 | 67,8 | 344 | 83,0 | 374 | 100,9 | 404 | 118,2 | 434 | 139,6 | 464 | 150,1 | 494 | 199,7 |
| 34 | 313 | 67,4 | 343 | 82,5 | 373 | 100,3 | 403 | 117,6 | 433 | 139,0 | 463 | 149,5 | 493 | 198,9 |
| 36 | 312 | 66,9 | 342 | 82,1 | 372 | 99,8 | 402 | 117,1 | 432 | 138,3 | 462 | 148,9 | 492 | 198,2 |
| 38 | 311 | 66,5 | 341 | 81,6 | 371 | 99,3 | 401 | 116,5 | 431 | 137,7 | 461 | 148,3 | 491 | 197,4 |
| 40 | 310 | 66,1 | 340 | 81,1 | 370 | 98,8 | 400 | 115,9 | 430 | 137,1 | 460 | 147,6 | 490 | 196,7 |
| 42 | 309 | 65,7 | 339 | 80,7 | 369 | 98,3 | 399 | 115,4 | 429 | 136,5 | 459 | 147,0 | 489 | 195,9 |
| 44 | 308 | 65,3 | 338 | 80,2 | 368 | 97,8 | 398 | 114,8 | 428 | 135,8 | 458 | 146,4 | 488 | 195,2 |
| 46 | 307 | 64,9 | 337 | 79,8 | 367 | 97,3 | 397 | 114,3 | 427 | 135,2 | 457 | 145,8 | 487 | 194,4 |
| 48 | 306 | 64,5 | 336 | 79,3 | 366 | 96,8 | 396 | 113,7 | 426 | 134,6 | 456 | 145,2 | 486 | 193,7 |
| 50 | 305 | 64,0 | 335 | 78,9 | 365 | 96,3 | 395 | 113,2 | 425 | 134,0 | 455 | 144,6 | 485 | 192,9 |
| 52 | 304 | 63,6 | 334 | 78,4 | 364 | 95,8 | 394 | 112,6 | 424 | 133,4 | 454 | 143,9 | 484 | 192,2 |
| 54 | 303 | 63,2 | 333 | 78,0 | 363 | 95,3 | 393 | 112,1 | 423 | 132,7 | 453 | 143,3 | 483 | 191,4 |
| 56 | 302 | 62,8 | 332 | 77,5 | 362 | 94,8 | 392 | 111,5 | 422 | 132,1 | 452 | 142,7 | 482 | 190,7 |
| 58 | 301 | 62,4 | 331 | 77,0 | 361 | 94,3 | 391 | 111,0 | 421 | 131,5 | 451 | 142,1 | 481 | 189,9 |
| 60 | 300 | 62,0 | 330 | 76,6 | 360 | 93,8 | 390 | 110,4 | 420 | 130,9 | 450 | 141,5 | 480 | 189,2 |
| 62 | 299 | 61,6 | 329 | 76,1 | 359 | 93,2 | 389 | 109,9 | 419 | 130,3 | 449 | 140,9 | 479 | 188,4 |
| 64 | 298 | 61,2 | 328 | 75,7 | 358 | 92,7 | 388 | 109,4 | 418 | 129,7 | 448 | 140,3 | 478 | 187,7 |
| 66 | 297 | 60,8 | 327 | 75,2 | 357 | 92,2 | 387 | 108,8 | 417 | 129,1 | 447 | 139,7 | 477 | 187,0 |
| 68 | 296 | 60,4 | 326 | 74,8 | 356 | 91,7 | 386 | 108,3 | 416 | 128,4 | 446 | 139,0 | 476 | 186,2 |
| 70 | 295 | 60,0 | 325 | 74,3 | 355 | 91,2 | 385 | 107,7 | 415 | 127,8 | 445 | 138,4 | 475 | 185,5 |
| 72 | 294 | 59,6 | 324 | 73,9 | 354 | 90,7 | 384 | 107,2 | 414 | 127,2 | 444 | 137,8 | 474 | 184,7 |
| 74 | 293 | 59,2 | 323 | 73,5 | 353 | 90,2 | 383 | 106,6 | 413 | 126,6 | 443 | 137,2 | 473 | 184,0 |
| 76 | 292 | 58,8 | 322 | 73,0 | 352 | 89,7 | 382 | 106,1 | 412 | 126,0 | 442 | 136,6 | 472 | 183,3 |
| 78 | 291 | 58,4 | 321 | 72,6 | 351 | 89,3 | 381 | 105,6 | 411 | 125,4 | 441 | 136,0 | 471 | 182,5 |
| 80 | 290 | 58,0 | 320 | 72,1 | 350 | 88,8 | 380 | 105,0 | 410 | 124,8 | 440 | 135,4 | 470 | 181,8 |
| 82 | 289 | 57,6 | 319 | 71,7 | 349 | 88,3 | 379 | 104,5 | 409 | 124,2 | 439 | 134,8 | 469 | 181,0 |
| 84 | 288 | 57,2 | 318 | 71,2 | 348 | 87,8 | 378 | 103,9 | 408 | 123,6 | 438 | 134,2 | 468 | 180,3 |
| 86 | 287 | 56,8 | 317 | 70,8 | 347 | 87,3 | 377 | 103,4 | 407 | 123,0 | 437 | 133,6 | 467 | 179,6 |
| 88 | 286 | 56,4 | 316 | 70,3 | 346 | 86,8 | 376 | 102,9 | 406 | 122,4 | 436 | 133,0 | 466 | 178,8 |
| 90 | 285 | 56,0 | 315 | 69,9 | 345 | 86,3 | 375 | 102,3 | 405 | 121,8 | 435 | 132,4 | 465 | 178,1 |
| 92 | 284 | 55,6 | 314 | 69,5 | 344 | 85,8 | 374 | 101,8 | 404 | 121,2 | 434 | 131,8 | 464 | 177,4 |
| 94 | 283 | 55,2 | 313 | 69,0 | 343 | 85,3 | 373 | 101,3 | 403 | 120,6 | 433 | 131,2 | 463 | 176,6 |
| 96 | 282 | 54,8 | 312 | 68,6 | 342 | 84,8 | 372 | 100,7 | 402 | 120,0 | 432 | 130,6 | 462 | 175,9 |
| 98 | 281 | 54,4 | 311 | 68,2 | 341 | 84,3 | 371 | 100,2 | 401 | 119,4 | 431 | 130,0 | 461 | 175,2 |
| 100 | 280 | 54,0 | 310 | 67,7 | 340 | 83,8 | 370 | 99,6 | 400 | 118,8 | 430 | 129,4 | 460 | 174,4 |
| 102 | 279 | 53,6 | 309 | 67,3 | 339 | 83,3 | 369 | 99,1 | 399 | 118,2 | 429 | 128,8 | 459 | 173,7 |
| 104 | 278 | 53,2 | 308 | 66,9 | 338 | 82,9 | 368 | 98,6 | 398 | 117,6 | 428 | 128,2 | 458 | 173,0 |
| 106 | 277 | 52,9 | 307 | 66,4 | 337 | 82,4 | 367 | 98,1 | 397 | 117,0 | 427 | 127,6 | 457 | 172,2 |
| 108 | 276 | 52,5 | 306 | 66,0 | 336 | 81,9 | 366 | 97,5 | 396 | 116,4 | 426 | 127,0 | 456 | 171,5 |
| 110 | 275 | 52,1 | 305 | 65,6 | 335 | 81,4 | 365 | 97,0 | 395 | 115,8 | 425 | 126,4 | 455 | 170,8 |
| 112 | 274 | 51,7 | 304 | 65,1 | 334 | 80,9 | 364 | 96,5 | 394 | 115,2 | 424 | 125,8 | 454 | 170,1 |
| 114 | 273 | 51,3 | 303 | 64,7 | 333 | 80,4 | 363 | 95,9 | 393 | 114,6 | 423 | 125,2 | 453 | 169,3 |
| 116 | 272 | 50,9 | 302 | 64,3 | 332 | 79,9 | 362 | 95,4 | 392 | 114,0 | 422 | 124,6 | 452 | 168,6 |
| 118 | 271 | 50,6 | 301 | 63,8 | 331 | 79,5 | 361 | 94,9 | 391 | 113,4 | 421 | 124,0 | 451 | 167,9 |
| 120 | 270 | 50,2 | 300 | 63,4 | 330 | 79,0 | 360 | 94,4 | 390 | 112,8 | 420 | 123,5 | 450 | 167,2 |
| 122 | 269 | 49,8 | 299 | 63,0 | 329 | 78,5 | 359 | 93,8 | 389 | 112,3 | 419 | 122,9 | 449 | 166,4 |
| 124 | 268 | 49,4 | 298 | 62,6 | 328 | 78,0 | 358 | 93,3 | 388 | 111,7 | 418 | 122,3 | 448 | 165,7 |
| 126 | 267 | 49,0 | 297 | 62,1 | 327 | 77,6 | 357 | 92,8 | 387 | 111,1 | 417 | 121,7 | 447 | 165,0 |
| 128 | 266 | 48,7 | 296 | 61,7 | 326 | 77,1 | 356 | 92,3 | 386 | 110,5 | 416 | 121,1 | 446 | 164,3 |
| 130 | 265 | 48,3 | 295 | 61,3 | 325 | 76,6 | 355 | 91,8 | 385 | 109,9 | 415 | 120,5 | 445 | 163,5 |
| 132 | 264 | 47,9 | 294 | 60,9 | 324 | 76,1 | 354 | 91,2 | 384 | 109,3 | 414 | 119,9 | 444 | 162,8 |
| 134 | 263 | 47,5 | 293 | 60,5 | 323 | 75,6 | 353 | 90,7 | 383 | 108,7 | 413 | 119,4 | 443 | 162,1 |
| 136 | 262 | 47,2 | 292 | 60,0 | 322 | 75,2 | 352 | 90,2 | 382 | 108,2 | 412 | 118,8 | 442 | 161,4 |
| 138 | 261 | 46,8 | 291 | 59,6 | 321 | 74,7 | 351 | 89,7 | 381 | 107,6 | 411 | 118,2 | 441 | 160,7 |
| 140 | 260 | 46,4 | 290 | 59,2 | 320 | 74,2 | 350 | 89,2 | 380 | 107,0 | 410 | 117,6 | 440 | 159,9 |
| 142 | 259 | 46,1 | 289 | 58,8 | 319 | 73,8 | 349 | 88,7 | 379 | 106,4 | 409 | 117,0 | 439 | 159,2 |
| 144 | 258 | 45,7 | 288 | 58,4 | 318 | 73,3 | 348 | 88,1 | 378 | 105,9 | 408 | 116,5 | 438 | 158,5 |
| 146 | 257 | 45,3 | 287 | 58,0 | 317 | 72,8 | 347 | 87,6 | 377 | 105,3 | 407 | 115,9 | 437 | 157,8 |
| 148 | 256 | 45,0 | 286 | 57,6 | 316 | 72,4 | 346 | 87,1 | 376 | 104,7 | 406 | 115,3 | 436 | 157,1 |
| 150 | 255 | 44,6 | 285 | 57,1 | 315 | 71,9 | 345 | 86,6 | 375 | 104,1 | 405 | 114,7 | 435 | 156,4 |
| 152 | 254 | 44,2 | 284 | 56,7 | 314 | 71,4 | 344 | 86,1 | 374 | 103,6 | 404 | 114,2 | 434 | 155,6 |
| 154 | 253 | 43,9 | 283 | 56,3 | 313 | 71,0 | 343 | 85,6 | 373 | 103,0 | 403 | 113,6 | 433 | 154,9 |
| 156 | 252 | 43,5 | 282 | 55,9 | 312 | 70,5 | 342 | 85,1 | 372 | 102,4 | 402 | 113,0 | 432 | 154,2 |
| 158 | 251 | 43,2 | 281 | 55,5 | 311 | 70,0 | 341 | 84,6 | 371 | 101,9 | 401 | 112,5 | 431 | 153,5 |
| 160 | 250 | 42,8 | 280 | 55,1 | 310 | 69,6 | 340 | 84,1 | 370 | 101,3 | 400 | 111,9 | 430 | 152,8 |

In the case of intermediate width, kH,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 | 6.7 |
| 500 | 26 | 12 | 34.5 | 16.2 |
| 540 | 30 | 14 | 43.9 | 20.7 |
| 600 | 36 | 16 | 59.9 | 25.8 |
| 660 | 40 | 18 | 76.3 | 35.1 |
| 720 | 46 | 20 | 96.4 | 41.2 |
| 780 | 48 | 22 | 106 | 49.7 |
| 840 | 54 | 24 | 131 | 58.2 |
| 900 | 60 | 28 | 158.9 | 75.9 |
| 960 | 64 | 28 | 183.2 | 80.4 |
| 1020 | 70 | 32 | 214.9 | 99.9 |

## Characteristic capacities for GLE/2.5X - with connector screw SSH/SSF

| Blank | Product capacities - Timber to Timber - Large connector screw | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
| | Header | | Joist | | R1.k | | | | R2.k | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| GLE300/2.5X | 2 | SSH12.0x60 [1] | 7 | CNA* | 10,6 | 11,0 | 11,6 | 11,7 | 9,9 | 10,3 | 11,1 | 11,3 |
| GLE340/2.5X | 2 | SSH12.0x60 [1] | 9 | CNA* | 12,0 | 12,2 | 12,5 | 12,5 | 11,3 | 11,8 | 12,4 | 12,5 |
| GLE380/2.5X | 2 | SSH12.0x60 [1] | 11 | CNA* | 12,5 | 12,5 | 12,5 | 12,5 | 12,4 | 12,5 | 12,5 | 12,5 |
| GLE440/2.5X | 4 | SSH12.0x60 [1] | 12 | CNA* | 19,6 | 20,7 | 22,2 | 22,5 | 19,6 | 20,6 | 22,1 | 22,5 |
| GLE500/2.5X | 4 | SSH12.0x60 [1] | 15 | CNA* | 22,6 | 23,2 | 23,6 | 23,6 | 22,7 | 23,3 | 23,6 | 23,6 |
| GLE540/2.5X | 4 | SSH12.0x60 [1] | 17 | CNA* | 23,9 | 24,0 | 24,0 | 24,0 | 23,9 | 24,0 | 24,0 | 24,0 |
| GLE600/2.5X | 4 | SSH12.0x60 [1] | 20 | CNA* | 24,3 | 24,3 | 24,3 | 24,3 | 24,3 | 24,3 | 24,3 | 24,3 |
| GLE660/2.5X | 6 | SSH12.0x60 [1] | 23 | CNA* | 35,5 | 36,0 | 36,0 | 36,0 | 35,6 | 36,0 | 36,0 | 36,0 |
| GLE720/2.5X | 6 | SSH12.0x60 [1] | 26 | CNA* | 36,3 | 36,3 | 36,3 | 36,3 | 36,3 | 36,3 | 36,3 | 36,3 |
| GLE780/2.5X | 6 | SSH12.0x60 [1] | 29 | CNA* | 36,6 | 36,6 | 36,6 | 36,6 | 36,6 | 36,6 | 36,6 | 36,6 |
| GLE840/2.5X | 6 | SSH12.0x60 [1] | 32 | CNA* | 36,7 | 36,7 | 36,7 | 36,7 | 36,7 | 36,7 | 36,7 | 36,7 |
| GLE900/2.5X | 6 | SSH12.0x60 [1] | 35 | CNA* | 36,9 | 36,9 | 36,9 | 36,9 | 36,9 | 36,9 | 36,9 | 36,9 |
| GLE960/2.5X | 8 | SSH12.0x60 [1] | 38 | CNA* | 49,0 | 49,0 | 49,0 | 49,0 | 49,0 | 49,0 | 49,0 | 49,0 |
| GLE1020/2.5X | 8 | SSH12.0x60 [1] | 41 | CNA* | 49,2 | 49,2 | 49,2 | 49,2 | 49,2 | 49,2 | 49,2 | 49,2 |

[1]SSH can be replaced by SSF

| Blank | Product capacities - Timber to Timber - Large connector screw | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
| | Header | | Joist | | R3.k | | | | R4.k | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| GLE300/2.5X | 2 | SSH12.0x60 [1] | 7 | CNA* | 2,2 | 2,5 | 3,2 | 3,9 | 5,0 | 5,0 | 5,0 | 5,0 |
| GLE340/2.5X | 2 | SSH12.0x60 [1] | 9 | CNA* | 1,8 | 2,1 | 2,7 | 3,3 | 5,0 | 5,0 | 5,0 | 5,0 |
| GLE380/2.5X | 2 | SSH12.0x60 [1] | 11 | CNA* | 1,5 | 1,8 | 2,2 | 2,8 | 5,0 | 5,0 | 5,0 | 5,0 |
| GLE440/2.5X | 4 | SSH12.0x60 [1] | 12 | CNA* | 3,8 | 4,0 | 4,6 | 5,2 | 10,0 | 10,0 | 10,0 | 10,0 |
| GLE500/2.5X | 4 | SSH12.0x60 [1] | 15 | CNA* | 3,5 | 3,7 | 4,1 | 4,6 | 10,0 | 10,0 | 10,0 | 10,0 |
| GLE540/2.5X | 4 | SSH12.0x60 [1] | 17 | CNA* | 3,7 | 3,9 | 4,2 | 4,6 | 10,0 | 10,0 | 10,0 | 10,0 |
| GLE600/2.5X | 4 | SSH12.0x60 [1] | 20 | CNA* | 3,6 | 3,7 | 4,0 | 4,3 | 10,0 | 10,0 | 10,0 | 10,0 |
| GLE660/2.5X | 6 | SSH12.0x60 [1] | 23 | CNA* | 4,8 | 5,0 | 5,3 | 5,7 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE720/2.5X | 6 | SSH12.0x60 [1] | 26 | CNA* | 4,7 | 4,8 | 5,1 | 5,4 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE780/2.5X | 6 | SSH12.0x60 [1] | 29 | CNA* | 5,2 | 5,4 | 5,7 | 6,0 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE840/2.5X | 6 | SSH12.0x60 [1] | 32 | CNA* | 5,1 | 5,2 | 5,4 | 5,7 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE900/2.5X | 6 | SSH12.0x60 [1] | 35 | CNA* | 5,4 | 5,8 | 6,0 | 6,2 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE960/2.5X | 8 | SSH12.0x60 [1] | 38 | CNA* | 5,4 | 6,4 | 6,6 | 6,8 | 20,0 | 20,0 | 20,0 | 20,0 |
| GLE1020/2.5X | 8 | SSH12.0x60 [1] | 41 | CNA* | 5,5 | 6,9 | 7,2 | 7,5 | 20,0 | 20,0 | 20,0 | 20,0 |

[1]SSH can be replaced by SSF

The user shall verify the transversal tension in timber which is not included in these capacities.
*Refer to *Characteristic capacities* table columns for type of fasteners that can be used on the joist. Capacities vary depending on fastener type used.

**Characteristic capacities for GLE/4X - with connector screw SSH/SSF**

| Blank | Product capacities - Timber to Timber - Large connector screw | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
| | Header | | Joist | | R1.k | | | | R2.k | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| GLE300/4X | 2 | SSH12.0x60 [1] | 7 | CNA* | 9,3 | 9,4 | 9,7 | 9,8 | 8,9 | 9,0 | 9,5 | 9,7 |
| GLE340/4X | 2 | SSH12.0x60 [1] | 9 | CNA* | 9,9 | 10,0 | 10,1 | 10,1 | 9,7 | 9,9 | 10,1 | 10,1 |
| GLE380/4X | 2 | SSH12.0x60 [1] | 11 | CNA* | 10,1 | 10,1 | 10,1 | 10,1 | 10,1 | 10,1 | 10,1 | 10,1 |
| GLE440/4X | 4 | SSH12.0x60 [1] | 12 | CNA* | 17,2 | 17,8 | 18,4 | 18,5 | 17,2 | 17,7 | 18,4 | 18,5 |
| GLE500/4X | 4 | SSH12.0x60 [1] | 15 | CNA* | 18,9 | 19,0 | 19,0 | 19,0 | 18,9 | 19,0 | 19,0 | 19,0 |
| GLE540/4X | 4 | SSH12.0x60 [1] | 17 | CNA* | 19,4 | 19,4 | 19,4 | 19,4 | 19,4 | 19,4 | 19,4 | 19,4 |
| GLE600/4X | 4 | SSH12.0x60 [1] | 20 | CNA* | 19,6 | 19,6 | 19,6 | 19,6 | 19,6 | 19,6 | 19,6 | 19,6 |
| GLE660/4X | 6 | SSH12.0x60 [1] | 23 | CNA* | 29,0 | 29,0 | 29,0 | 29,0 | 29,0 | 29,0 | 29,0 | 29,0 |
| GLE720/4X | 6 | SSH12.0x60 [1] | 26 | CNA* | 29,2 | 29,2 | 29,2 | 29,2 | 29,2 | 29,2 | 29,2 | 29,2 |
| GLE780/4X | 6 | SSH12.0x60 [1] | 29 | CNA* | 29,5 | 29,5 | 29,5 | 29,5 | 29,5 | 29,5 | 29,5 | 29,5 |
| GLE840/4X | 6 | SSH12.0x60 [1] | 32 | CNA* | 29,6 | 29,6 | 29,6 | 29,6 | 29,6 | 29,6 | 29,6 | 29,6 |
| GLE900/4X | 6 | SSH12.0x60 [1] | 35 | CNA* | 29,7 | 29,7 | 29,7 | 29,7 | 29,7 | 29,7 | 29,7 | 29,7 |
| GLE960/4X | 8 | SSH12.0x60 [1] | 38 | CNA* | 39,5 | 39,5 | 39,5 | 39,5 | 39,5 | 39,5 | 39,5 | 39,5 |
| GLE1020/4X | 8 | SSH12.0x60 [1] | 41 | CNA* | 39,7 | 39,7 | 39,7 | 39,7 | 39,7 | 39,7 | 39,7 | 39,7 |

[1] *SSH can be replaced by SSF*

| Blank | Product capacities - Timber to Timber - Large connector screw | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
| | Header | | Joist | | R3.k | | | | R4.k | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| GLE300/4X | 2 | SSH12.0x60 [1] | 7 | CNA* | 1,6 | 1,8 | 2,3 | 2,8 | 5,0 | 5,0 | 5,0 | 5,0 |
| GLE340/4X | 2 | SSH12.0x60 [1] | 9 | CNA* | 1,3 | 1,5 | 2,0 | 2,4 | 5,0 | 5,0 | 5,0 | 5,0 |
| GLE380/4X | 2 | SSH12.0x60 [1] | 11 | CNA* | 1,1 | 1,3 | 1,7 | 2,0 | 5,0 | 5,0 | 5,0 | 5,0 |
| GLE440/4X | 4 | SSH12.0x60 [1] | 12 | CNA* | 2,9 | 3,1 | 3,5 | 4,0 | 10,0 | 10,0 | 10,0 | 10,0 |
| GLE500/4X | 4 | SSH12.0x60 [1] | 15 | CNA* | 2,7 | 2,8 | 3,2 | 3,5 | 10,0 | 10,0 | 10,0 | 10,0 |
| GLE540/4X | 4 | SSH12.0x60 [1] | 17 | CNA* | 2,9 | 3,0 | 3,3 | 3,6 | 10,0 | 10,0 | 10,0 | 10,0 |
| GLE600/4X | 4 | SSH12.0x60 [1] | 20 | CNA* | 2,8 | 2,9 | 3,1 | 3,3 | 10,0 | 10,0 | 10,0 | 10,0 |
| GLE660/4X | 6 | SSH12.0x60 [1] | 23 | CNA* | 3,8 | 3,9 | 4,2 | 4,5 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE720/4X | 6 | SSH12.0x60 [1] | 26 | CNA* | 3,7 | 3,8 | 4,0 | 4,2 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE780/4X | 6 | SSH12.0x60 [1] | 29 | CNA* | 4,2 | 4,3 | 4,5 | 4,7 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE840/4X | 6 | SSH12.0x60 [1] | 32 | CNA* | 4,0 | 4,1 | 4,3 | 4,5 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE900/4X | 6 | SSH12.0x60 [1] | 35 | CNA* | 4,5 | 4,5 | 4,7 | 4,9 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE960/4X | 8 | SSH12.0x60 [1] | 38 | CNA* | 5,0 | 5,0 | 5,2 | 5,4 | 20,0 | 20,0 | 20,0 | 20,0 |
| GLE1020/4X | 8 | SSH12.0x60 [1] | 41 | CNA* | 5,1 | 5,6 | 5,7 | 5,9 | 20,0 | 20,0 | 20,0 | 20,0 |

[1] *SSH can be replaced by SSF*

The user shall verify the transversal tension in timber which is not included in these capacities.
*Refer to *Characteristic capacities* table columns for type of fasteners that can be used on the joist. Capacities vary depending on fastener type used.

**GLE fire resistance R30 to EN 13501-2**
See GLE Joist hanger

## D17 GLE-AL Joist hanger

| Product Name | Material reference acc. to clause II-1 | Alternative Names |
|---|---|---|
| GLE-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 | 161-200 | (500-A)/2 | 90 | 38.5 | 95 | 2.5 | 18 | Ø5 | 4 | Ø14 | 13 | Ø5 |
| 540/2.5X-AL | 161-240 | (540-A)/2 | 90 | 38.5 | 95 | 2.5 | 18 | Ø5 | 4 | Ø14 | 13 | Ø5 |
| 600/2.5X-AL | 161-240 | (600-A)/2 | 90 | 38.5 | 95 | 2.5 | 24 | Ø5 | 4 | Ø14 | 16 | Ø5 |
| 660/2.5X-AL | 161-240 | (660-A)/2 | 90 | 38.5 | 95 | 2.5 | 28 | Ø5 | 6 | Ø14 | 19 | Ø5 |
| 720/2.5X-AL | 161-240 | (720-A)/2 | 90 | 38.5 | 95 | 2.5 | 34 | Ø5 | 6 | Ø14 | 22 | Ø5 |
| 780/2.5X-AL | 161-240 | (780-A)/2 | 90 | 38.5 | 95 | 2.5 | 40 | Ø5 | 6 | Ø14 | 25 | Ø5 |
| 840/2.5X-AL | 161-240 | (840-A)/2 | 90 | 38.5 | 95 | 2.5 | 46 | Ø5 | 6 | Ø14 | 28 | Ø5 |
| 900/2.5X-AL | 161-240 | (900-A)/2 | 90 | 38.5 | 95 | 2.5 | 52 | Ø5 | 6 | Ø14 | 31 | Ø5 |
| 960/2.5X-AL | 161-240 | (960-A)/2 | 90 | 38.5 | 95 | 2.5 | 58 | Ø5 | 6 | Ø14 | 34 | Ø5 |
| 1020/2.5X-AL | 161-240 | (1020-A)/2 | 90 | 38.5 | 95 | 2.5 | 62 | Ø5 | 8 | Ø14 | 37 | Ø5 |
| 500/4X-AL | 161-200 | (500-A)/2 | 90 | 40 | 98 | 4 | 18 | Ø5 | 4 | Ø14 | 13 | Ø5 |
| 540/4X-AL | 161-240 | (540-A)/2 | 90 | 40 | 98 | 4 | 18 | Ø5 | 4 | Ø14 | 13 | Ø5 |
| 600/4X-AL | 161-240 | (600-A)/2 | 90 | 40 | 98 | 4 | 24 | Ø5 | 4 | Ø14 | 16 | Ø5 |
| 660/4X-AL | 161-240 | (660-A)/2 | 90 | 40 | 98 | 4 | 28 | Ø5 | 6 | Ø14 | 19 | Ø5 |
| 720/4X-AL | 161-240 | (720-A)/2 | 90 | 40 | 98 | 4 | 34 | Ø5 | 6 | Ø14 | 22 | Ø5 |
| 780/4X-AL | 161-240 | (780-A)/2 | 90 | 40 | 98 | 4 | 40 | Ø5 | 6 | Ø14 | 25 | Ø5 |
| 840/4X-AL | 161-240 | (840-A)/2 | 90 | 40 | 98 | 4 | 46 | Ø5 | 6 | Ø14 | 28 | Ø5 |
| 900/4X-AL | 161-240 | (900-A)/2 | 90 | 40 | 98 | 4 | 52 | Ø5 | 6 | Ø14 | 31 | Ø5 |
| 960/4X-AL | 161-240 | (960-A)/2 | 90 | 40 | 98 | 4 | 58 | Ø5 | 6 | Ø14 | 34 | Ø5 |
| 1020/4X-AL | 161-240 | (1020-A)/2 | 90 | 40 | 98 | 4 | 62 | Ø5 | 8 | Ø14 | 37 | 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-AL and GLI-AL - Full nailing - F1

| | Full nailing | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Blank Model | | | | | | | | | | | | | |
| | 300AL | | 340AL | | 380AL | | 440AL | | 500AL | | 540AL | | 600AL | |
| | 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$_J$ |
| | - | - | - | - | - | - | - | - | 18 | 13 | 18 | 13 | 24 | 16 |
| A | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 |
| 162 | - | - | - | - | - | - | - | - | 169 | 39,2 | 189 | 48,2 | 219 | 69,1 |
| 164 | - | - | - | - | - | - | - | - | 168 | 38,8 | 188 | 47,8 | 218 | 68,5 |
| 166 | - | - | - | - | - | - | - | - | 167 | 38,3 | 187 | 47,3 | 217 | 67,9 |
| 168 | - | - | - | - | - | - | - | - | 166 | 37,9 | 186 | 46,9 | 216 | 67,4 |
| 170 | - | - | - | - | - | - | - | - | 165 | 37,5 | 185 | 46,4 | 215 | 66,8 |
| 172 | - | - | - | - | - | - | - | - | 164 | 37,0 | 184 | 46,0 | 214 | 66,2 |
| 174 | - | - | - | - | - | - | - | - | 163 | 36,6 | 183 | 45,5 | 213 | 65,6 |
| 176 | - | - | - | - | - | - | - | - | 162 | 36,1 | 182 | 45,0 | 212 | 65,0 |
| 178 | - | - | - | - | - | - | - | - | 161 | 35,7 | 181 | 44,6 | 211 | 64,5 |
| 180 | - | - | - | - | - | - | - | - | 160 | 35,3 | 180 | 44,1 | 210 | 63,9 |
| 182 | - | - | - | - | - | - | - | - | 159 | 34,8 | 179 | 43,7 | 209 | 63,3 |
| 184 | - | - | - | - | - | - | - | - | 158 | 34,4 | 178 | 43,2 | 208 | 62,7 |
| 186 | - | - | - | - | - | - | - | - | 157 | 34,0 | 177 | 42,8 | 207 | 62,2 |
| 188 | - | - | - | - | - | - | - | - | 156 | 33,6 | 176 | 42,3 | 206 | 61,6 |
| 190 | - | - | - | - | - | - | - | - | 155 | 33,1 | 175 | 41,9 | 205 | 61,0 |
| 192 | - | - | - | - | - | - | - | - | 154 | 32,7 | 174 | 41,4 | 204 | 60,5 |
| 194 | - | - | - | - | - | - | - | - | 153 | 32,3 | 173 | 41,0 | 203 | 59,9 |
| 196 | - | - | - | - | - | - | - | - | 152 | 31,8 | 172 | 40,6 | 202 | 59,3 |
| 198 | - | - | - | - | - | - | - | - | 151 | 31,4 | 171 | 40,1 | 201 | 58,8 |
| 200 | - | - | - | - | - | - | - | - | 150 | 31,0 | 170 | 39,7 | 200 | 58,2 |
| 202 | - | - | - | - | - | - | - | - | - | - | 169 | 39,2 | 199 | 57,6 |
| 204 | - | - | - | - | - | - | - | - | - | - | 168 | 38,8 | 198 | 57,1 |
| 206 | - | - | - | - | - | - | - | - | - | - | 167 | 38,3 | 197 | 56,5 |
| 208 | - | - | - | - | - | - | - | - | - | - | 166 | 37,9 | 196 | 56,0 |
| 210 | - | - | - | - | - | - | - | - | - | - | 165 | 37,5 | 195 | 55,4 |
| 212 | - | - | - | - | - | - | - | - | - | - | 164 | 37,0 | 194 | 54,8 |
| 214 | - | - | - | - | - | - | - | - | - | - | 163 | 36,6 | 193 | 54,3 |
| 216 | - | - | - | - | - | - | - | - | - | - | 162 | 36,1 | 192 | 53,7 |
| 218 | - | - | - | - | - | - | - | - | - | - | 161 | 35,7 | 191 | 53,2 |
| 220 | - | - | - | - | - | - | - | - | - | - | 160 | 35,3 | 190 | 52,6 |
| 222 | - | - | - | - | - | - | - | - | - | - | 159 | 34,8 | 189 | 52,1 |
| 224 | - | - | - | - | - | - | - | - | - | - | 158 | 34,4 | 188 | 51,5 |
| 226 | - | - | - | - | - | - | - | - | - | - | 157 | 34,0 | 187 | 51,0 |
| 228 | - | - | - | - | - | - | - | - | - | - | 156 | 33,6 | 186 | 50,4 |
| 230 | - | - | - | - | - | - | - | - | - | - | 155 | 33,1 | 185 | 49,9 |
| 232 | - | - | - | - | - | - | - | - | - | - | 154 | 32,7 | 184 | 49,4 |
| 234 | - | - | - | - | - | - | - | - | - | - | 153 | 32,3 | 183 | 48,8 |
| 236 | - | - | - | - | - | - | - | - | - | - | 152 | 31,8 | 182 | 48,3 |
| 238 | - | - | - | - | - | - | - | - | - | - | 151 | 31,4 | 181 | 47,7 |
| 240 | - | - | - | - | - | - | - | - | - | - | 150 | 31,0 | 180 | 47,2 |

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

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

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Full nailing** | | | | | | | | | | | | | | |
| | **Blank Model** | | | | | | | | | | | | | |
| | **660AL** | | **720AL** | | **780AL** | | **840AL** | | **900AL** | | **960AL** | | **1020AL** | |
| | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ |
| | 28 | 19 | 34 | 22 | 40 | 25 | 46 | 28 | 52 | 31 | 58 | 34 | 62 | 37 |
| Width | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 |
| 162 | 249 | 87,8 | 279 | 112,7 | 309 | 139,8 | 339 | 171,8 | 369 | 204,8 | 399 | 244,1 | 429 | 274,4 |
| 164 | 248 | 87,2 | 278 | 112,0 | 308 | 138,9 | 338 | 170,8 | 368 | 203,7 | 398 | 242,9 | 428 | 273,2 |
| 166 | 247 | 86,5 | 277 | 111,2 | 307 | 138,0 | 337 | 169,8 | 367 | 202,6 | 397 | 241,7 | 427 | 271,9 |
| 168 | 246 | 85,9 | 276 | 110,4 | 306 | 137,1 | 336 | 168,8 | 366 | 201,5 | 396 | 240,5 | 426 | 270,6 |
| 170 | 245 | 85,3 | 275 | 109,7 | 305 | 136,2 | 335 | 167,8 | 365 | 200,4 | 395 | 239,3 | 425 | 269,3 |
| 172 | 244 | 84,6 | 274 | 108,9 | 304 | 135,4 | 334 | 166,8 | 364 | 199,3 | 394 | 238,1 | 424 | 268,1 |
| 174 | 243 | 84,0 | 273 | 108,1 | 303 | 134,5 | 333 | 165,8 | 363 | 198,2 | 393 | 236,9 | 423 | 266,8 |
| 176 | 242 | 83,4 | 272 | 107,4 | 302 | 133,6 | 332 | 164,8 | 362 | 197,1 | 392 | 235,7 | 422 | 265,5 |
| 178 | 241 | 82,7 | 271 | 106,6 | 301 | 132,7 | 331 | 163,9 | 361 | 196,0 | 391 | 234,5 | 421 | 264,3 |
| 180 | 240 | 82,1 | 270 | 105,9 | 300 | 131,9 | 330 | 162,9 | 360 | 194,9 | 390 | 233,3 | 420 | 263,0 |
| 182 | 239 | 81,5 | 269 | 105,1 | 299 | 131,0 | 329 | 161,9 | 359 | 193,8 | 389 | 232,1 | 419 | 261,8 |
| 184 | 238 | 80,8 | 268 | 104,3 | 298 | 130,1 | 328 | 160,9 | 358 | 192,8 | 388 | 230,9 | 418 | 260,5 |
| 186 | 237 | 80,2 | 267 | 103,6 | 297 | 129,3 | 327 | 159,9 | 357 | 191,7 | 387 | 229,7 | 417 | 259,2 |
| 188 | 236 | 79,6 | 266 | 102,8 | 296 | 128,4 | 326 | 159,0 | 356 | 190,6 | 386 | 228,5 | 416 | 258,0 |
| 190 | 235 | 79,0 | 265 | 102,1 | 295 | 127,5 | 325 | 158,0 | 355 | 189,5 | 385 | 227,3 | 415 | 256,7 |
| 192 | 234 | 78,3 | 264 | 101,3 | 294 | 126,7 | 324 | 157,0 | 354 | 188,4 | 384 | 226,1 | 414 | 255,5 |
| 194 | 233 | 77,7 | 263 | 100,6 | 293 | 125,8 | 323 | 156,1 | 353 | 187,4 | 383 | 224,9 | 413 | 254,2 |
| 196 | 232 | 77,1 | 262 | 99,8 | 292 | 124,9 | 322 | 155,1 | 352 | 186,3 | 382 | 223,7 | 412 | 253,0 |
| 198 | 231 | 76,5 | 261 | 99,1 | 291 | 124,1 | 321 | 154,1 | 351 | 185,2 | 381 | 222,6 | 411 | 251,7 |
| 200 | 230 | 75,9 | 260 | 98,3 | 290 | 123,2 | 320 | 153,2 | 350 | 184,1 | 380 | 221,4 | 410 | 250,5 |
| 202 | 229 | 75,2 | 259 | 97,6 | 289 | 122,4 | 319 | 152,2 | 349 | 183,1 | 379 | 220,2 | 409 | 249,3 |
| 204 | 228 | 74,6 | 258 | 96,8 | 288 | 121,5 | 318 | 151,2 | 348 | 182,0 | 378 | 219,0 | 408 | 248,0 |
| 206 | 227 | 74,0 | 257 | 96,1 | 287 | 120,7 | 317 | 150,3 | 347 | 180,9 | 377 | 217,9 | 407 | 246,8 |
| 208 | 226 | 73,4 | 256 | 95,4 | 286 | 119,8 | 316 | 149,3 | 346 | 179,9 | 376 | 216,7 | 406 | 245,6 |
| 210 | 225 | 72,8 | 255 | 94,6 | 285 | 119,0 | 315 | 148,4 | 345 | 178,8 | 375 | 215,5 | 405 | 244,3 |
| 212 | 224 | 72,2 | 254 | 93,9 | 284 | 118,1 | 314 | 147,4 | 344 | 177,8 | 374 | 214,3 | 404 | 243,1 |
| 214 | 223 | 71,6 | 253 | 93,1 | 283 | 117,3 | 313 | 146,5 | 343 | 176,7 | 373 | 213,2 | 403 | 241,9 |
| 216 | 222 | 71,0 | 252 | 92,4 | 282 | 116,5 | 312 | 145,5 | 342 | 175,7 | 372 | 212,0 | 402 | 240,6 |
| 218 | 221 | 70,4 | 251 | 91,7 | 281 | 115,6 | 311 | 144,6 | 341 | 174,6 | 371 | 210,9 | 401 | 239,4 |
| 220 | 220 | 69,8 | 250 | 91,0 | 280 | 114,8 | 310 | 143,6 | 340 | 173,6 | 370 | 209,7 | 400 | 238,2 |
| 222 | 219 | 69,2 | 249 | 90,2 | 279 | 113,9 | 309 | 142,7 | 339 | 172,5 | 369 | 208,5 | 399 | 237,0 |
| 224 | 218 | 68,6 | 248 | 89,5 | 278 | 113,1 | 308 | 141,7 | 338 | 171,5 | 368 | 207,4 | 398 | 235,8 |
| 226 | 217 | 68,0 | 247 | 88,8 | 277 | 112,3 | 307 | 140,8 | 337 | 170,4 | 367 | 206,2 | 397 | 234,6 |
| 228 | 216 | 67,4 | 246 | 88,1 | 276 | 111,5 | 306 | 139,9 | 336 | 169,4 | 366 | 205,1 | 396 | 233,3 |
| 230 | 215 | 66,8 | 245 | 87,3 | 275 | 110,6 | 305 | 138,9 | 335 | 168,3 | 365 | 203,9 | 395 | 232,1 |
| 232 | 214 | 66,2 | 244 | 86,6 | 274 | 109,8 | 304 | 138,0 | 334 | 167,3 | 364 | 202,8 | 394 | 230,9 |
| 234 | 213 | 65,6 | 243 | 85,9 | 273 | 109,0 | 303 | 137,1 | 333 | 166,3 | 363 | 201,7 | 393 | 229,7 |
| 236 | 212 | 65,0 | 242 | 85,2 | 272 | 108,2 | 302 | 136,1 | 332 | 165,2 | 362 | 200,5 | 392 | 228,5 |
| 238 | 211 | 64,4 | 241 | 84,5 | 271 | 107,3 | 301 | 135,2 | 331 | 164,2 | 361 | 199,4 | 391 | 227,3 |
| 240 | 210 | 63,8 | 240 | 83,8 | 270 | 106,5 | 300 | 134,3 | 330 | 163,2 | 360 | 198,2 | 390 | 226,1 |

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

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

| | Partial nailing | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Blank Model | | | | | | | | | | | | | |
| | 300AL | | 340AL | | 380AL | | 440AL | | 500AL | | 540AL | | 600AL | |
| | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ |
| | - | - | - | - | - | - | - | - | 8 | 7 | 8 | 7 | 10 | 8 |
| Width | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 |
| 162 | - | - | - | - | - | - | - | - | 169 | 19,8 | 189 | 24,2 | 219 | 33,4 |
| 164 | - | - | - | - | - | - | - | - | 168 | 19,6 | 188 | 24,0 | 218 | 33,1 |
| 166 | - | - | - | - | - | - | - | - | 167 | 19,4 | 187 | 23,7 | 217 | 32,9 |
| 168 | - | - | - | - | - | - | - | - | 166 | 19,2 | 186 | 23,5 | 216 | 32,6 |
| 170 | - | - | - | - | - | - | - | - | 165 | 19,0 | 185 | 23,3 | 215 | 32,3 |
| 172 | - | - | - | - | - | - | - | - | 164 | 18,7 | 184 | 23,1 | 214 | 32,1 |
| 174 | - | - | - | - | - | - | - | - | 163 | 18,5 | 183 | 22,9 | 213 | 31,8 |
| 176 | - | - | - | - | - | - | - | - | 162 | 18,3 | 182 | 22,6 | 212 | 31,5 |
| 178 | - | - | - | - | - | - | - | - | 161 | 18,1 | 181 | 22,4 | 211 | 31,3 |
| 180 | - | - | - | - | - | - | - | - | 160 | 17,9 | 180 | 22,2 | 210 | 31,0 |
| 182 | - | - | - | - | - | - | - | - | 159 | 17,7 | 179 | 22,0 | 209 | 30,7 |
| 184 | - | - | - | - | - | - | - | - | 158 | 17,5 | 178 | 21,8 | 208 | 30,5 |
| 186 | - | - | - | - | - | - | - | - | 157 | 17,3 | 177 | 21,5 | 207 | 30,2 |
| 188 | - | - | - | - | - | - | - | - | 156 | 17,1 | 176 | 21,3 | 206 | 29,9 |
| 190 | - | - | - | - | - | - | - | - | 155 | 16,9 | 175 | 21,1 | 205 | 29,7 |
| 192 | - | - | - | - | - | - | - | - | 154 | 16,6 | 174 | 20,9 | 204 | 29,4 |
| 194 | - | - | - | - | - | - | - | - | 153 | 16,4 | 173 | 20,7 | 203 | 29,2 |
| 196 | - | - | - | - | - | - | - | - | 152 | 16,2 | 172 | 20,5 | 202 | 28,9 |
| 198 | - | - | - | - | - | - | - | - | 151 | 16,0 | 171 | 20,2 | 201 | 28,6 |
| 200 | - | - | - | - | - | - | - | - | 150 | 15,8 | 170 | 20,0 | 200 | 28,4 |
| 202 | - | - | - | - | - | - | - | - | - | - | 169 | 19,8 | 199 | 28,1 |
| 204 | - | - | - | - | - | - | - | - | - | - | 168 | 19,6 | 198 | 27,8 |
| 206 | - | - | - | - | - | - | - | - | - | - | 167 | 19,4 | 197 | 27,6 |
| 208 | - | - | - | - | - | - | - | - | - | - | 166 | 19,2 | 196 | 27,3 |
| 210 | - | - | - | - | - | - | - | - | - | - | 165 | 19,0 | 195 | 27,1 |
| 212 | - | - | - | - | - | - | - | - | - | - | 164 | 18,7 | 194 | 26,8 |
| 214 | - | - | - | - | - | - | - | - | - | - | 163 | 18,5 | 193 | 26,5 |
| 216 | - | - | - | - | - | - | - | - | - | - | 162 | 18,3 | 192 | 26,3 |
| 218 | - | - | - | - | - | - | - | - | - | - | 161 | 18,1 | 191 | 26,0 |
| 220 | - | - | - | - | - | - | - | - | - | - | 160 | 17,9 | 190 | 25,8 |
| 222 | - | - | - | - | - | - | - | - | - | - | 159 | 17,7 | 189 | 25,5 |
| 224 | - | - | - | - | - | - | - | - | - | - | 158 | 17,5 | 188 | 25,3 |
| 226 | - | - | - | - | - | - | - | - | - | - | 157 | 17,3 | 187 | 25,0 |
| 228 | - | - | - | - | - | - | - | - | - | - | 156 | 17,1 | 186 | 24,7 |
| 230 | - | - | - | - | - | - | - | - | - | - | 155 | 16,9 | 185 | 24,5 |
| 232 | - | - | - | - | - | - | - | - | - | - | 154 | 16,6 | 184 | 24,2 |
| 234 | - | - | - | - | - | - | - | - | - | - | 153 | 16,4 | 183 | 24,0 |
| 236 | - | - | - | - | - | - | - | - | - | - | 152 | 16,2 | 182 | 23,7 |
| 238 | - | - | - | - | - | - | - | - | - | - | 151 | 16,0 | 181 | 23,5 |
| 240 | - | - | - | - | - | - | - | - | - | - | 150 | 15,8 | 180 | 23,2 |

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

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

| | Partial nailing | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Blank Model | | | | | | | | | | | | | |
| | 660AL | | 720AL | | 780AL | | 840AL | | 900AL | | 960AL | | 1020AL | |
| | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ |
| | 12 | 10 | 14 | 12 | 18 | 13 | 20 | 14 | 24 | 16 | 26 | 18 | 28 | 19 |
| Width | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 | B | kh,1 |
| 162 | 249 | 39,9 | 279 | 51,8 | 309 | 81,6 | 339 | 81,3 | 369 | 99,1 | 399 | 117,2 | 429 | 129,2 |
| 164 | 248 | 39,6 | 278 | 51,5 | 308 | 81,2 | 338 | 80,9 | 368 | 98,6 | 398 | 116,6 | 428 | 128,6 |
| 166 | 247 | 39,3 | 277 | 51,1 | 307 | 80,7 | 337 | 80,4 | 367 | 98,1 | 397 | 116,1 | 427 | 128,0 |
| 168 | 246 | 39,0 | 276 | 50,8 | 306 | 80,3 | 336 | 79,9 | 366 | 97,5 | 396 | 115,5 | 426 | 127,4 |
| 170 | 245 | 38,7 | 275 | 50,4 | 305 | 79,8 | 335 | 79,5 | 365 | 97,0 | 395 | 114,9 | 425 | 126,8 |
| 172 | 244 | 38,4 | 274 | 50,1 | 304 | 79,4 | 334 | 79,0 | 364 | 96,5 | 394 | 114,3 | 424 | 126,3 |
| 174 | 243 | 38,1 | 273 | 49,8 | 303 | 79,0 | 333 | 78,6 | 363 | 95,9 | 393 | 113,8 | 423 | 125,7 |
| 176 | 242 | 37,8 | 272 | 49,4 | 302 | 78,5 | 332 | 78,1 | 362 | 95,4 | 392 | 113,2 | 422 | 125,1 |
| 178 | 241 | 37,5 | 271 | 49,1 | 301 | 78,1 | 331 | 77,6 | 361 | 94,9 | 391 | 112,6 | 421 | 124,5 |
| 180 | 240 | 37,2 | 270 | 48,7 | 300 | 77,6 | 330 | 77,2 | 360 | 94,4 | 390 | 112,1 | 420 | 123,9 |
| 182 | 239 | 36,9 | 269 | 48,4 | 299 | 77,2 | 329 | 76,7 | 359 | 93,8 | 389 | 111,5 | 419 | 123,3 |
| 184 | 238 | 36,7 | 268 | 48,1 | 298 | 76,8 | 328 | 76,3 | 358 | 93,3 | 388 | 110,9 | 418 | 122,7 |
| 186 | 237 | 36,4 | 267 | 47,7 | 297 | 76,3 | 327 | 75,8 | 357 | 92,8 | 387 | 110,4 | 417 | 122,1 |
| 188 | 236 | 36,1 | 266 | 47,4 | 296 | 75,9 | 326 | 75,4 | 356 | 92,3 | 386 | 109,8 | 416 | 121,5 |
| 190 | 235 | 35,8 | 265 | 47,1 | 295 | 75,5 | 325 | 74,9 | 355 | 91,8 | 385 | 109,2 | 415 | 120,9 |
| 192 | 234 | 35,5 | 264 | 46,7 | 294 | 75,0 | 324 | 74,5 | 354 | 91,2 | 384 | 108,7 | 414 | 120,4 |
| 194 | 233 | 35,2 | 263 | 46,4 | 293 | 74,6 | 323 | 74,0 | 353 | 90,7 | 383 | 108,1 | 413 | 119,8 |
| 196 | 232 | 34,9 | 262 | 46,1 | 292 | 74,2 | 322 | 73,6 | 352 | 90,2 | 382 | 107,5 | 412 | 119,2 |
| 198 | 231 | 34,6 | 261 | 45,7 | 291 | 73,7 | 321 | 73,1 | 351 | 89,7 | 381 | 107,0 | 411 | 118,6 |
| 200 | 230 | 34,3 | 260 | 45,4 | 290 | 73,3 | 320 | 72,7 | 350 | 89,2 | 380 | 106,4 | 410 | 118,0 |
| 202 | 229 | 34,0 | 259 | 45,1 | 289 | 72,8 | 319 | 72,2 | 349 | 88,7 | 379 | 105,9 | 409 | 117,4 |
| 204 | 228 | 33,8 | 258 | 44,7 | 288 | 72,4 | 318 | 71,8 | 348 | 88,1 | 378 | 105,3 | 408 | 116,9 |
| 206 | 227 | 33,5 | 257 | 44,4 | 287 | 72,0 | 317 | 71,3 | 347 | 87,6 | 377 | 104,7 | 407 | 116,3 |
| 208 | 226 | 33,2 | 256 | 44,1 | 286 | 71,6 | 316 | 70,9 | 346 | 87,1 | 376 | 104,2 | 406 | 115,7 |
| 210 | 225 | 32,9 | 255 | 43,7 | 285 | 71,1 | 315 | 70,4 | 345 | 86,6 | 375 | 103,6 | 405 | 115,1 |
| 212 | 224 | 32,6 | 254 | 43,4 | 284 | 70,7 | 314 | 70,0 | 344 | 86,1 | 374 | 103,1 | 404 | 114,6 |
| 214 | 223 | 32,3 | 253 | 43,1 | 283 | 70,3 | 313 | 69,5 | 343 | 85,6 | 373 | 102,5 | 403 | 114,0 |
| 216 | 222 | 32,1 | 252 | 42,8 | 282 | 69,8 | 312 | 69,1 | 342 | 85,1 | 372 | 102,0 | 402 | 113,4 |
| 218 | 221 | 31,8 | 251 | 42,4 | 281 | 69,4 | 311 | 68,6 | 341 | 84,6 | 371 | 101,4 | 401 | 112,8 |
| 220 | 220 | 31,5 | 250 | 42,1 | 280 | 69,0 | 310 | 68,2 | 340 | 84,1 | 370 | 100,9 | 400 | 112,3 |
| 222 | 219 | 31,2 | 249 | 41,8 | 279 | 68,6 | 309 | 67,8 | 339 | 83,6 | 369 | 100,3 | 399 | 111,7 |
| 224 | 218 | 30,9 | 248 | 41,4 | 278 | 68,1 | 308 | 67,3 | 338 | 83,1 | 368 | 99,8 | 398 | 111,1 |
| 226 | 217 | 30,7 | 247 | 41,1 | 277 | 67,7 | 307 | 66,9 | 337 | 82,6 | 367 | 99,2 | 397 | 110,6 |
| 228 | 216 | 30,4 | 246 | 40,8 | 276 | 67,3 | 306 | 66,4 | 336 | 82,0 | 366 | 98,7 | 396 | 110,0 |
| 230 | 215 | 30,1 | 245 | 40,5 | 275 | 66,9 | 305 | 66,0 | 335 | 81,5 | 365 | 98,1 | 395 | 109,4 |
| 232 | 214 | 29,8 | 244 | 40,2 | 274 | 66,4 | 304 | 65,6 | 334 | 81,0 | 364 | 97,6 | 394 | 108,9 |
| 234 | 213 | 29,5 | 243 | 39,8 | 273 | 66,0 | 303 | 65,1 | 333 | 80,6 | 363 | 97,0 | 393 | 108,3 |
| 236 | 212 | 29,3 | 242 | 39,5 | 272 | 65,6 | 302 | 64,7 | 332 | 80,1 | 362 | 96,5 | 392 | 107,7 |
| 238 | 211 | 29,0 | 241 | 39,2 | 271 | 65,2 | 301 | 64,3 | 331 | 79,6 | 361 | 95,9 | 391 | 107,2 |
| 240 | 210 | 28,7 | 240 | 38,9 | 270 | 64,7 | 300 | 63,8 | 330 | 79,1 | 360 | 95,4 | 390 | 106,6 |

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

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

| Blank | Total number of nails in the header | | $k_{H2}$ | |
|---|---|---|---|---|
| | Full nailing | Partial nailing | Full nailing | Partial nailing |
| 500AL | 18 | 8 | 19,1 | 8,8 |
| 540AL | 18 | 8 | 19,1 | 8,8 |
| 600AL | 24 | 10 | 30,4 | 12,5 |
| 660AL | 28 | 12 | 42,2 | 18,8 |
| 720AL | 34 | 14 | 57,5 | 23,4 |
| 780AL | 40 | 18 | 76,9 | 35,4 |
| 840AL | 46 | 20 | 98,4 | 42,8 |
| 900AL | 52 | 24 | 122,8 | 58,2 |
| 960AL | 58 | 26 | 150,1 | 66,2 |
| 1020AL | 62 | 28 | 173,5 | 80,4 |

**Characteristic capacities for GLE/2.5X-AL - with connector screw SSH/SSF**

| Blank | Product capacities - Timber to Timber - Large connector screw | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | | |
| | Header | | Joist | | R[1.k] | | | | R[2.k] | | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| GLE500-AL/2.5X | 4 | SSH12.0x60[1] | 13 | CNA* | 20,6 | 21,5 | 22,7 | 22,9 | 20,8 | 21,6 | 22,7 | 22,9 |
| GLE540-AL/2.5X | 4 | SSH12.0x60[1] | 13 | CNA* | 20,6 | 21,5 | 22,7 | 22,9 | 20,8 | 21,6 | 22,7 | 22,9 |
| GLE600-AL/2.5X | 4 | SSH12.0x60[1] | 16 | CNA* | 23,2 | 23,6 | 23,6 | 23,6 | 23,3 | 23,6 | 23,6 | 23,6 |
| GLE660-AL/2.5X | 6 | SSH12.0x60[1] | 19 | CNA* | 31,4 | 33,3 | 35,1 | 35,1 | 31,5 | 33,6 | 35,1 | 35,1 |
| GLE720-AL/2.5X | 6 | SSH12.0x60[1] | 22 | CNA* | 34,7 | 35,6 | 35,7 | 35,7 | 34,9 | 35,6 | 35,7 | 35,7 |
| GLE780-AL/2.5X | 6 | SSH12.0x60[1] | 25 | CNA* | 36,3 | 36,3 | 36,3 | 36,3 | 36,3 | 36,3 | 36,3 | 36,3 |
| GLE840-AL/2.5X | 6 | SSH12.0x60[1] | 28 | CNA* | 36,4 | 36,4 | 36,4 | 36,4 | 36,4 | 36,4 | 36,4 | 36,4 |
| GLE900-AL/2.5X | 6 | SSH12.0x60[1] | 31 | CNA* | 36,7 | 36,7 | 36,7 | 36,7 | 36,7 | 36,7 | 36,7 | 36,7 |
| GLE960-AL/2.5X | 6 | SSH12.0x60[1] | 34 | CNA* | 36,8 | 36,8 | 36,8 | 36,8 | 36,8 | 36,8 | 36,8 | 36,8 |
| GLE1020-AL/2.5X | 8 | SSH12.0x60[1] | 37 | CNA* | 49,0 | 49,0 | 49,0 | 49,0 | 49,0 | 49,0 | 49,0 | 49,0 |

[1]*SSH can be replaced by SSF*

| Blank | Product capacities - Timber to Timber - Large connector screw | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | | |
| | Header | | Joist | | R[3.k] | | | | R[4.k] | | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| GLE500-AL/2.5X | 4 | SSH12.0x60[1] | 13 | CNA* | 7,4 | 8,9 | 10,6 | 10,6 | 10,0 | 10,0 | 10,0 | 10,0 |
| GLE540-AL/2.5X | 4 | SSH12.0x60[1] | 13 | CNA* | 7,4 | 8,9 | 9,7 | 9,7 | 10,0 | 10,0 | 10,0 | 10,0 |
| GLE600-AL/2.5X | 4 | SSH12.0x60[1] | 16 | CNA* | 8,2 | 8,2 | 8,2 | 8,2 | 10,0 | 10,0 | 10,0 | 10,0 |
| GLE660-AL/2.5X | 6 | SSH12.0x60[1] | 19 | CNA* | 10,4 | 10,8 | 10,8 | 10,8 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE720-AL/2.5X | 6 | SSH12.0x60[1] | 22 | CNA* | 9,5 | 9,5 | 9,5 | 9,5 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE780-AL/2.5X | 6 | SSH12.0x60[1] | 25 | CNA* | 9,3 | 9,3 | 9,3 | 9,3 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE840-AL/2.5X | 6 | SSH12.0x60[1] | 28 | CNA* | 8,4 | 8,4 | 8,4 | 8,4 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE900-AL/2.5X | 6 | SSH12.0x60[1] | 31 | CNA* | 8,5 | 8,5 | 8,5 | 8,5 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE960-AL/2.5X | 6 | SSH12.0x60[1] | 34 | CNA* | 8,0 | 8,0 | 8,0 | 8,0 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE1020-AL/2.5X | 8 | SSH12.0x60[1] | 37 | CNA* | 9,8 | 9,8 | 9,8 | 9,8 | 20,0 | 20,0 | 20,0 | 20,0 |

[1]*SSH can be replaced by SSF*

The user shall verify the transversal tension in timber which is not included in these capacities.
*Refer to *Characteristic capacities* table columns for type of fasteners that can be used on the joist. Capacities vary depending on fastener type used.

**Characteristic capacities for GLE/4X-AL - with connector screw SSH/SSF**

| Blank | Product capacities - Timber to Timber - Large connector screw | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
| | Header | | Joist | | $R_{1.k}$ | | | | $R_{2.k}$ | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| GLE500-AL/4X | 4 | SSH12.0x60[1] | 13 | CNA* | 17,7 | 18,2 | 18,5 | 18,5 | 17,8 | 18,2 | 18,5 | 18,5 |
| GLE540-AL/4X | 4 | SSH12.0x60[1] | 13 | CNA* | 17,7 | 18,2 | 18,5 | 18,5 | 17,8 | 18,2 | 18,5 | 18,5 |
| GLE600-AL/4X | 4 | SSH12.0x60[1] | 16 | CNA* | 19,0 | 19,0 | 19,0 | 19,0 | 19,0 | 19,0 | 19,0 | 19,0 |
| GLE660-AL/4X | 6 | SSH12.0x60[1] | 19 | CNA* | 27,5 | 28,1 | 28,3 | 28,3 | 27,6 | 28,2 | 28,3 | 28,3 |
| GLE720-AL/4X | 6 | SSH12.0x60[1] | 22 | CNA* | 28,8 | 28,8 | 28,8 | 28,8 | 28,8 | 28,8 | 28,8 | 28,8 |
| GLE780-AL/4X | 6 | SSH12.0x60[1] | 25 | CNA* | 29,2 | 29,2 | 29,2 | 29,2 | 29,2 | 29,2 | 29,2 | 29,2 |
| GLE840-AL/4X | 6 | SSH12.0x60[1] | 28 | CNA* | 29,4 | 29,4 | 29,4 | 29,4 | 29,4 | 29,4 | 29,4 | 29,4 |
| GLE900-AL/4X | 6 | SSH12.0x60[1] | 31 | CNA* | 29,6 | 29,6 | 29,6 | 29,6 | 29,6 | 29,6 | 29,6 | 29,6 |
| GLE960-AL/4X | 6 | SSH12.0x60[1] | 34 | CNA* | 29,7 | 29,7 | 29,7 | 29,7 | 29,7 | 29,7 | 29,7 | 29,7 |
| GLE1020-AL/4X | 8 | SSH12.0x60[1] | 37 | CNA* | 39,5 | 39,5 | 39,5 | 39,5 | 39,5 | 39,5 | 39,5 | 39,5 |

[1]*SSH can be replaced by SSF*

| Blank | Product capacities - Timber to Timber - Large connector screw | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
| | Header | | Joist | | $R_{3.k}$ | | | | $R_{4.k}$ | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| GLE500-AL/4X | 4 | SSH12.0x60[1] | 13 | CNA* | 7,3 | 8,2 | 8,2 | 8,2 | 10,0 | 10,0 | 10,0 | 10,0 |
| GLE540-AL/4X | 4 | SSH12.0x60[1] | 13 | CNA* | 7,3 | 7,5 | 7,5 | 7,5 | 10,0 | 10,0 | 10,0 | 10,0 |
| GLE600-AL/4X | 4 | SSH12.0x60[1] | 16 | CNA* | 6,3 | 6,3 | 6,3 | 6,3 | 10,0 | 10,0 | 10,0 | 10,0 |
| GLE660-AL/4X | 6 | SSH12.0x60[1] | 19 | CNA* | 8,4 | 8,4 | 8,4 | 8,4 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE720-AL/4X | 6 | SSH12.0x60[1] | 22 | CNA* | 7,4 | 7,4 | 7,4 | 7,4 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE780-AL/4X | 6 | SSH12.0x60[1] | 25 | CNA* | 7,3 | 7,3 | 7,3 | 7,3 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE840-AL/4X | 6 | SSH12.0x60[1] | 28 | CNA* | 6,6 | 6,6 | 6,6 | 6,6 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE900-AL/4X | 6 | SSH12.0x60[1] | 31 | CNA* | 6,7 | 6,7 | 6,7 | 6,7 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE960-AL/4X | 6 | SSH12.0x60[1] | 34 | CNA* | 6,3 | 6,3 | 6,3 | 6,3 | 15,0 | 15,0 | 15,0 | 15,0 |
| GLE1020-AL/4X | 8 | SSH12.0x60[1] | 37 | CNA* | 7,8 | 7,8 | 7,8 | 7,8 | 20,0 | 20,0 | 20,0 | 20,0 |

[1]*SSH can be replaced by SSF*

The user shall verify the transversal tension in timber which is not included in these capacities.
*Refer to *Characteristic capacities* table columns for type of fasteners that can be used on the joist. Capacities vary depending on fastener type used.

**GLE-AL fire resistance R30 to EN 13501-2**

See GLE Joist hanger

## D18   GLI Joist hanger
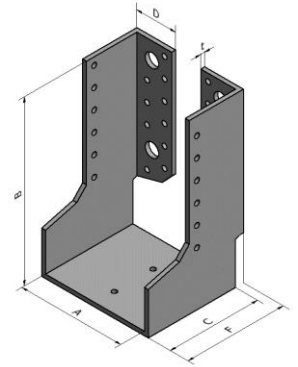
| Product Name | Material reference acc. to clause II-1 | Alternative Names |
|---|---|---|
| GLI | Steel ref 1 - Steel ref 2 | - |

**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 |
| 780/2.5X | 76-160 | (780-A)/2 | 90 | 38.5 | 95 | 2.5 | 48 | Ø5 | 6 | Ø14 | 29 | Ø5 |
| 840/2.5X | 76-160 | (840-A)/2 | 90 | 38.5 | 95 | 2.5 | 54 | Ø5 | 6 | Ø14 | 32 | Ø5 |
| 900/2.5X | 76-160 | (900-A)/2 | 90 | 38.5 | 95 | 2.5 | 60 | Ø5 | 6 | Ø14 | 35 | Ø5 |
| 960/2.5X | 76-160 | (960-A)/2 | 90 | 38.5 | 95 | 2.5 | 64 | Ø5 | 8 | Ø14 | 38 | Ø5 |
| 1020/2.5X | 76-160 | (1020-A)/2 | 90 | 38.5 | 95 | 2.5 | 70 | Ø5 | 8 | Ø14 | 41 | 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 |
| 780/4X | 76-160 | (780-A)/2 | 90 | 40 | 98 | 4 | 48 | Ø5 | 6 | Ø14 | 29 | Ø5 |
| 840/4X | 76-160 | (840-A)/2 | 90 | 40 | 98 | 4 | 54 | Ø5 | 6 | Ø14 | 32 | Ø5 |
| 900/4X | 76-160 | (900-A)/2 | 90 | 40 | 98 | 4 | 60 | Ø5 | 6 | Ø14 | 35 | Ø5 |
| 960/4X | 76-160 | (960-A)/2 | 90 | 40 | 98 | 4 | 64 | Ø5 | 8 | Ø14 | 38 | Ø5 |
| 1020/4X | 76-160 | (1020-A)/2 | 90 | 40 | 98 | 4 | 70 | Ø5 | 8 | Ø14 | 41 | Ø5 |
| Permitted deviation | - | - | ±1.0 | ±1.0 | ±1.0 | - | - | - | - | - | - | - |

Parameters have to be used with equation in .

**$k_{H,1}$ 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 GLE Joist hanger

## D19   GLI-AL Joist hanger
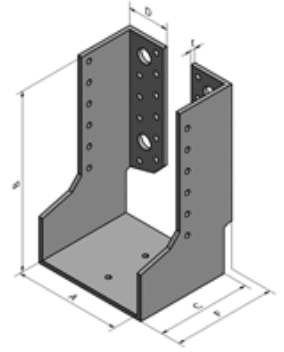
| Product Name | Material reference acc. to clause II-1 | Alternative Names |
|---|---|---|
| GLI-AL | Steel ref 1 - Steel ref 2 | - |

**Dimensions**

| Blank | Dimensions [mm] | | | | | | Holes | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Header | | | | Joist | |
| | A | B | C | D | F | t | Qty | Size | Qty | Size | Qty | Size |
| 500/2.5X-AL | 161-200 | (500-A)/2 | 90 | 38.5 | 95 | 2.5 | 18 | Ø5 | 4 | Ø14 | 13 | Ø5 |
| 540/2.5X-AL | 161-240 | (540-A)/2 | 90 | 38.5 | 95 | 2.5 | 18 | Ø5 | 4 | Ø14 | 13 | Ø5 |
| 600/2.5X-AL | 161-240 | (600-A)/2 | 90 | 38.5 | 95 | 2.5 | 24 | Ø5 | 4 | Ø14 | 16 | Ø5 |
| 660/2.5X-AL | 161-240 | (660-A)/2 | 90 | 38.5 | 95 | 2.5 | 28 | Ø5 | 6 | Ø14 | 19 | Ø5 |
| 720/2.5X-AL | 161-240 | (720-A)/2 | 90 | 38.5 | 95 | 2.5 | 34 | Ø5 | 6 | Ø14 | 22 | Ø5 |
| 780/2.5X-AL | 161-240 | (780-A)/2 | 90 | 38.5 | 95 | 2.5 | 40 | Ø5 | 6 | Ø14 | 25 | Ø5 |
| 840/2.5X-AL | 161-240 | (840-A)/2 | 90 | 38.5 | 95 | 2.5 | 46 | Ø5 | 6 | Ø14 | 28 | Ø5 |
| 900/2.5X-AL | 161-240 | (900-A)/2 | 90 | 38.5 | 95 | 2.5 | 52 | Ø5 | 6 | Ø14 | 31 | Ø5 |
| 960/2.5X-AL | 161-240 | (960-A)/2 | 90 | 38.5 | 95 | 2.5 | 58 | Ø5 | 8 | Ø14 | 34 | Ø5 |
| 1020/2.5X-AL | 161-240 | (1020-A)/2 | 90 | 38.5 | 95 | 2.5 | 62 | Ø5 | 8 | Ø14 | 37 | Ø5 |
| 500/4X-AL | 161-200 | (500-A)/2 | 90 | 40 | 98 | 4 | 18 | Ø5 | 4 | Ø14 | 13 | Ø5 |
| 540/4X-AL | 161-240 | (540-A)/2 | 90 | 40 | 98 | 4 | 18 | Ø5 | 4 | Ø14 | 13 | Ø5 |
| 600/4X-AL | 161-240 | (600-A)/2 | 90 | 40 | 98 | 4 | 24 | Ø5 | 4 | Ø14 | 16 | Ø5 |
| 660/4X-AL | 161-240 | (660-A)/2 | 90 | 40 | 98 | 4 | 28 | Ø5 | 6 | Ø14 | 19 | Ø5 |
| 720/4X-AL | 161-240 | (720-A)/2 | 90 | 40 | 98 | 4 | 34 | Ø5 | 6 | Ø14 | 22 | Ø5 |
| 780/4X-AL | 161-240 | (780-A)/2 | 90 | 40 | 98 | 4 | 40 | Ø5 | 6 | Ø14 | 25 | Ø5 |
| 840/4X-AL | 161-240 | (840-A)/2 | 90 | 40 | 98 | 4 | 46 | Ø5 | 6 | Ø14 | 28 | Ø5 |
| 900/4X-AL | 161-240 | (900-A)/2 | 90 | 40 | 98 | 4 | 52 | Ø5 | 6 | Ø14 | 31 | Ø5 |
| 960/4X-AL | 161-240 | (960-A)/2 | 90 | 40 | 98 | 4 | 58 | Ø5 | 8 | Ø14 | 34 | Ø5 |
| 1020/4X-AL | 161-240 | (1020-A)/2 | 90 | 40 | 98 | 4 | 62 | Ø5 | 8 | Ø14 | 37 | 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-AL - Full nailing - F1**

See GLE Joist hanger


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

See GLE Joist hanger


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

See GLE Joist hanger


**GLI-AL fire resistance R30 to EN 13501-2**

See GLE Joist hanger

## D20   GSE Joist hanger

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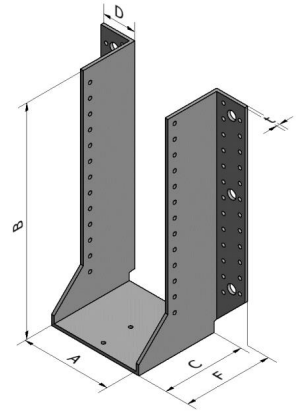
**Dimensions**

| 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 | 36 | 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 | 36 | 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 | - | - | - | - | - | - | - |

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 |

**Characteristic capacities for GSE/2.5 - with connector screw SSH/SSF**

| References | Product capacities - Timber to Timber - Large connector screw | | | | | | | | | | | |
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
| | Header | | Joist | | $R_{1.k}$ | | | | $R_{2.k}$ | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| GSE300 | 2 | SSH12.0x60[1] | 6 | CNA* | 8,7 | 9,1 | 9,7 | 9,9 | 7,9 | 8,2 | 8,8 | 9,1 |
| GSE340 | 2 | SSH12.0x60[1] | 8 | CNA* | 10,6 | 10,9 | 11,5 | 11,7 | 9,2 | 9,6 | 10,4 | 10,8 |
| GSE380 | 2 | SSH12.0x60[1] | 8 | CNA* | 11,0 | 11,3 | 11,7 | 11,9 | 8,5 | 9,0 | 9,9 | 10,3 |
| GSE440 | 4 | SSH12.0x60[1] | 12 | CNA* | 18,0 | 18,9 | 20,2 | 20,6 | 17,6 | 18,4 | 19,9 | 20,4 |
| GSE500 | 4 | SSH12.0x60[1] | 14 | CNA* | 20,2 | 21,0 | 22,2 | 22,5 | 20,1 | 20,9 | 22,1 | 22,5 |
| GSE540 | 4 | SSH12.0x60[1] | 16 | CNA* | 21,9 | 22,6 | 23,4 | 23,4 | 21,9 | 22,6 | 23,4 | 23,4 |
| GSE600 | 4 | SSH12.0x60[1] | 20 | CNA* | 24,0 | 24,1 | 24,1 | 24,1 | 24,0 | 24,1 | 24,1 | 24,1 |
| GSE660 | 6 | SSH12.0x60[1] | 22 | CNA* | 32,6 | 33,9 | 35,0 | 35,0 | 32,7 | 34,0 | 35,0 | 35,0 |
| GSE720 | 6 | SSH12.0x60[1] | 26 | CNA* | 35,5 | 35,8 | 35,8 | 35,8 | 35,5 | 35,8 | 35,8 | 35,8 |
| GSE780 | 6 | SSH12.0x60[1] | 28 | CNA* | 36,2 | 36,2 | 36,2 | 36,2 | 36,2 | 36,2 | 36,2 | 36,2 |
| GSE840 | 6 | SSH12.0x60[1] | 32 | CNA* | 36,4 | 36,4 | 36,4 | 36,4 | 36,4 | 36,4 | 36,4 | 36,4 |
| GSE900 | 6 | SSH12.0x60[1] | 34 | CNA* | 36,5 | 36,5 | 36,5 | 36,5 | 36,5 | 36,5 | 36,5 | 36,5 |
| GSE960 | 6 | SSH12.0x60[1] | 38 | CNA* | 36,7 | 36,7 | 36,7 | 36,7 | 36,7 | 36,7 | 36,7 | 36,7 |
| GSE1020 | 6 | SSH12.0x60[1] | 40 | CNA* | 36,8 | 36,8 | 36,8 | 36,8 | 36,8 | 36,8 | 36,8 | 36,8 |

[1]*SSH can be replaced by SSF*

| References | Product capacities - Timber to Timber - Large connector screw | | | | | | | | | | | |
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
| | Header | | Joist | | $R_{3.k}$ | | | | $R_{4.k}$ | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| GSE300 | 2 | SSH12.0x60[1] | 6 | CNA* | 1,9 | 2,4 | 3,5 | 4,3 | 5,0 | 5,0 | 5,0 | 5,0 |
| GSE340 | 2 | SSH12.0x60[1] | 8 | CNA* | 2,2 | 2,5 | 3,0 | 3,6 | 5,0 | 5,0 | 5,0 | 5,0 |
| GSE380 | 2 | SSH12.0x60[1] | 8 | CNA* | 2,1 | 2,3 | 2,9 | 3,5 | 5,0 | 5,0 | 5,0 | 5,0 |
| GSE440 | 4 | SSH12.0x60[1] | 12 | CNA* | 3,2 | 4,0 | 5,0 | 5,6 | 10,0 | 10,0 | 10,0 | 10,0 |
| GSE500 | 4 | SSH12.0x60[1] | 14 | CNA* | 3,5 | 3,9 | 4,4 | 4,8 | 10,0 | 10,0 | 10,0 | 10,0 |
| GSE540 | 4 | SSH12.0x60[1] | 16 | CNA* | 3,8 | 4,1 | 4,4 | 4,8 | 10,0 | 10,0 | 10,0 | 10,0 |
| GSE600 | 4 | SSH12.0x60[1] | 20 | CNA* | 4,1 | 4,8 | 5,1 | 5,4 | 10,0 | 10,0 | 10,0 | 10,0 |
| GSE660 | 6 | SSH12.0x60[1] | 22 | CNA* | 4,3 | 5,2 | 5,5 | 5,9 | 15,0 | 15,0 | 15,0 | 15,0 |
| GSE720 | 6 | SSH12.0x60[1] | 26 | CNA* | 4,5 | 5,7 | 6,1 | 6,5 | 15,0 | 15,0 | 15,0 | 15,0 |
| GSE780 | 6 | SSH12.0x60[1] | 28 | CNA* | 4,6 | 5,8 | 6,2 | 6,5 | 15,0 | 15,0 | 15,0 | 15,0 |
| GSE840 | 6 | SSH12.0x60[1] | 32 | CNA* | 4,7 | 6,0 | 6,4 | 6,6 | 15,0 | 15,0 | 15,0 | 15,0 |
| GSE900 | 6 | SSH12.0x60[1] | 34 | CNA* | 4,8 | 5,8 | 6,0 | 6,2 | 15,0 | 15,0 | 15,0 | 15,0 |
| GSE960 | 6 | SSH12.0x60[1] | 38 | CNA* | 4,9 | 6,2 | 6,5 | 6,7 | 15,0 | 15,0 | 15,0 | 15,0 |
| GSE1020 | 6 | SSH12.0x60[1] | 40 | CNA* | 4,9 | 6,1 | 6,2 | 6,4 | 15,0 | 15,0 | 15,0 | 15,0 |

[1]*SSH can be replaced by SSF*

The user shall verify the transversal tension in timber which is not included in these capacities.
*Refer to *Characteristic capacities* table columns for type of fasteners that can be used on the joist. Capacities vary depending on fastener type used.

**GSE/GSI 4 mm and GLE/GLI 4 mm fire resistance R30 to EN 13501-2 – timber to timber connection :**

**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 + 10 mm
· Joist end shall be within the header face edges
· Member width ≥ 100 mm
· Gap between members ≤ 3 mm

**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:**

$$E_{d,fi} = \eta_{fi}\, E_d \tag{2.8}$$

where:

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

$\eta_{fi}$      is the reduction factor for the design load in the fire situation.

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

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

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

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

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

where:

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

$G_k$      is the characteristic value of the permanent action;

$\gamma_G$      is the partial factor for permanent actions;

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

[AC2] $\psi_{fi}$      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]

$\xi$      is a reduction factor for unfavourable permanent actions $G$.

**GSE 4 mm fire resistance R30 to EN 13501-2 – timber to concrete connection :**

**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 19992FA* 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 range of 4mm thick (ETA-06/0270) for timber to concrete connection

**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: GSE/4 Number of anchors used on each hanger**

| Blank Length (mm) | Seat Width (mm) | | | | | |
|---|---|---|---|---|---|---|
| | 100 | 120 | 140 | 160 | 180 | 200 |
| 380 | 2 | 2 | - | - | - | - |
| 440 | 4 | 4 | - | - | - | - |
| 500 | 4 | 4 | 2 | 2 | 2 | 2 |
| 540 | 4 | 4 | 4 | 4 | 4 | 4 |
| 600 | 4 | 4 | 4 | 4 | 4 | 4 |
| 660 | 6 | 6 | 4 | 4 | 4 | 4 |
| 720 | 6 | 6 | 6 | 6 | 6 | 6 |
| 780 | 6 | 6 | 6 | 6 | 6 | 6 |
| 840 | 6 | 6 | 6 | 6 | 6 | 6 |
| 900 | 6 | 6 | 6 | 6 | 6 | 6 |
| 960 | 6 | 6 | 6 | 6 | 6 | 6 |
| 1020 | 6 | 6 | 6 | 6 | 6 | 6 |

**Service Class:** 1 and 2 to Eurocode 5
**Fasteners:**
- Fixed on concrete C25/30 support with BOAX-II M12-103/5 or equivalent
- Fully nailed with CNA4,0x75mm or CSA5.0x80 (ETA-04/0013) on timber

**Timber:** Untreated C24 strength class timber to EN338. The joist was exposed on 3 faces (sides and bottom).
**Boundary conditions:**
- Header height ≥ Joist height ≥ Hanger height + 10 mm
- Joist end shall be within the header face edges
- Member width ≥ 100 mm
- Gap between members ≤ 3 mm

**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 | 10 | 10 | - | - | - | - |
| 440 | 20 | 20 | - | - | - | - |
| 500 | 20 | 20 | 10 | 10 | 10 | 10 |
| 540 | 20 | 20 | 20 | 20 | 20 | 20 |
| 600 | 20 | 20 | 20 | 20 | 20 | 20 |
| 660 | 20.57 | 20.57 | 20 | 20 | 20 | 20 |
| 720 | 20.57 | 20.57 | 20.57 | 20.57 | 20.57 | 20.57 |
| 780 | 20.57 | 20.57 | 20.57 | 20.57 | 20.57 | 20.57 |
| 840 | 20.57 | 20.57 | 20.57 | 20.57 | 20.57 | 20.57 |
| 900 | 20.57 | 20.57 | 20.57 | 20.57 | 20.57 | 20.57 |
| 960 | 20.57 | 20.57 | 20.57 | 20.57 | 20.57 | 20.57 |
| 1020 | 20.57 | 20.57 | 20.57 | 20.57 | 20.57 | 20.57 |

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

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.

## D21  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 | - | - | - | - | - | - | - |
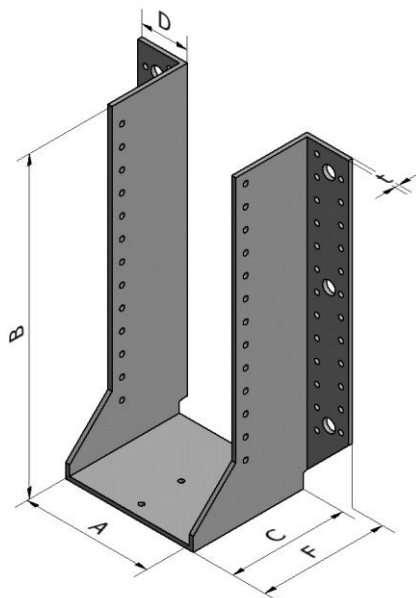
Parameters have to be used with equation in [Annex C](Annex C)

## $k_{H,1}$ 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 |

**Characteristic capacity for GSE-AL/2.5 - with connector screw SSH/SSF**

| References | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Header | | Joist | | $R_{1.k}$ | | | | $R_{2.k}$ | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| GSE500AL | 2 | SSH12.0x60[1] | 12 | CNA* | 12,3 | 12,4 | 12,5 | 12,5 | 12,2 | 12,4 | 12,5 | 12,5 |
| GSE540AL | 4 | SSH12.0x60[1] | 14 | CNA* | 19,7 | 20,4 | 21,4 | 21,7 | 19,4 | 20,2 | 21,3 | 21,6 |
| GSE600AL | 4 | SSH12.0x60[1] | 18 | CNA* | 23,0 | 23,3 | 23,4 | 23,4 | 22,8 | 23,3 | 23,4 | 23,4 |
| GSE660AL | 4 | SSH12.0x60[1] | 20 | CNA* | 23,4 | 23,4 | 23,4 | 23,4 | 23,4 | 23,4 | 23,4 | 23,4 |
| GSE720AL | 6 | SSH12.0x60[1] | 24 | CNA* | 34,1 | 35,0 | 35,3 | 35,3 | 34,1 | 35,0 | 35,3 | 35,3 |
| GSE780AL | 6 | SSH12.0x60[1] | 26 | CNA* | 35,5 | 35,9 | 35,9 | 35,9 | 35,5 | 35,9 | 35,9 | 35,9 |
| GSE840AL | 6 | SSH12.0x60[1] | 30 | CNA* | 36,1 | 36,1 | 36,1 | 36,1 | 36,1 | 36,1 | 36,1 | 36,1 |
| GSE900AL | 6 | SSH12.0x60[1] | 32 | CNA* | 35,0 | 35,0 | 35,0 | 35,0 | 35,0 | 35,0 | 35,0 | 35,0 |
| GSE960AL | 6 | SSH12.0x60[1] | 34 | CNA* | 36,4 | 36,4 | 36,4 | 36,4 | 36,4 | 36,4 | 36,4 | 36,4 |
| GSE1020AL | 6 | SSH12.0x60[1] | 38 | CNA* | 36,6 | 36,6 | 36,6 | 36,6 | 36,6 | 36,6 | 36,6 | 36,6 |

Product capacities - Timber to Timber - Large connector screw

[1]*SSH can be replaced by SSF*

| References | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Header | | Joist | | $R_{3.k}$ | | | | $R_{4.k}$ | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| GSE500AL | 2 | SSH12.0x60[1] | 12 | CNA* | 4,6 | 4,6 | 4,6 | 4,6 | 5,0 | 5,0 | 5,0 | 5,0 |
| GSE540AL | 4 | SSH12.0x60[1] | 14 | CNA* | 7,4 | 8,5 | 8,5 | 8,5 | 10,0 | 10,0 | 10,0 | 10,0 |
| GSE600AL | 4 | SSH12.0x60[1] | 18 | CNA* | 8,0 | 8,0 | 8,0 | 8,0 | 10,0 | 10,0 | 10,0 | 10,0 |
| GSE660AL | 4 | SSH12.0x60[1] | 20 | CNA* | 6,8 | 6,8 | 6,8 | 6,8 | 10,0 | 10,0 | 10,0 | 10,0 |
| GSE720AL | 6 | SSH12.0x60[1] | 24 | CNA* | 9,4 | 9,4 | 9,4 | 9,4 | 15,0 | 15,0 | 15,0 | 15,0 |
| GSE780AL | 6 | SSH12.0x60[1] | 26 | CNA* | 9,0 | 9,0 | 9,0 | 9,0 | 15,0 | 15,0 | 15,0 | 15,0 |
| GSE840AL | 6 | SSH12.0x60[1] | 30 | CNA* | 8,5 | 8,5 | 8,5 | 8,5 | 15,0 | 15,0 | 15,0 | 15,0 |
| GSE900AL | 6 | SSH12.0x60[1] | 32 | CNA* | 6,6 | 6,6 | 6,6 | 6,6 | 15,0 | 15,0 | 15,0 | 15,0 |
| GSE960AI | 6 | SSH12.0x60[1] | 34 | CNA* | 7,7 | 7,7 | 7,7 | 7,7 | 15,0 | 15,0 | 15,0 | 15,0 |
| GSE1020AL | 6 | SSH12.0x60[1] | 38 | CNA* | 7,3 | 7,3 | 7,3 | 7,3 | 15,0 | 15,0 | 15,0 | 15,0 |

Product capacities - Timber to Timber - Large connector screw

[1]*SSH can be replaced by SSF*

The user shall verify the transversal tension in timber, which is not included in these capacities.
*Refer to *Characteristic capacities* table columns for type of fasteners that can be used on the joist. Capacities vary depending on fastener type used.

**GSE-AL fire resistance R30 to EN 13501-2**

See GSE Joist hanger

## D22 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 | - | - | - | - | - |
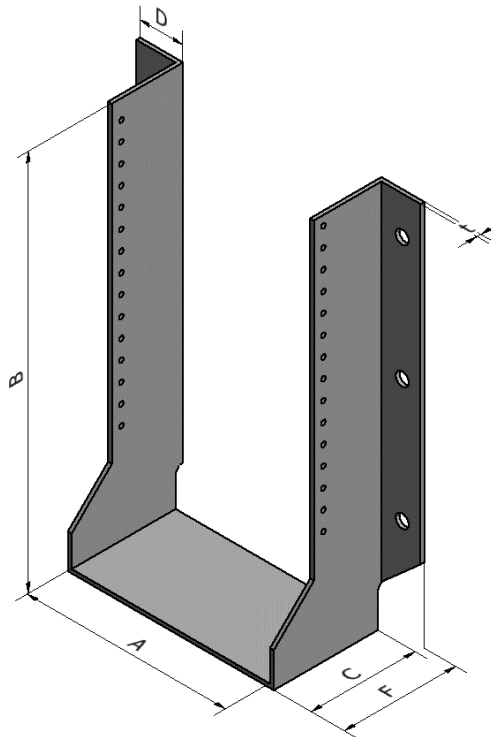


**Characteristic capacity for GSEXL - Full nailing - F1 F2 F3 F4 - timber to rigid support**

See formulas from Annex C for characteristic values calculation.

## D23  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 | 76-136 | (380-A)/2 | 110 | 42.5 | 115 | 2.5 | 16 | Ø5 | 4 | Ø13 | 8 | Ø5 |
| 440/2.5X | 76-136 | (440-A)/2 | 110 | 42.5 | 115 | 2.5 | 22 | Ø5 | 4 | Ø13 | 12 | Ø5 |
| 500/2.5X | 76-136 | (500-A)/2 | 110 | 42.5 | 115 | 2.5 | 28 | Ø5 | 4 | Ø13 | 14 | Ø5 |
| 540/2.5X | 76-136 | (540-A)/2 | 110 | 42.5 | 115 | 2.5 | 32 | Ø5 | 4 | Ø13 | 16 | Ø5 |
| 600/2.5X | 76-136 | (600-A)/2 | 110 | 42.5 | 115 | 2.5 | 38 | Ø5 | 4 | Ø13 | 20 | Ø5 |
| 660/2.5X | 76-136 | (660-A)/2 | 110 | 42.5 | 115 | 2.5 | 44 | Ø5 | 6 | Ø13 | 22 | Ø5 |
| 720/2.5X | 76-136 | (720-A)/2 | 110 | 42.5 | 115 | 2.5 | 50 | Ø5 | 6 | Ø13 | 26 | Ø5 |
| 780/2.5X | 76-136 | (780-A)/2 | 110 | 42.5 | 115 | 2.5 | 56 | Ø5 | 6 | Ø13 | 28 | Ø5 |
| 840/2.5X | 76-136 | (840-A)/2 | 110 | 42.5 | 115 | 2.5 | 62 | Ø5 | 6 | Ø13 | 32 | Ø5 |
| 900/2.5X | 76-136 | (900-A)/2 | 110 | 42.5 | 115 | 2.5 | 68 | Ø5 | 6 | Ø13 | 38 | Ø5 |
| 960/2.5X | 76-136 | (960-A)/2 | 110 | 42.5 | 115 | 2.5 | 74 | Ø5 | 6 | Ø13 | 38 | Ø5 |
| 1020/2.5X | 76-136 | (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 | 76-136 | (380-A)/2 | 110 | 45.5 | 118 | 4 | 16 | Ø5 | 4 | Ø13 | 8 | Ø5 |
| 440/4X | 76-136 | (440-A)/2 | 110 | 45.5 | 118 | 4 | 22 | Ø5 | 4 | Ø13 | 12 | Ø5 |
| 500/4X | 76-136 | (500-A)/2 | 110 | 45.5 | 118 | 4 | 28 | Ø5 | 4 | Ø13 | 14 | Ø5 |
| 540/4X | 76-136 | (540-A)/2 | 110 | 45.5 | 118 | 4 | 32 | Ø5 | 4 | Ø13 | 16 | Ø5 |
| 600/4X | 76-136 | (600-A)/2 | 110 | 45.5 | 118 | 4 | 38 | Ø5 | 4 | Ø13 | 20 | Ø5 |
| 660/4X | 76-136 | (660-A)/2 | 110 | 45.5 | 118 | 4 | 44 | Ø5 | 6 | Ø13 | 22 | Ø5 |
| 720/4X | 76-136 | (720-A)/2 | 110 | 45.5 | 118 | 4 | 50 | Ø5 | 6 | Ø13 | 26 | Ø5 |
| 780/4X | 76-136 | (780-A)/2 | 110 | 45.5 | 118 | 4 | 56 | Ø5 | 6 | Ø13 | 28 | Ø5 |
| 840/4X | 76-136 | (840-A)/2 | 110 | 45.5 | 118 | 4 | 62 | Ø5 | 6 | Ø13 | 32 | Ø5 |
| 900/4X | 76-136 | (900-A)/2 | 110 | 45.5 | 118 | 4 | 68 | Ø5 | 6 | Ø13 | 38 | Ø5 |
| 960/4X | 76-136 | (960-A)/2 | 110 | 45.5 | 118 | 4 | 74 | Ø5 | 6 | Ø13 | 38 | Ø5 |
| 1020/4X | 76-136 | (1020-A)/2 | 110 | 45.5 | 118 | 4 | 80 | Ø5 | 6 | Ø13 | 40 | Ø5 |
| Permitted deviation | - | - | ±1.0 | ±1.0 | ±1.0 | - | - | - | - | - | - | - |
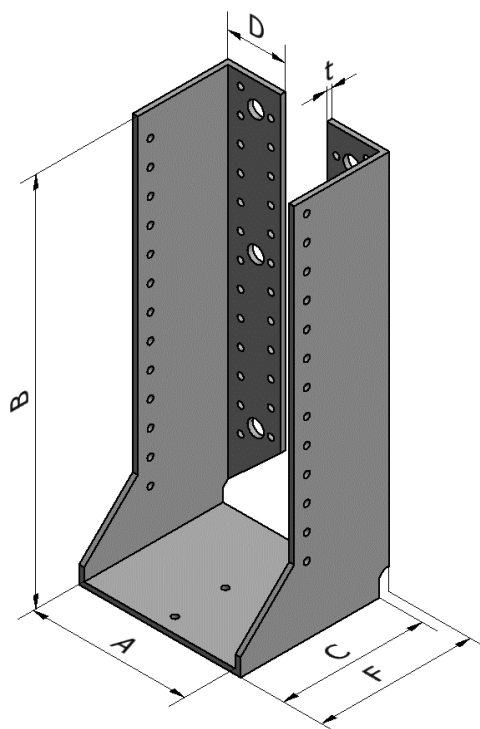
Parameters have to be used with equation in [Annex C](#).

### $k_{H,1}$ 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

## D24   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 | 137-200 | (500-A)/2 | 110 | 42.5 | 115 | 2.5 | 22 | Ø5 | 2 | Ø13 | 12 | Ø5 |
| 540/2.5X-AL | 137-200 | (540-A)/2 | 110 | 42.5 | 115 | 2.5 | 26 | Ø5 | 4 | Ø13 | 14 | Ø5 |
| 600/2.5X-AL | 137-200 | (600-A)/2 | 110 | 42.5 | 115 | 2.5 | 32 | Ø5 | 4 | Ø13 | 18 | Ø5 |
| 660/2.5X-AL | 137-200 | (660-A)/2 | 110 | 42.5 | 115 | 2.5 | 38 | Ø5 | 4 | Ø13 | 20 | Ø5 |
| 720/2.5X-AL | 137-200 | (720-A)/2 | 110 | 42.5 | 115 | 2.5 | 44 | Ø5 | 6 | Ø13 | 24 | Ø5 |
| 780/2.5X-AL | 137-200 | (780-A)/2 | 110 | 42.5 | 115 | 2.5 | 50 | Ø5 | 6 | Ø13 | 26 | Ø5 |
| 840/2.5X-AL | 137-200 | (840-A)/2 | 110 | 42.5 | 115 | 2.5 | 56 | Ø5 | 6 | Ø13 | 30 | Ø5 |
| 900/2.5X-AL | 137-200 | (900-A)/2 | 110 | 42.5 | 115 | 2.5 | 62 | Ø5 | 6 | Ø13 | 32 | Ø5 |
| 960/2.5X-AL | 137-200 | (960-A)/2 | 110 | 42.5 | 115 | 2.5 | 66 | Ø5 | 6 | Ø13 | 34 | Ø5 |
| 1020/2.5X-AL | 137-200 | (1020-A)/2 | 110 | 42.5 | 115 | 2.5 | 74 | Ø5 | 6 | Ø13 | 38 | Ø5 |
| 500/4X-AL | 137-200 | (500-A)/2 | 110 | 45.5 | 118 | 4 | 22 | Ø5 | 2 | Ø13 | 12 | Ø5 |
| 540/4X-AL | 137-200 | (540-A)/2 | 110 | 45.5 | 118 | 4 | 26 | Ø5 | 4 | Ø13 | 14 | Ø5 |
| 600/4X-AL | 137-200 | (600-A)/2 | 110 | 45.5 | 118 | 4 | 32 | Ø5 | 4 | Ø13 | 18 | Ø5 |
| 660/4X-AL | 137-200 | (660-A)/2 | 110 | 45.5 | 118 | 4 | 38 | Ø5 | 4 | Ø13 | 20 | Ø5 |
| 720/4X-AL | 137-200 | (720-A)/2 | 110 | 45.5 | 118 | 4 | 44 | Ø5 | 6 | Ø13 | 24 | Ø5 |
| 780/4X-AL | 137-200 | (780-A)/2 | 110 | 45.5 | 118 | 4 | 50 | Ø5 | 6 | Ø13 | 26 | Ø5 |
| 840/4X-AL | 137-200 | (840-A)/2 | 110 | 45.5 | 118 | 4 | 56 | Ø5 | 6 | Ø13 | 30 | Ø5 |
| 900/4X-AL | 137-200 | (900-A)/2 | 110 | 45.5 | 118 | 4 | 62 | Ø5 | 6 | Ø13 | 32 | Ø5 |
| 960/4X-AL | 137-200 | (960-A)/2 | 110 | 45.5 | 118 | 4 | 66 | Ø5 | 6 | Ø13 | 34 | Ø5 |
| 1020/4X-AL | 137-200 | (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 .

## $k_{H,1}$ 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
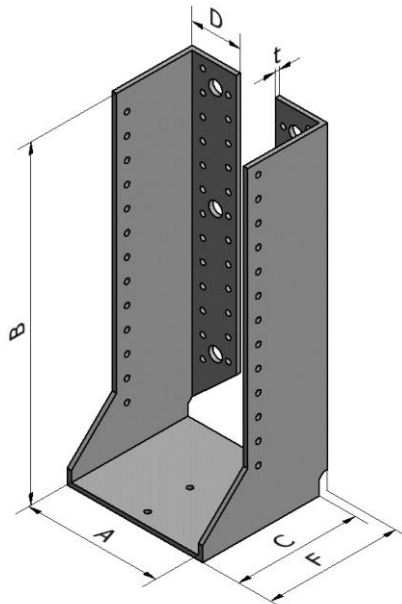
See GSE-AL Joist hanger

## GSI-AL fire resistance R30 to EN 13501-2

See GSE-AL Joist hanger

## D25 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 | - | - | - | - | - |
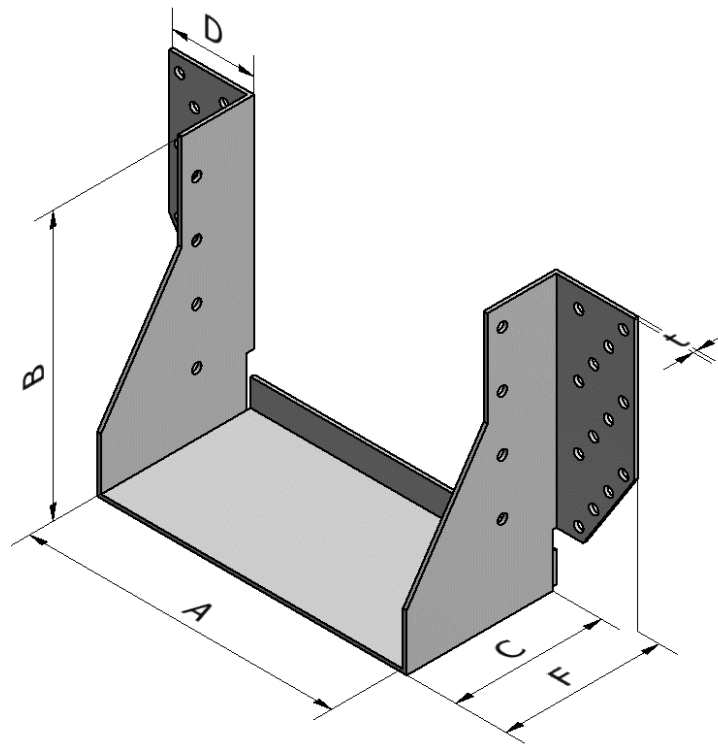


**Characteristic capacity for HGUQ SCR - F1 and F2 - timber to timber**

| 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

## D26  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
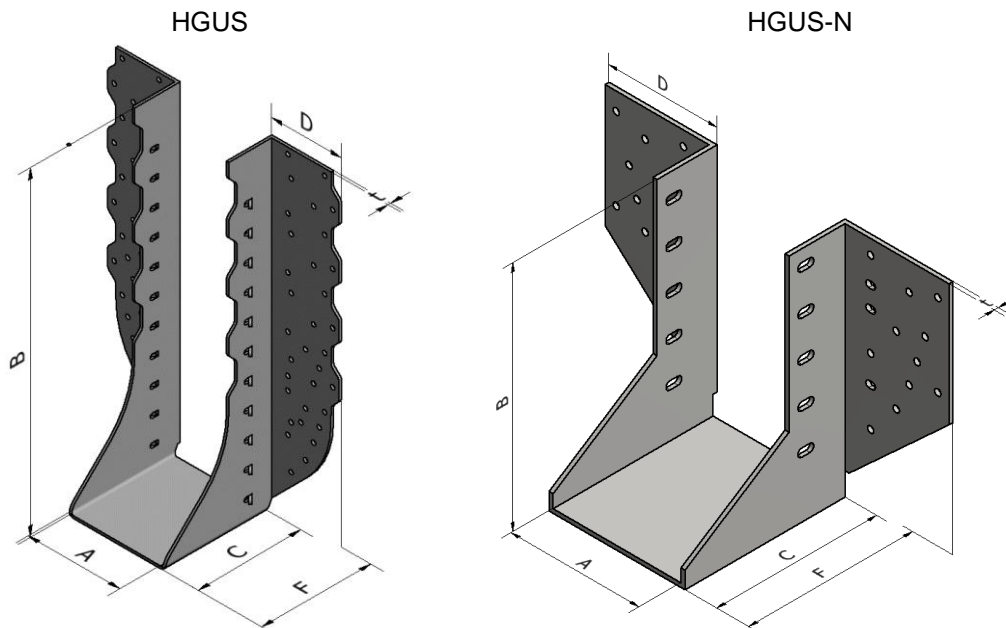
Parameters have to be used with equation in [Annex C](#).

## $k_{H,1}$ 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 |

## D27 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 | - | - | - | - | - |
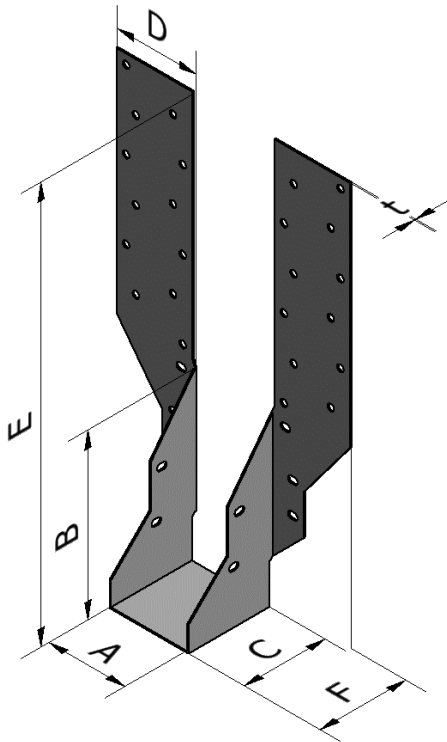
Parameters have to be used with equation in Annex C.

**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 3.75 x 30 ST | | Supported Timber Fasteners | |
|---|---|---|---|---|---|
| | | Top | Face | ST 3.75 x 30 | SS 3.75 x 75 |
| JHA270 | Face Fix | - | 20 | 4 | - |
| | Wrap Over | 4 | 8 | 4 | - |
| | Face Fix | - | 20 | - | 4 |
| | Wrap Over | 4 | 8 | - | 4 |

## D28  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 | - | - | - | - | - |
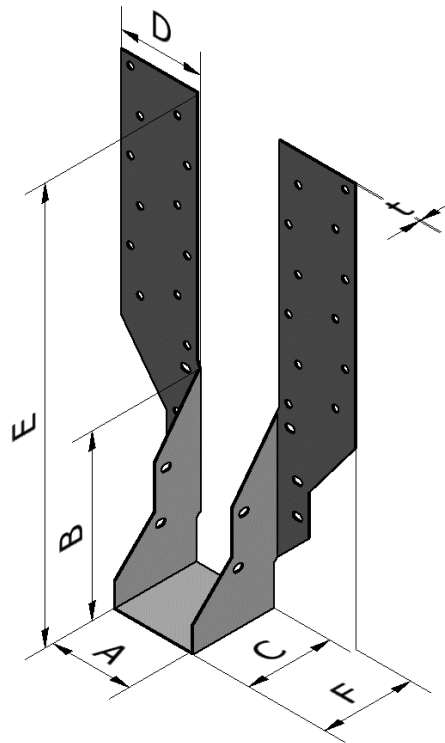
Parameters have to be used with equation in Annex C.

## Parameters for JHA450 - F1 - timber to timber

| Model | l | $l_{ef}$ | S | $B_{eff}$ | a-0.5$a_c$ | 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

## D29    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 | - | - | - | - | - | - | - |
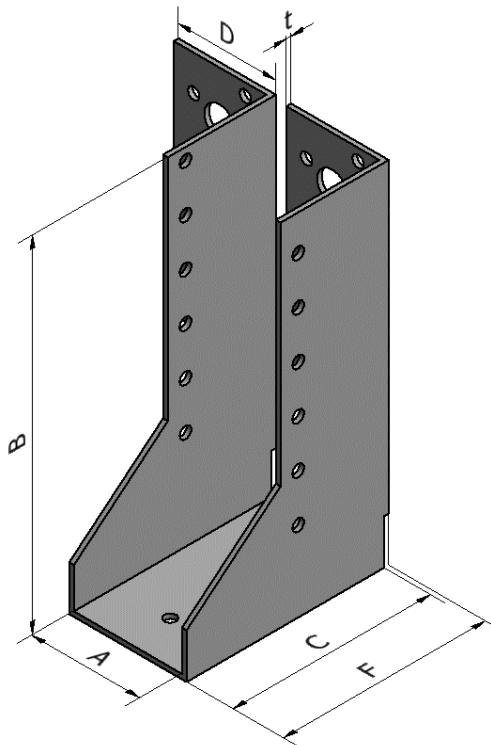


**Characteristic capacity for JHR-L - Full nailing - F1 - timber to timber**

| 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 |

## D30    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 | - | - | - | - | - |
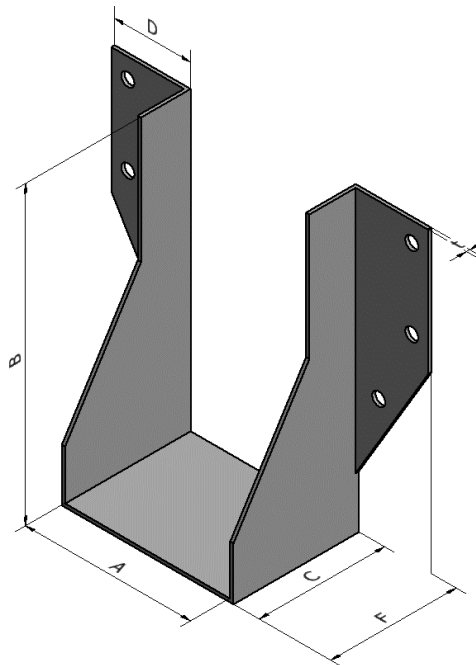


Parameters have to be used with equation in Annex C.

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

| | LUP230 | | LUP24 | |
|---|---|---|---|---|
| | $n_H$ | $n_J$ | $n_H$ | $n_J$ |
| | 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.

## D31 MF Joist hanger

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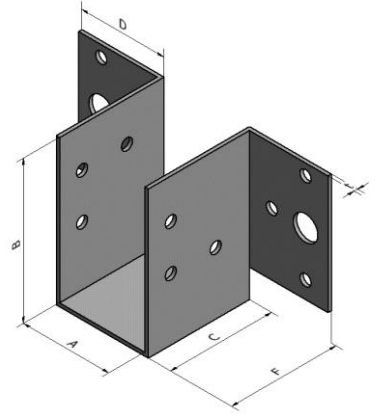
**Dimensions**

| 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 | |
|---|---|---|---|---|---|---|
| | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ |
| | 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 |

## D32   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 | - | - | - | - | - |
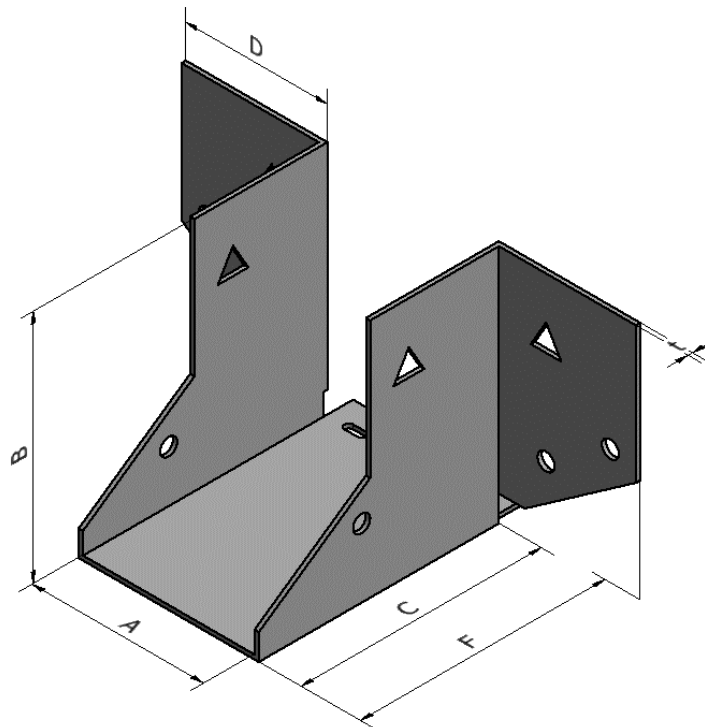


**Characteristic capacity for MH - Full nailing - F1 - timber to timber and timber**

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

## D33    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 | - | - | - | - | - | - | - |
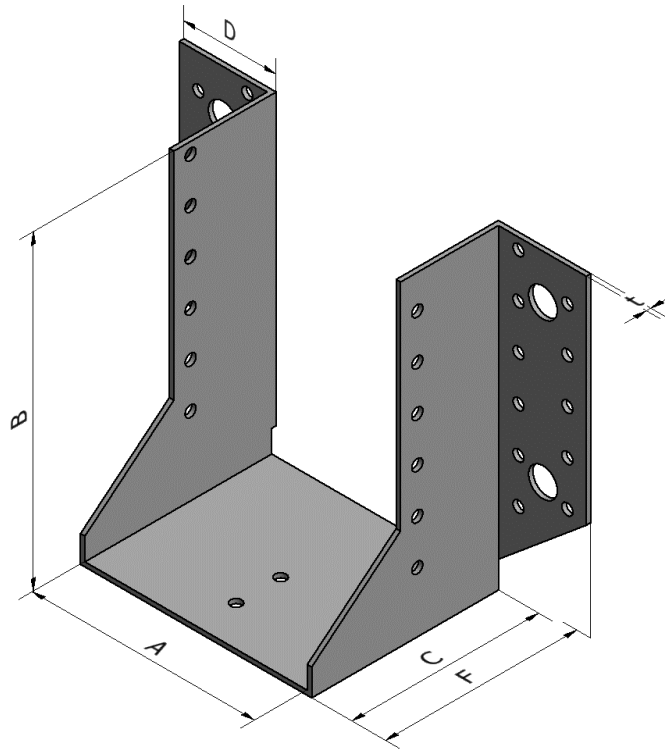
Parameters have to be used with equation in .

## $k_{H,1}$ for Joist Hanger SAE - 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 |

SAE joist hangers are warranted for an installation on timber column. The partial nail pattern that applies then is the one described in Annex B3 for connection to column and above coefficients, valid for partial nailing, apply.

**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)

**Characteristic capacity for SAE - with connector screw SSH/SSF**

| References | Product capacities - Timber to Timber - Large connector screw | | | | | | | | | | | |
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
| | Header | | Joist | | $R_{1.k}$ | | | | $R_{2.k}$ | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAE200 | 2 | SSH10.0x40[1] | 5 | CNA* | 5,6 | 5,9 | 6,4 | 6,6 | 5,8 | 6,0 | 6,5 | 6,7 |
| SAE250 | 2 | SSH10.0x40[1] | 7 | CNA* | 7,1 | 7,2 | 7,2 | 7,2 | 7,0 | 7,2 | 7,2 | 7,2 |
| SAE300 | 4 | SSH12.0x60[1] | 10 | CNA* | 11,5 | 11,5 | 11,5 | 11,5 | 11,5 | 11,5 | 11,5 | 11,5 |
| SAE340 | 4 | SSH12.0x60[1] | 12 | CNA* | 18,5 | 19,8 | 21,1 | 21,3 | 18,5 | 19,8 | 21,1 | 21,3 |
| SAE380 | 4 | SSH12.0x60[1] | 12 | CNA* | 18,5 | 19,8 | 21,1 | 21,3 | 18,5 | 19,8 | 21,1 | 21,3 |
| SAE440 | 4 | SSH12.0x60[1] | 15 | CNA* | 22,1 | 22,8 | 23,0 | 23,0 | 22,1 | 22,8 | 23,0 | 23,0 |
| SAE500 | 6 | SSH12.0x60[1] | 18 | CNA* | 27,7 | 30,6 | 33,4 | 33,6 | 27,7 | 30,6 | 33,4 | 33,6 |

[1]*SSH can be replaced by SSF*

| References | Product capacities - Timber to Timber - Large connector screw | | | | | | | | | | | |
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
| | Header | | Joist | | $R_{3.k}$ | | | | $R_{4.k}$ | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAE200 | 2 | SSH10.0x40[1] | 5 | CNA* | 2,1 | 2,6 | 3,7 | 4,2 | 5,0 | 5,0 | 5,0 | 5,0 |
| SAE250 | 2 | SSH10.0x40[1] | 7 | CNA* | 2,0 | 2,2 | 2,7 | 3,2 | 5,0 | 5,0 | 5,0 | 5,0 |
| SAE300 | 4 | SSH12.0x60[1] | 10 | CNA* | 3,4 | 3,6 | 4,1 | 4,6 | 5,0 | 5,0 | 5,0 | 5,0 |
| SAE340 | 4 | SSH12.0x60[1] | 12 | CNA* | 3,9 | 4,8 | 6,5 | 7,3 | 10,0 | 10,0 | 10,0 | 10,0 |
| SAE380 | 4 | SSH12.0x60[1] | 12 | CNA* | 3,9 | 4,8 | 5,6 | 6,4 | 10,0 | 10,0 | 10,0 | 10,0 |
| SAE440 | 4 | SSH12.0x60[1] | 15 | CNA* | 4,2 | 4,9 | 5,4 | 6,0 | 10,0 | 10,0 | 10,0 | 10,0 |
| SAE500 | 6 | SSH12.0x60[1] | 18 | CNA* | 4,5 | 5,7 | 6,6 | 7,2 | 15,0 | 15,0 | 15,0 | 15,0 |

[1]*SSH can be replaced by SSF*

The user shall verify the transversal tension in timber, which is not included in these capacities.
*Refer to *Characteristic capacities* table columns for type of fasteners that can be used on the joist. Capacities vary depending on fastener type used.

The capacity is increased for the following configuration:

| References | Product capacities - Timber to Timber - Large connector screw | | | | | | | | |
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | |
| | Header | | Joist | | $R_{1.k}$ | $R_{2.k}$ | $R_{3.k}$ | $R_{4.k}$ |
| | Qty | Type | Qty | Type | | | | |
|---|---|---|---|---|---|---|---|---|
| SAE200/38/2 | 2 | SSH10.0x40[1] | 5 | CNA4.0x35 | 6.23 | 5.79 | 2.20 | 5.00 |

[1]*SSH can be replaced by SSF*

## D34   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 | - | - | - | - | - | - | - |
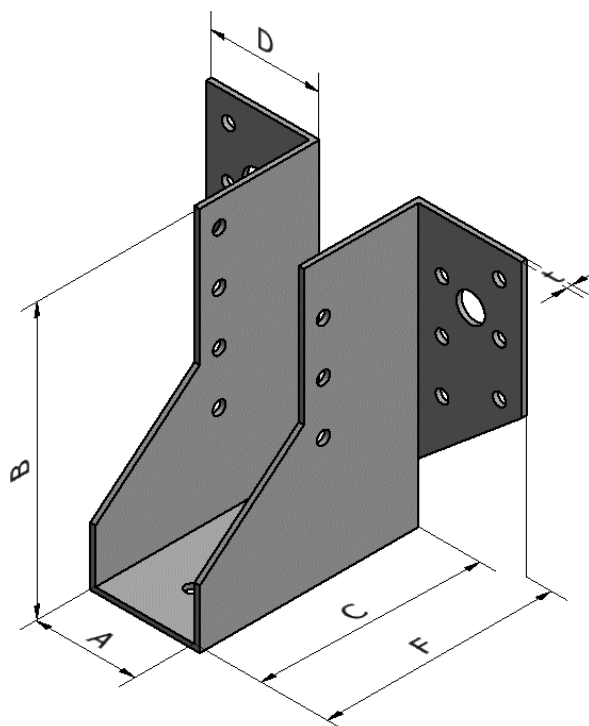


**Characteristic capacity for SAE - Full nailing - Timber to timber**

| 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 > 95 mm

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 |

Timber elements have to be checked also according to EN 1995, 8.1.4 for direction force F2.

## D35  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
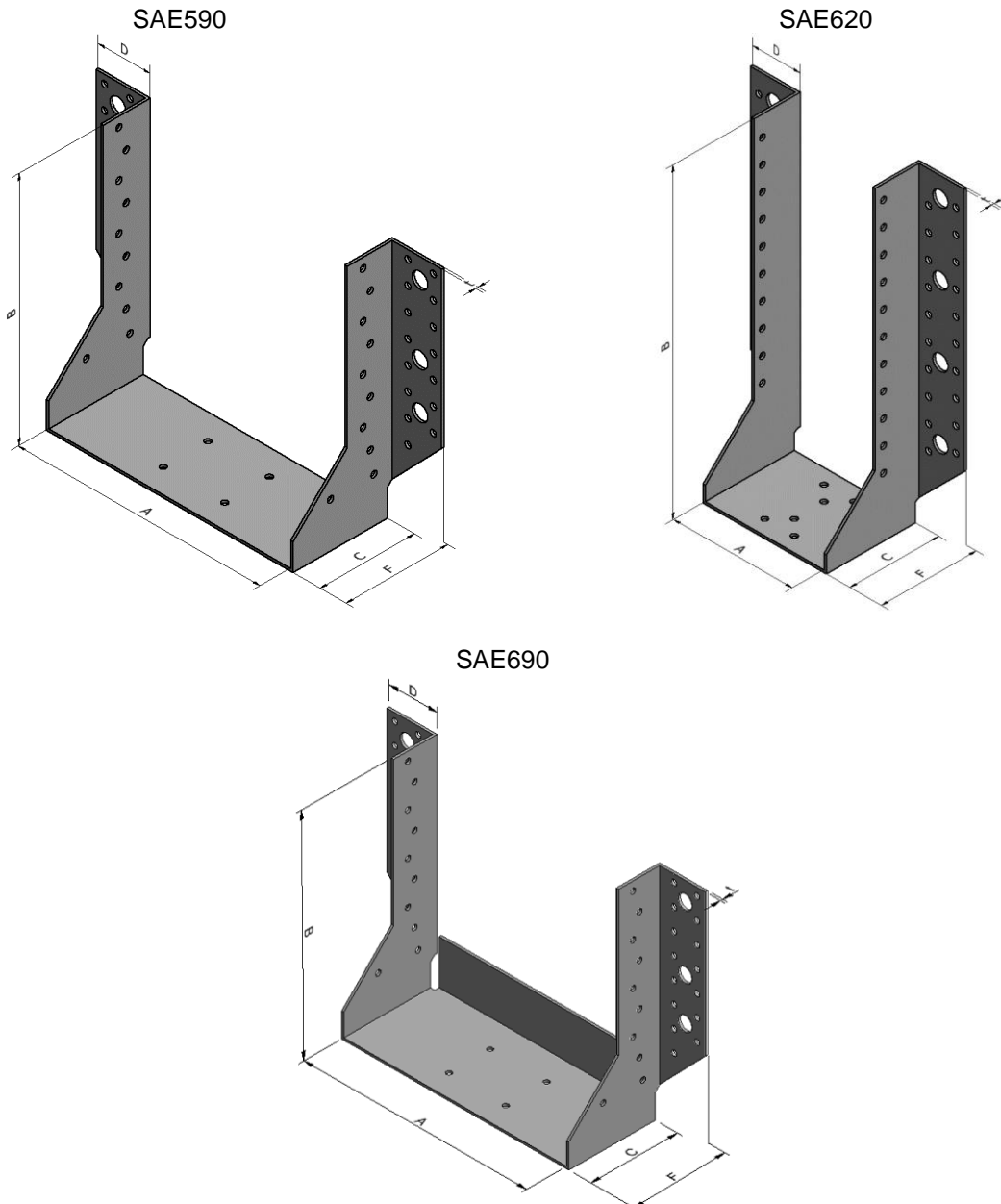
SAE620

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 | $k_{H.1}$ | B | $k_{H.1}$ | B | $k_{H.1}$ | B | $k_{H.1}$ |
| 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 |

SAE joist hangers are warranted for an installation on timber column. The partial nail pattern that applies then is the one described in Annex B3 for connection to column and above coefficients, valid for partial nailing, apply.

**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)

## D36 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 | 24-116 | (300-A)/2 | 84 | 41.5 | 86 | 2 | 18 | Ø5 | 4 | Ø13 | 10 | Ø5 |
| 340 | 24-116 | (340-A)/2 | 84 | 41.5 | 86 | 2 | 22 | Ø5 | 4 | Ø13 | 12 | Ø5 |
| 380 | 24-156 | (380-A)/2 | 84 | 41.5 | 86 | 2 | 22 | Ø5 | 4 | Ø13 | 12 | Ø5 |
| 440 | 24-156 | (440-A)/2 | 84 | 41.5 | 86 | 2 | 28 | Ø5 | 4 | Ø13 | 15 | Ø5 |
| 500 | 24-156 | (500-A)/2 | 84 | 41.5 | 86 | 2 | 34 | Ø5 | 6 | Ø13 | 18 | Ø5 |
| Permitted deviation | - | - | ±1.0 | ±1.0 | ±1.0 | - | - | - | - | - | - | - |
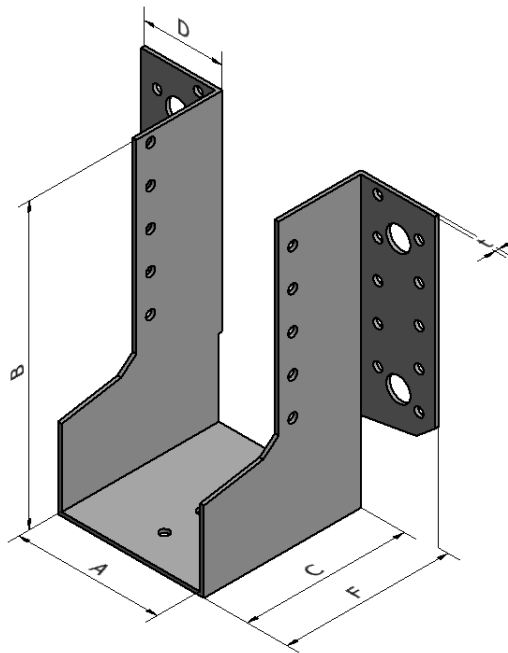
Parameters have to be used with equation in [Annex C](Annex C)

## $k_{H,1}$ 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 |

SAEL joist hangers are warranted for an installation on timber column. The partial nail pattern that applies then is the one described in Annex B3 for connection to column and above coefficients, valid for partial nailing, apply.

## 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/m$^3$)

**Characteristic capacity for SAEL - with connector screw SSH/SSF**

| References | Product capacities - Timber to Timber - Large connector screw | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
| | Header | | Joist | | $R_{1.k}$ | | | | $R_{2.k}$ | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| SAEL300 | 4 | SSH12.0x60[1] | 8 | CNA* | 10,7 | 11,0 | 11,4 | 11,5 | 10,8 | 11,1 | 11,4 | 11,5 |
| SAEL340 | 4 | SSH12.0x60[1] | 10 | CNA* | 15,4 | 17,0 | 19,2 | 19,8 | 15,4 | 17,0 | 19,8 | 20,3 |
| SAEL380 | 4 | SSH12.0x60[1] | 10 | CNA* | 15,4 | 17,0 | 19,2 | 19,8 | 15,4 | 17,0 | 19,8 | 20,3 |
| SAEL440 | 4 | SSH12.0x60[1] | 13 | CNA* | 19,9 | 21,2 | 22,8 | 23,0 | 20,0 | 21,6 | 22,8 | 23,0 |
| SAEL500 | 6 | SSH12.0x60[1] | 16 | CNA* | 24,6 | 27,2 | 31,8 | 32,8 | 24,6 | 27,2 | 32,2 | 33,0 |

[1]*SSH can be replaced by SSF*

| References | Product capacities - Timber to Timber - Large connector screw | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fasteners | | | | Characteristic capacities - Timber C24 | | | | | | | |
| | Header | | Joist | | $R_{3.k}$ | | | | $R_{4.k}$ | | | |
| | Qty | Type | Qty | Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
| SAEL300 | 4 | SSH12.0x60[1] | 8 | CNA* | 3,0 | 3,6 | 4,1 | 4,6 | 5,0 | 5,0 | 5,0 | 5,0 |
| SAEL340 | 4 | SSH12.0x60[1] | 10 | CNA* | 3,5 | 4,4 | 6,3 | 7,3 | 10,0 | 10,0 | 10,0 | 10,0 |
| SAEL380 | 4 | SSH12.0x60[1] | 10 | CNA* | 3,5 | 4,4 | 5,6 | 6,4 | 10,0 | 10,0 | 10,0 | 10,0 |
| SAEL440 | 4 | SSH12.0x60[1] | 13 | CNA* | 4,0 | 4,9 | 5,4 | 6,0 | 10,0 | 10,0 | 10,0 | 10,0 |
| SAEL500 | 6 | SSH12.0x60[1] | 16 | CNA* | 4,3 | 5,4 | 6,6 | 7,2 | 15,0 | 15,0 | 15,0 | 15,0 |

[1]*SSH can be replaced by SSF*

The user shall verify the transversal tension in timber, which is not included in these capacities.
*Refer to *Characteristic capacities* table columns for type of fasteners that can be used on the joist. Capacities vary depending on fastener type used.
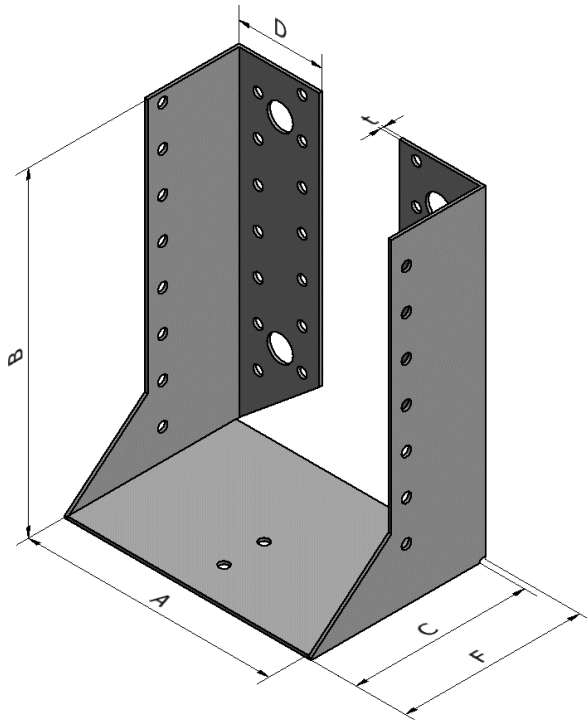
## D37   SAI Joist hanger

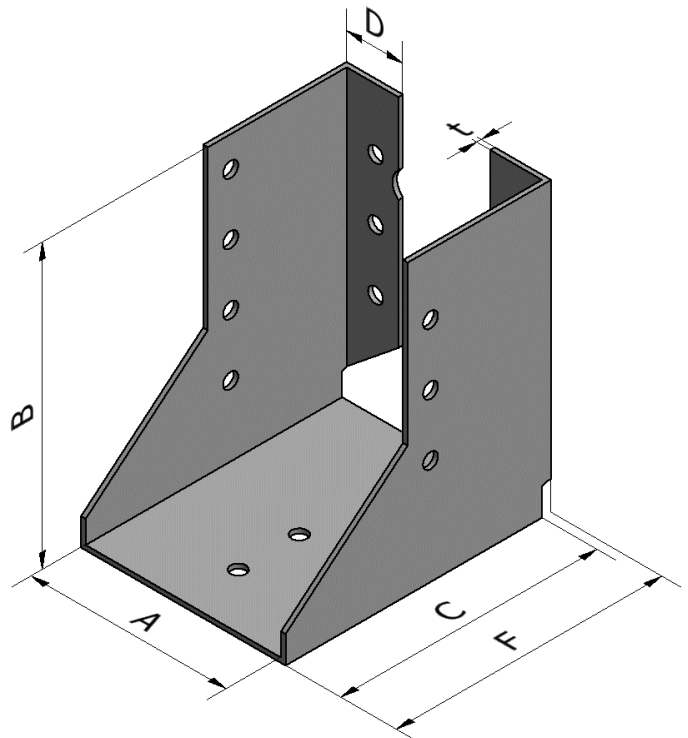| Product Name | Material reference acc. to clause II-1 | Alternative Names |
|---|---|---|
| SAI | Steel ref 1 - Steel ref 2 | - |

**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](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 | $k_{H.1}$ | 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 | 58.4 | 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 | 20.0 | 134 | 27.5 | 154 | 37.2 | 184 | 56.0 | 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 | 73.0 |
| 78 | 61 | 5.0 | 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 | 53.0 | 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 | 50.0 | 204 | 67.5 |
| 94 | - | - | - | - | 103 | 16.0 | 123 | 23.1 | 143 | 32.0 | 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 | 15.0 | 120 | 22.0 | 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 | 14.0 | 117 | 20.8 | 137 | 29.3 | 167 | 46.0 | 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 | 13.0 | 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 | 27.0 | 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 | 42.0 | 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 | |
|---|---|---|---|---|
| | $n_H$ | $n_J$ | $n_H$ | $n_J$ |
| | 4 | 4 | 6 | 6 |
| A | B | $k_{H,1}$ | B | $k_{H,1}$ |
| 38 | 81 | 5.2 | 106 | 8.1 |
| 40 | 80 | 5.0 | 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 | 7.0 |
| 54 | 73 | 4.2 | 98 | 6.8 |
| 56 | 72 | 4.0 | 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 | $k_{H.1}$ | 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 | - | - | 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 Bblank 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 | - |

SAI joist hangers are warranted for an installation on timber column. The partial nail pattern that applies then is the one described in Annex B3 for connection to column and above coefficients, valid for partial nailing, apply.

## 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)

## D38   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 | 90-100 | (620-A)/2 | 75 | 40 | 81 | 1.5 - 2 | 40 | Ø5 | 8 | Ø13 | 22 | Ø5 |
| 620-b | 101-200 | (620-A)/2 | 75 | 40 | 77 | 1.5 - 2 | 40 | Ø5 | 8 | Ø13 | 22 | Ø5 |
| Permitted deviation | - | - | ±1.0 | ±1.0 | ±1.0 | - | - | - | - | - | - | - |
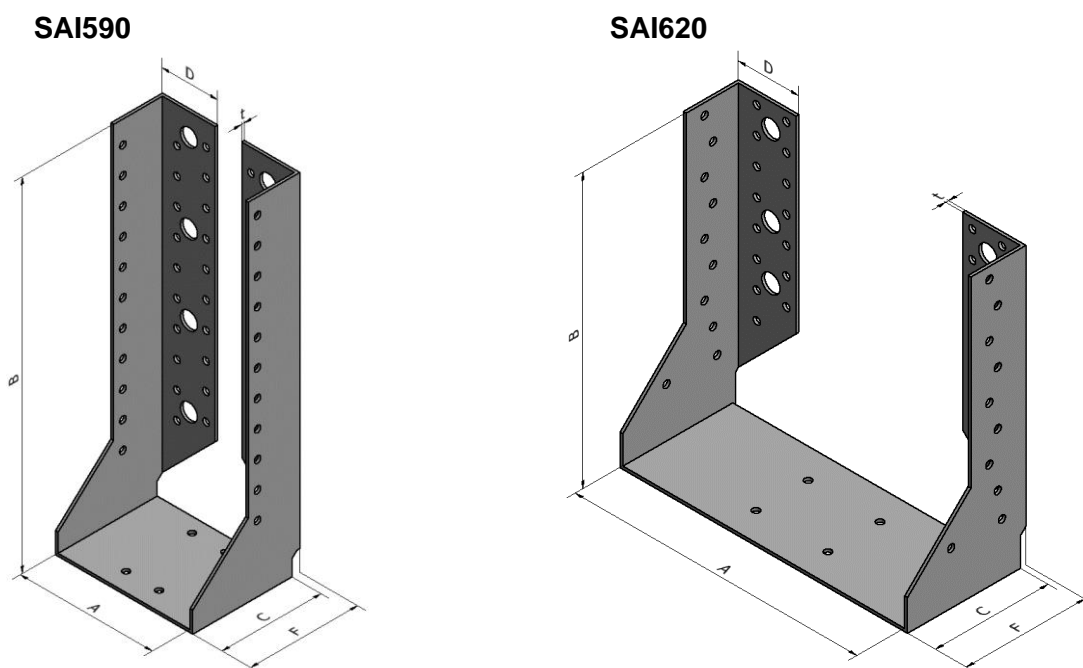
**SAI590**                                              **SAI620**



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

SAI joist hangers are warranted for an installation on timber column. The partial nail pattern that applies then is the one described in Annex B3 for connection to column and above coefficients, valid for partial nailing, apply.

**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/m$^3$)

## D39   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 | - | - | - | - | - | - | - |
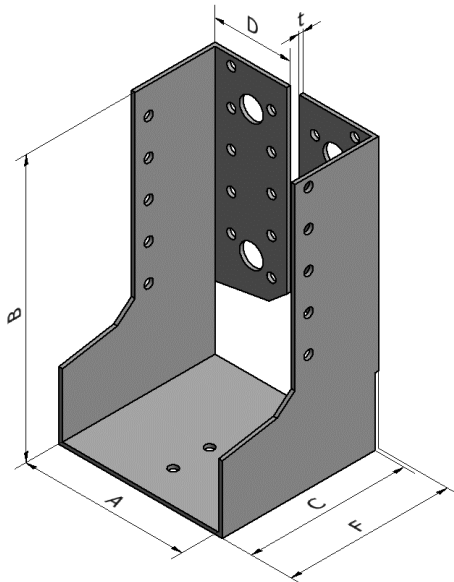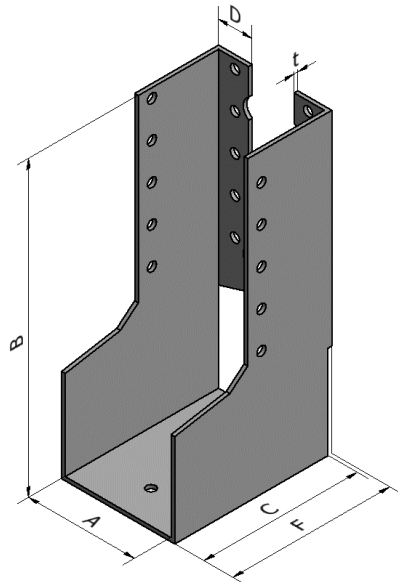
1st blank model

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 | 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 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.

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

| | 300 | | 340 | | 380 | | 440 | | 500 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ |
| | 8 | 8 | 10 | 10 | 10 | 10 | 12 | 13 | 16 | 16 |
| A | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ |
| 38 | 131 | 16,6 | 151 | 21,8 | 171 | 27,1 | 201 | 36,6 | 231 | 49,1 |
| 40 | 130 | 16,4 | 150 | 21,6 | 170 | 26,8 | 200 | 36,2 | 230 | 48,7 |
| 42 | 129 | 16,2 | 149 | 21,3 | 169 | 26,5 | 199 | 35,9 | 229 | 48,3 |
| 44 | 128 | 15,9 | 148 | 21,1 | 168 | 26,3 | 198 | 35,6 | 228 | 47,9 |
| 46 | 127 | 15,7 | 147 | 20,8 | 167 | 26,0 | 197 | 35,3 | 227 | 47,6 |
| 48 | 126 | 15,5 | 146 | 20,5 | 166 | 25,7 | 196 | 35,0 | 226 | 47,2 |
| 50 | 125 | 15,3 | 145 | 20,3 | 165 | 25,5 | 195 | 34,7 | 225 | 46,8 |
| 52 | 124 | 15,1 | 144 | 20,0 | 164 | 25,2 | 194 | 34,4 | 224 | 46,4 |
| 54 | 123 | 14,9 | 143 | 19,8 | 163 | 25,0 | 193 | 34,1 | 223 | 46,0 |
| 56 | 122 | 14,7 | 142 | 19,5 | 162 | 24,7 | 192 | 33,8 | 222 | 45,7 |
| 58 | 121 | 14,4 | 141 | 19,3 | 161 | 24,4 | 191 | 33,5 | 221 | 45,3 |
| 60 | 120 | 14,2 | 140 | 19,0 | 160 | 24,2 | 190 | 33,2 | 220 | 44,9 |
| 62 | 119 | 14,0 | 139 | 18,8 | 159 | 23,9 | 189 | 32,9 | 219 | 44,5 |
| 64 | 118 | 13,8 | 138 | 18,5 | 158 | 23,6 | 188 | 32,6 | 218 | 44,1 |
| 66 | 117 | 13,6 | 137 | 18,3 | 157 | 23,4 | 187 | 32,3 | 217 | 43,8 |
| 68 | 116 | 13,4 | 136 | 18,0 | 156 | 23,1 | 186 | 32,0 | 216 | 43,4 |
| 70 | 115 | 13,2 | 135 | 17,8 | 155 | 22,9 | 185 | 31,7 | 215 | 43,0 |
| 72 | 114 | 13,0 | 134 | 17,5 | 154 | 22,6 | 184 | 31,4 | 214 | 42,6 |
| 74 | 113 | 12,8 | 133 | 17,3 | 153 | 22,3 | 183 | 31,1 | 213 | 42,3 |
| 76 | 112 | 12,5 | 132 | 17,0 | 152 | 22,1 | 182 | 30,8 | 212 | 41,9 |
| 78 | 111 | 12,3 | 131 | 16,8 | 151 | 21,8 | 181 | 30,5 | 211 | 41,5 |

**$k_{H,2}$ 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 $n_{J,ef,1}$ | Partial nailing $n_{J,ef,1}$ | Full nailing $n_{J,ef,2}$ | Partial nailing $n_{J,ef,2}$ |
| 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 | - |

SAIL joist hangers are warranted for an installation on timber column. The partial nail pattern that applies then is the one described in Annex B3 for connection to column and above coefficients, valid for partial nailing, apply.
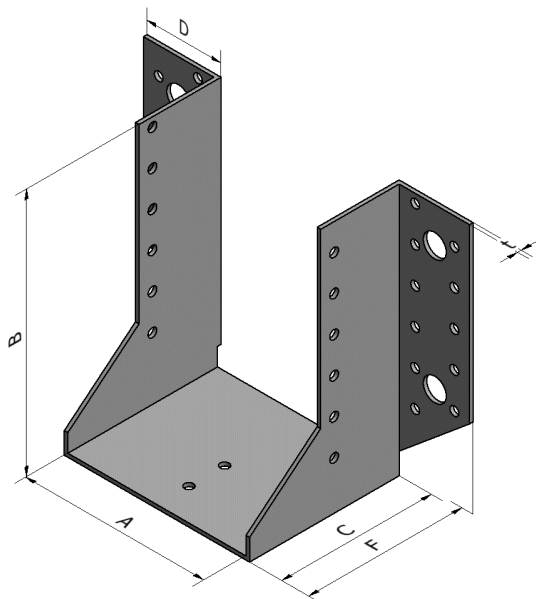
# D40  SAIX Joist hanger

| Product Name | Material reference acc. to clause II-1 | Alternative Names |
|---|---|---|
| SAIX | Steel ref 2 or S250GD + ZM310 | SAEX (external flanges) SAIX (internal flanges) |

## 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 | 38-79 | (380-A)/2 | 84 | 18.5 | 87 | 1.5 | 12 | Ø5 | - | - | 11 | Ø5 |
| | 440 | 38-79 | (440-A)/2 | 84 | 18.5 | 87 | 1.5 | 14 | Ø5 | - | - | 15 | Ø5 |
| | 500 | 38-79 | (500-A)/2 | 84 | 18.5 | 87 | 1.5 | 18 | Ø5 | - | - | 18 | Ø5 |
| | Permitted deviation | - | - | ±1.0 | ±1.0 | ±1.0 | - | - | - | - | - | - | - |

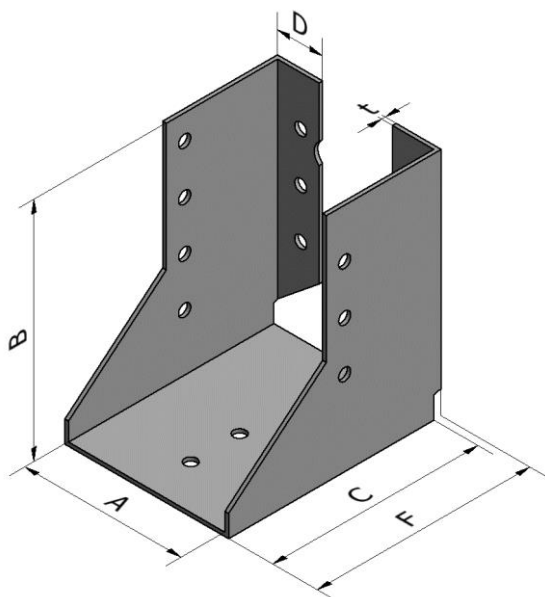1st blank model                    2nd blank model
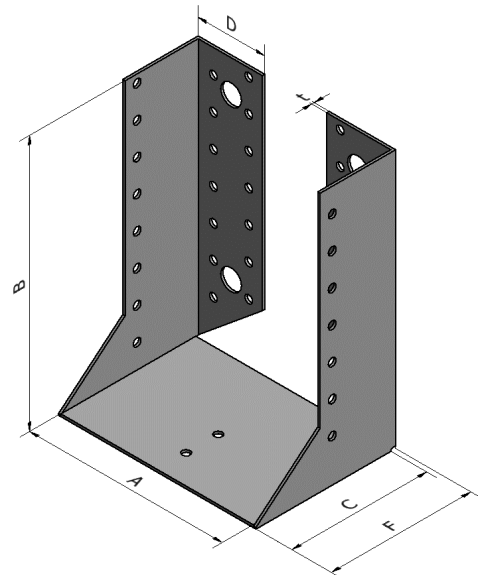
3rd blank model



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 3$^{rd}$ 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 SAIX - Partial nailing - F1**
For 1$^{st}$ blank model - See SAE Joist hanger

For 2nd blank model

| A | 380 nH 22 B | 380 nJ 12 $k_{H,1}$ | 440 nH 28 B | 440 nJ 15 $k_{H,1}$ | 500 nH 34 B | 500 nJ 18 $k_{H,1}$ |
|---|---|---|---|---|---|---|
| 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 Full nailing | Total number of nails in the header Partial nailing | $k_{H2}$ Full nailing | $k_{H2}$ Partial nailing |
|---|---|---|---|---|---|
| 1st blank model | 250 | | | | |
| 1st blank model | 300 | | | | |
| 1st blank model | 340 | See SAE Joist hanger | | | |
| 1st blank model | 380 | | | | |
| 1st blank model | 440 | | | | |
| 1st blank model | 500 | | | | |
| 2nd blank model | 380 | 22 | 12 | 27.4 | 15.4 |
| 2nd blank model | 440 | 28 | 14 | 41.8 | 19.9 |
| 2nd blank model | 500 | 34 | 18 | 59.3 | 32.1 |
| 3rd blank model | 250 | 6 | - | 4.7 | - |
| 3rd blank model | 300 | 10 | - | 11.1 | - |
| 3rd blank model | 340 | 12 | - | 15.4 | - |
| 3rd blank model | 380 | 12 | - | 15.4 | - |
| 3rd blank model | 440 | 14 | - | 20.3 | - |
| 3rd blank model | 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 $n_{J,ef,1}$ | Partial nailing $n_{J,ef,1}$ | Full nailing $n_{J,ef,2}$ | Partial nailing $n_{J,ef,2}$ |
| 1st blank model | 250 | | | | | | |
| | 300 | | | See SAE Joist hanger | | | |
| | 340 | | | | | | |
| | 380 | | | | | | |
| | 440 | | | | | | |
| | 500 | | | | | | |
| 2nd blank model | 380 | 12 | 6 | 8.76 | 4.91 | 7.69 | 4.00 |
| | 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 |

SAIX joist hangers are warranted for an installation on timber column. The partial nail pattern that applies then is the one described in Annex B3 for connection to column and above coefficients, valid for partial nailing, apply.

## D41   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 | - | - | - | - | - |
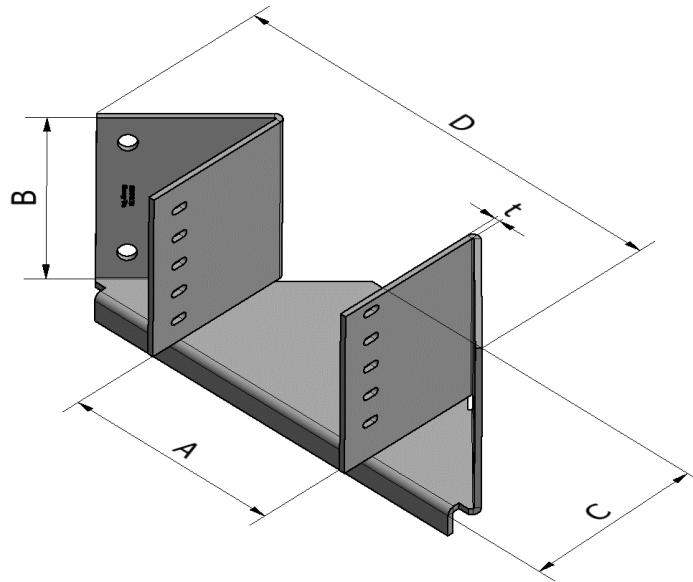


**Characteristic capacity for SAMI/4X - F1 - timber to timber**

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

## D42   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 | - | - | - | - | - | - | - |
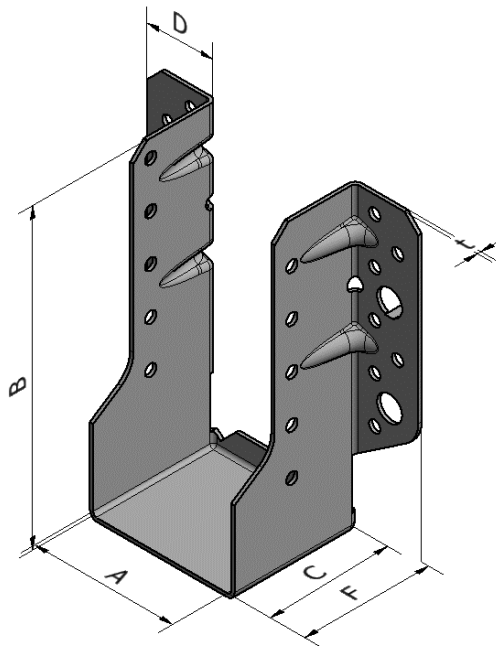
Parameters have to be used with equation in <u>Annex C</u>

## $k_{H,1}$ 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 $I_{p,fl}$ 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 |
| | | | $n_{J,ef,1}$ | $n_{J,ef,1}$ | $n_{J,ef,2}$ | $n_{J,ef,2}$ | $I_{p,fl}$ | $I_{p,fl}$ |
| 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 |

**Characteristic capacity for SBE - with connector screw SSH/SSF**

| References | \<Fasteners>Header Qty | Header Type | Joist Qty | Joist Type | $R_{1.k}$ 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | $R_{2.k}$ 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |

| References | Header Qty | Header Type | Joist Qty | Joist Type | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product capacities - Timber to Timber - Large connector screw ||||||||||||

Table 1 — Product capacities - Timber to Timber - Large connector screw; Characteristic capacities - Timber C24

| References | Qty | Type (Header) | Qty | Type (Joist) | $R_{1.k}$ 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | $R_{2.k}$ 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SBE230 | 2 | SSH10.0x40[1] | 6 | CNA* | 6,5 | 6,8 | 7,2 | 7,2 | 6,8 | 6,9 | 7,2 | 7,2 |
| SBE230 | 2 | SSH10.0x50[1] | 6 | CNA* | 7,8 | 8,2 | 8,9 | 9,1 | 7,8 | 8,6 | 9,1 | 9,2 |
| SBE260 | 2 | SSH10.0x40[1] | 8 | CNA* | 7,2 | 7,2 | 7,2 | 7,2 | 7,2 | 7,2 | 7,2 | 7,2 |
| SBE260 | 2 | SSH10.0x50[1] | 8 | CNA* | 9,2 | 9,4 | 9,4 | 9,4 | 9,2 | 9,4 | 9,4 | 9,4 |
| SBE320 | 2 | SSH10.0x40[1] | 10 | CNA* | 6,7 | 6,7 | 6,7 | 6,7 | 6,7 | 6,7 | 6,7 | 6,7 |
| SBE320 | 2 | SSH10.0x50[1] | 10 | CNA* | 8,8 | 8,8 | 8,8 | 8,8 | 8,8 | 8,8 | 8,8 | 8,8 |
| SBE380 | 4 | SSH10.0x40[1] | 12 | CNA* | 12,8 | 12,8 | 12,8 | 12,8 | 12,8 | 12,8 | 12,8 | 12,8 |
| SBE380 | 4 | SSH10.0x50[1] | 12 | CNA* | 15,7 | 16,4 | 16,8 | 16,8 | 15,7 | 16,5 | 16,8 | 16,8 |
| SBE440 | 4 | SSH10.0x40[1] | 14 | CNA* | 13,5 | 13,5 | 13,5 | 13,5 | 13,5 | 13,5 | 13,5 | 13,5 |
| SBE440 | 4 | SSH10.0x50[1] | 14 | CNA* | 17,4 | 17,6 | 17,6 | 17,6 | 17,4 | 17,6 | 17,6 | 17,6 |
| SBE500 | 4 | SSH10.0x40[1] | 16 | CNA* | 13,5 | 13,5 | 13,5 | 13,5 | 13,5 | 13,5 | 13,5 | 13,5 |
| SBE500 | 4 | SSH10.0x50[1] | 16 | CNA* | 17,6 | 17,6 | 17,6 | 17,6 | 17,6 | 17,6 | 17,6 | 17,6 |

[1] *SSH can be replaced by SSF*

Product capacities - Timber to Timber - Large connector screw; Characteristic capacities - Timber C24

| References | Qty | Type (Header) | Qty | Type (Joist) | $R_{3.k}$ 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 | $R_{4.k}$ 4.0x35 | 4.0x40 | 4.0x50 | 4.0x60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SBE230 | 2 | SSH10.0x40[1] | 6 | CNA* | 1,5 | 1,7 | 2,2 | 2,6 | 5,0 | 5,0 | 5,0 | 5,0 |
| SBE230 | 2 | SSH10.0x50[1] | 6 | CNA* | 2,2 | 3,8 | 2,9 | 3,4 | 5,0 | 5,0 | 5,0 | 5,0 |
| SBE260 | 2 | SSH10.0x40[1] | 8 | CNA* | 1,3 | 1,5 | 1,9 | 2,3 | 5,0 | 5,0 | 5,0 | 5,0 |
| SBE260 | 2 | SSH10.0x50[1] | 8 | CNA* | 1,7 | 1,9 | 2,5 | 3,0 | 5,0 | 5,0 | 5,0 | 5,0 |
| SBE320 | 2 | SSH10.0x40[1] | 10 | CNA* | 1,2 | 1,3 | 1,6 | 1,8 | 5,0 | 5,0 | 5,0 | 5,0 |
| SBE320 | 2 | SSH10.0x50[1] | 10 | CNA* | 1,6 | 1,8 | 2,1 | 2,4 | 5,0 | 5,0 | 5,0 | 5,0 |
| SBE380 | 4 | SSH10.0x40[1] | 12 | CNA* | 1,9 | 2,0 | 2,4 | 2,8 | 10,0 | 10,0 | 10,0 | 10,0 |
| SBE380 | 4 | SSH10.0x50[1] | 12 | CNA* | 2,5 | 2,7 | 3,2 | 3,7 | 10,0 | 10,0 | 10,0 | 10,0 |
| SBE440 | 4 | SSH10.0x40[1] | 14 | CNA* | 1,9 | 2,0 | 2,3 | 2,6 | 10,0 | 10,0 | 10,0 | 10,0 |
| SBE440 | 4 | SSH10.0x50[1] | 14 | CNA* | 2,4 | 2,6 | 2,9 | 3,3 | 10,0 | 10,0 | 10,0 | 10,0 |
| SBE500 | 4 | SSH10.0x40[1] | 16 | CNA* | 1,5 | 1,7 | 1,9 | 2,1 | 10,0 | 10,0 | 10,0 | 10,0 |
| SBE500 | 4 | SSH10.0x50[1] | 16 | CNA* | 2,0 | 2,2 | 2,5 | 2,8 | 10,0 | 10,0 | 10,0 | 10,0 |

[1] *SSH can be replaced by SSF*

The user shall verify the transversal tension in timber, which is not included in these capacities.
*Refer to *Characteristic Capacities* table columns for type of fasteners that can be used on the joist. Capacities vary depending on fastener type used.

## D43 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 |
| SBE45/168/TF | 45 | 168 | 52.5 | 29 | 54 | 1.5 | 6 | Ø5 | 2 | Ø11 | 2 | Ø5 |
| Permitted deviation | - | - | ±1.0 | ±1.0 | ±1.0 | - | - | - | - | - | - | - |
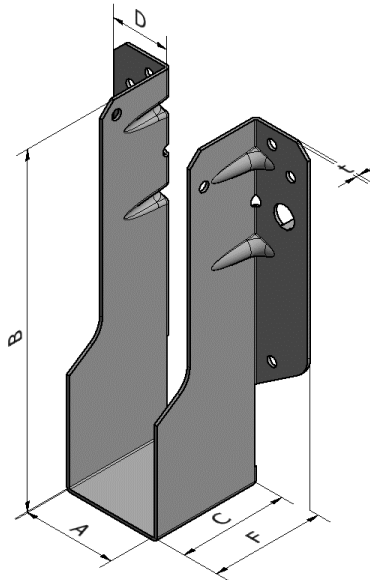


**Characteristic capacity for SBE45/168/TF - Full nailing - F1 - timber to timber**

| Model | Fasteners - CNA4.0x35 | | Characteristic capacity [kN] - C24 | |
|---|---|---|---|---|
| | nH | nJ | R1,k | R2,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 |

## D44   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
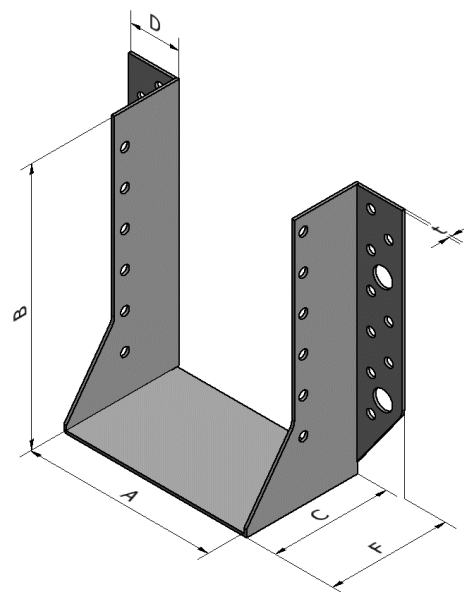
Parameters have to be used with equation in Annex C

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

| | 230 | | 260 | | 320 | | 380 | | 440 | | 500 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ |
| | 8 | 6 | 12 | 6 | 16 | 10 | 18 | 12 | 22 | 14 | 26 | 16 |
| **A** | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ |
| 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 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ | $n_H$ | $n_J$ |
| | 6 | 3 | 8 | 4 | 10 | 6 | 12 | 6 | 14 | 8 | 16 | 8 |
| A | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ | B | $k_{H,1}$ | H | $k_{H,1}$ |
| 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

## D45 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 | - | - | - | - | - | - | - |
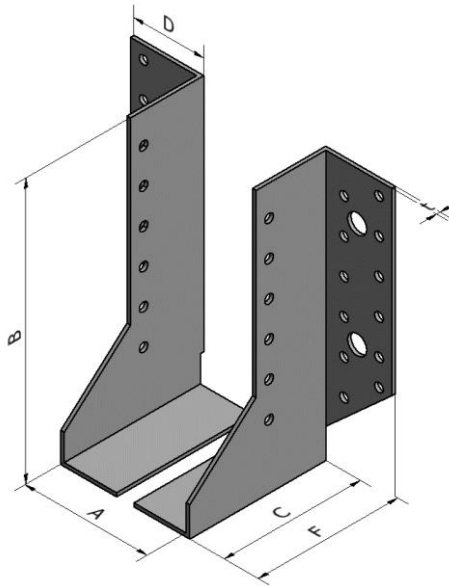


Parameters have to be used with equation in Annex C.

## $k_{H,1}$ 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 |

## D46  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 | - | - | - | - | - | - | - | - | - | - | - |
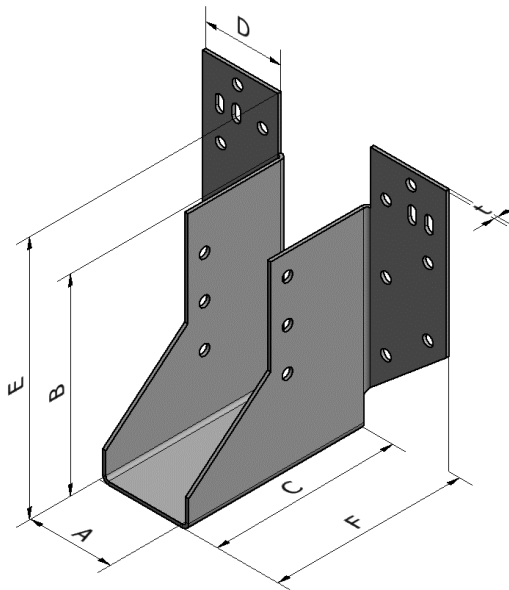


**Characteristic Capacities for SHT - Timber to Timber – C24**

| 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 |

## D47  SJH Joist hanger

**Dimensions**

| Model | Dimensions [mm] | | | | | Holes | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | t | Header | | | | Joist | |
| | | | | | | Qty | Size | Qty | Size | Qty | Size |
| SJH80 | 35.8 | 80 | 60 | 41.6 | 2 | 4 | Ø5 | 1 | Ø11 | 3 | Ø5 |
| SJH130 | 35.8 | 130 | 60 | 41.6 | 2 | 9 | Ø5 | 2 | Ø13 | 5 | Ø5 |
| SJH170 | 35.8 | 170 | 60 | 41.6 | 2 | 13 | Ø5 | 2 | Ø13 | 7 | Ø5 |



SJHR80    SJHR130    SJHL130    SJHR170

SJHR80-F    SJHR130-F    SJHL130-F    SJHR170-F
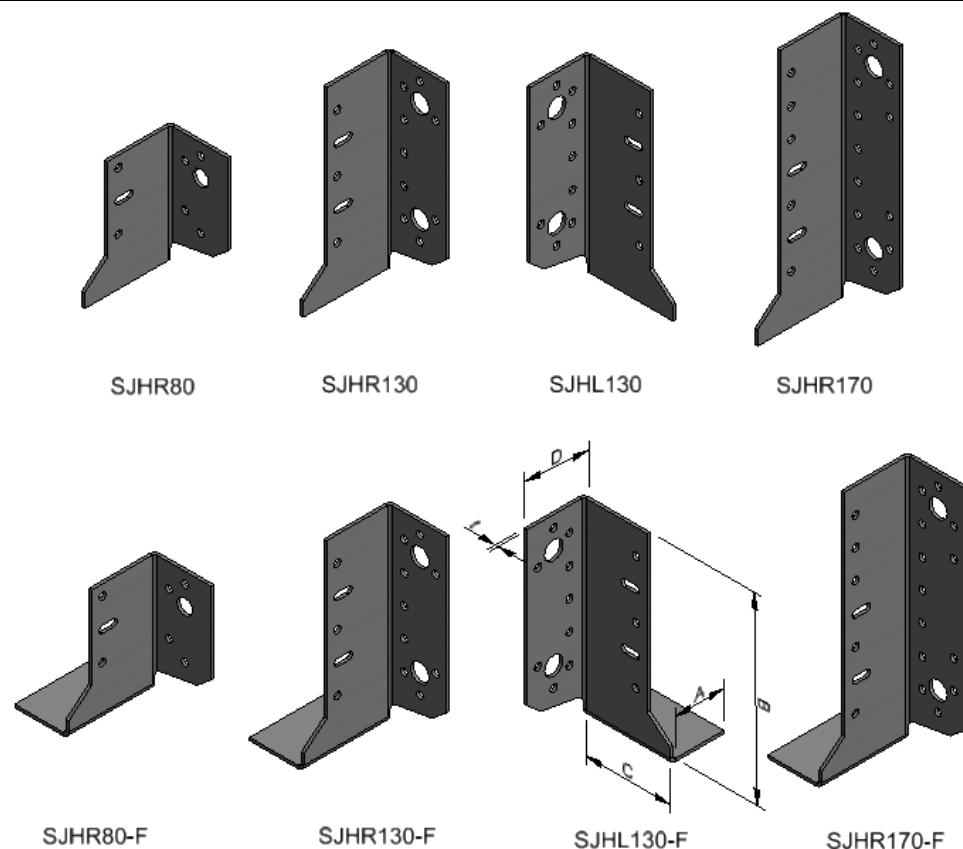
**Joist dimensions**

| Model | Joist dimensions with one pair of SJH [mm] | | | | |
|---|---|---|---|---|---|
| | Width* | | Height | | |
| | Min. | Max. | Min. | Max. | Max+** |
| SJH170 | 35 | 90 | 97 | 145 | 220 |
| SJH80 | 35 | 140 | 147 | 225 | 300 |
| SJH130 | 35 | 160 | 187 | 300 | 0 |

* When CNA4.0x50 or CSA5.0x50 is used, min joist width is 50 mm
** Reinforcement of joist with full threaded screw type ESCRFTZ required (recommended: 8.0x140 for SJH80, 8.0x220 for SJH130, 8.0x300 for SJH170)

**Characteristic capacities – Timber to timber C24**

| | Characteristic capacities per pair of half hangers - Timber to timber - C24 [kN] | | | | | |
|---|---|---|---|---|---|---|
| | Header | Joist | $R_{1.k} = R_{2.k}$ | | | |
| Model | $n_H$ | $n_J$ | CNA4.0x35 | CNA4.0x50 | CSA5.0x35 | CSA5.0x50 |
| SJH80 | 8 | 6 | 5.45 | 7.84 | 9.53 | 10.88 |
| SJH130 | 18 | 10 | 15.95 | 22.76 | 25.31 | 28.76 |
| SJH170 | 26 | 14 | 28.35 | 39.84 | 41.23 | 46.75 |

| Model | Header $n_H$ | Joist $n_J$ | $R_{3.k}$*** | | | | $R_{4.k}$ | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | CNA4.0x35 | CNA4.0x50 | CSA5.0x35 | CSA5.0x50 | CNA4.0x35 | CNA4.0x50 | CSA5.0x35 | CSA5.0x50 |
| SJH80 | 8 | 6 | 1.6 | 1.6 | 1.6 | 1.6 | 2.44 | 3.92 | 6.76 | 7.65 |
| SJH130 | 18 | 10 | 2.99 | 2.99 | 2.99 | 2.99 | 6.1 | 9.8 | 10.14 | 11.47 |
| SJH170 | 26 | 14 | 5.22 | 5.22 | 5.22 | 5.22 | 8.54 | 13.72 | 16.91 | 19.12 |

*Characteristic capacities per pair of half hanger - Timber to timber - C24 [kN]*

The capacities are valid for a pair of half hangers, which can be set on the joist symmetrically or on opposed corners, except for $R_{3.k}$*** which is only valid if half joist hangers are set on opposed corners (diagonally). For two pairs of hangers used on the same joist end, capacities can be multiplied by 2.

## D48   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
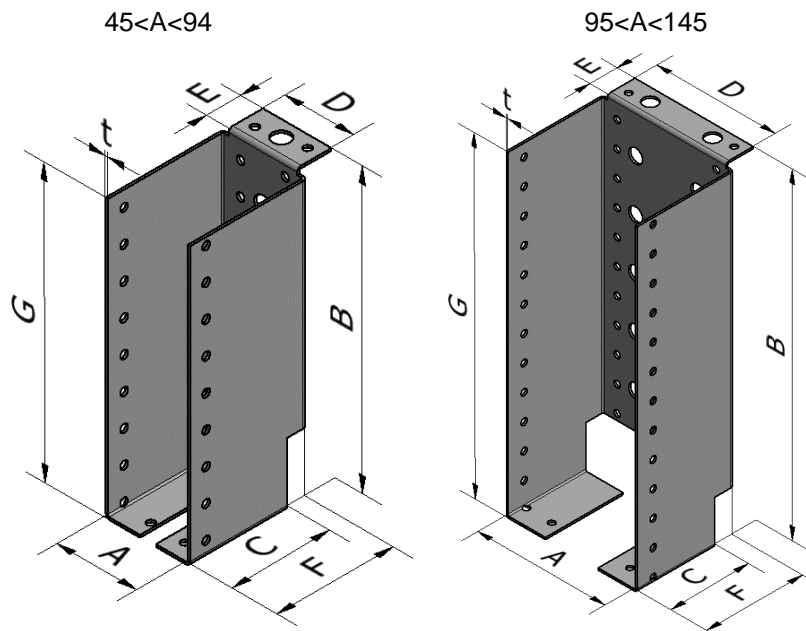
**Characteristic capacity for TFU - Timber to Timber - C24**

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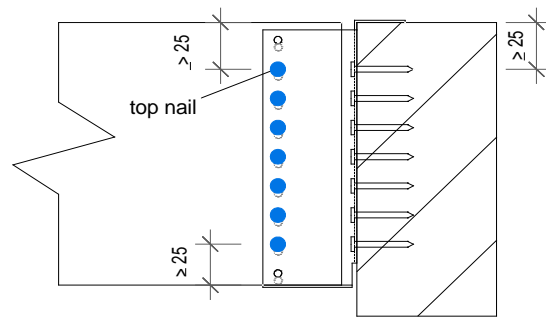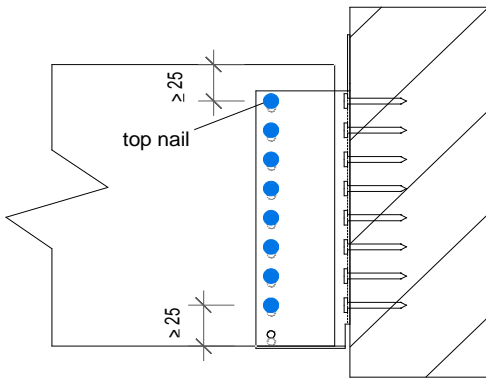
**Characteristic capacity for TFU - Timber to Rigid Support for A <70 and A ≥ 95mm**

| 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: $3{,}9/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $4{,}1/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $4{,}1/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $4{,}2/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | 2.65 /$k_{mod}$ |
| TFU A/120 | 1 | 8 | min of: $5{,}5/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $5{,}9/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $5{,}9/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $6{,}1/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | 3.21 /$k_{mod}$ |
| TFU A/141 | 2* | 10 | min of: $7{,}3/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $7{,}9/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $7{,}9/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $8{,}2/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | 3.77 /$k_{mod}$ |
| TFU A/158 | 2* | 12 | min of: $9{,}2/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $10{,}1/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $10{,}1/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $10{,}4/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | 4.32 /$k_{mod}$ |
| TFU A/181 | 2* | 14 | min of: $11{,}2/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $12{,}4/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $12{,}4/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $12{,}8/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | 4.88 /$k_{mod}$ |
| TFU A/198 | 2* | 16 | min of: $13{,}3/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $14{,}8/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $14{,}8/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $15{,}4/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | 5.44 /$k_{mod}$ |
| TFU A/221 | 2* | 18 | min of: $15{,}5/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $17{,}4/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $17{,}4/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $18{,}1/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | 6,0 /$k_{mod}$ |
| TFU A/238 | 2* | 20 | min of: $17{,}8/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $20{,}0/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $20{,}0/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $20{,}9/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | 6.56 /$k_{mod}$ |
| TFU A/261 | 2* | 22 | min of: $20{,}2/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $22{,}8/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $22{,}8/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $23{,}8/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | 7.11 /$k_{mod}$ |
| TFU A/278 | 2* | 24 | min of: $22{,}6/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $25{,}6/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $25{,}6/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $26{,}8/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | 7.67 /$k_{mod}$ |
| TFU A/300 | 2* | 26 | min of: $25{,}1/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $28{,}5/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $28{,}5/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | min of: $29{,}9/k_{mod}^{0.5}$; $n_b$x5.8/$k_{mod}$ | 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 $70 \leq A < 95$ mm

| Model | Fasteners | | $R_{1.k}$ and $R_{2.k}$ [kN] for $70 \leq A < 95$ mm | | | | $R_{3.k}$ [kN] |
|---|---|---|---|---|---|---|---|
| | $n_H$ | $n_J$ | CNA4,0x35 | CNA4,0x40 | CNA4,0x50 | CNA4,0x60 | all |
| TFU A/100 (96) | 2 | 6 | min of: $2{,}7/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $2{,}8/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $3{,}0/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $3{,}1/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | 2.65 /$k_{mod}$ |
| TFU A/120 | 2 | 8 | min of: $3{,}9/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $4{,}1/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $4{,}5/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $4{,}7/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | 3.21 /$k_{mod}$ |
| TFU A/141 | 4* | 10 | min of: $5{,}3/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $5{,}6/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $6{,}2/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $6{,}4/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | 3.77 /$k_{mod}$ |
| TFU A/158 | 4* | 12 | min of: $6{,}8/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $7{,}2/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $8{,}1/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $8{,}4/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | 4.32 /$k_{mod}$ |
| TFU A/181 | 4* | 14 | min of: $8{,}5/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $9{,}0/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $10{,}1/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $10{,}6/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | 4.88 /$k_{mod}$ |
| TFU A/198 | 4* | 16 | min of: $10{,}2/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $10{,}8/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $12{,}3/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $12{,}9/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | 5.44 /$k_{mod}$ |
| TFU A/221 | 4* | 18 | min of: $12{,}1/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $15{,}0/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $14{,}6/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $15{,}4/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | 6.0 /$k_{mod}$ |
| TFU A/238 | 4* | 20 | min of: $14{,}0/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $17{,}1/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $17{,}1/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $18{,}0/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | 6.56 /$k_{mod}$ |
| TFU A/261 | 4* | 22 | min of: $16{,}0/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $19{,}4/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $19{,}7/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $20{,}7/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | 7.11 /$k_{mod}$ |
| TFU A/278 | 4* | 24 | min of: $18{,}1/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $21{,}8/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $22{,}4/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $23{,}6/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | 7.67 /$k_{mod}$ |
| TFU A/300 | 4* | 26 | min of: $20{,}3/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $25{,}1/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | min of: $26{,}5/k_{mod}^{0.5}$; $n_b x5.8/k_{mod}$ | 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 $F_2$.
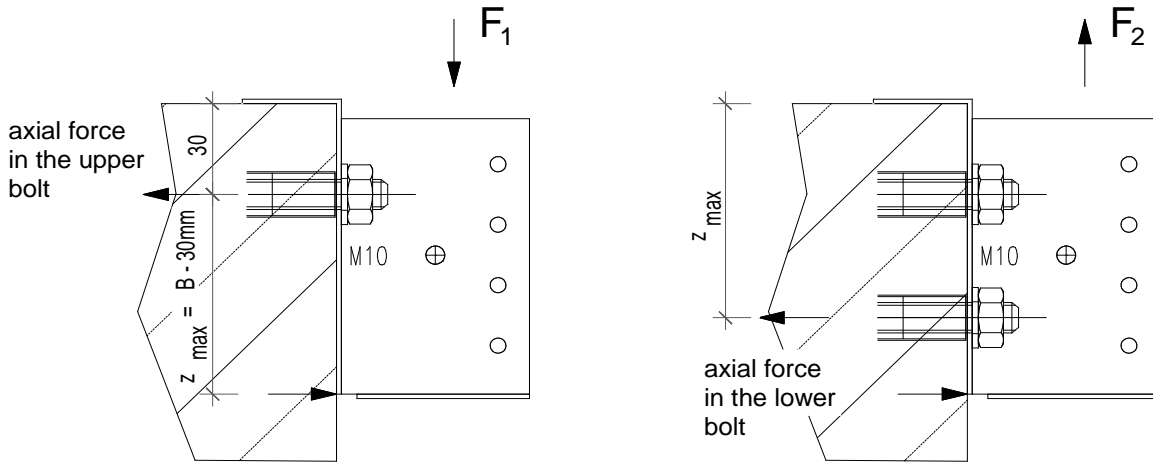
The forces in the bolts for $F_3$ have to be calculate as shown next.
An axial part for the bolts from the force $F_3$ can be neglected.
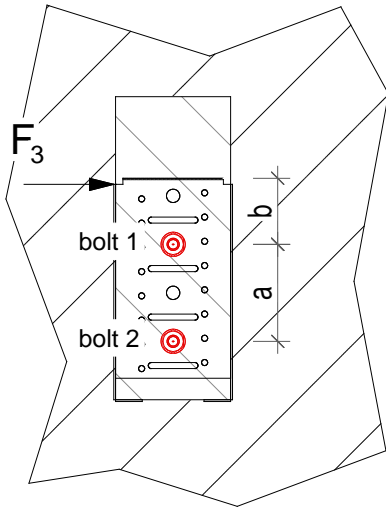
## D49   THA Straps hanger

| 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 | - | - | - | - | - |
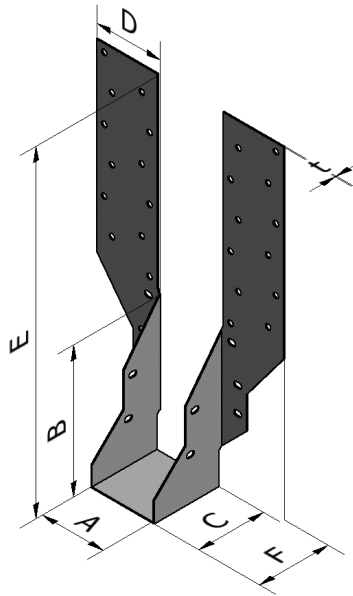


Parameters have to be used with equation in Annex C.

**Parameters for THA - F1 - Timber to timber**

| Model | l | $l_{ef}$ | S | $B_{eff}$ | $a-0.5a_c$ | e | $c_{hor}$ | kef | d | $n_{eff}$ (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 |

## D50   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 | 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 | 568 | 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 | 213 | 63.5 | 63.5 | 550 | 67 | 2 | 56 | Ø4.34 | - | - | 2 | Closed Pan |
| THAI1200 | 38 - 150 | (560-A)/2 | 63.5 | 63.5 | (1200-A)/2 | 67 | 2 | 48 | Ø5 | 8 | Ø13 | 6 | Ø5 |
| Permitted deviation | - | - | ±1.0 | ±1.0 | - | ±1.0 | - | - | - | - | - | - | - |
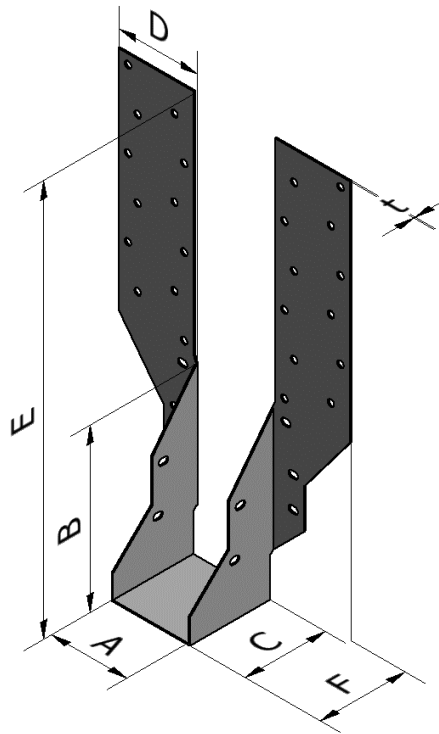
Parameters have to be used with equation in [Annex C](#).

## Parameters for THAI - F1 - timber to timber

| Model | l | $l_{ef}$ | S | $B_{eff}$ | $a-0.5a_c$ | e | $c_{hor}$ | kef | d | $n_{eff}$ (per flange) round wire | $n_{eff}$ (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 |
| THAI1200 | 63.5 | 124 | 49 | 109-0.32A | 200 | 37 | 15 | 1 | 1.1 | 5 | 2.5 |

| Hanger Type | Installation Configuration | Supporting Timber Fasteners | | | | Supported Timber Fasteners | |
|---|---|---|---|---|---|---|---|
| | | SS 3.75x75 | | ARS 4.0x50 | | ST 3.75x30 | SS 3.8x38 |
| | | Top | Face | Top | Face | | |
| THAI* | Face Fix | - | 20 | - | - | 2 | - |
| | | - | - | - | 20 | - | 2 |
| | Wrap Over | 4 | 2 | - | - | 2 | - |
| | | - | - | 4 | 2 | - | 2 |

*Except THAI1200*

| Hanger Type | Installation Configuration | Supporting Timber Fasteners | | | | Supported Timber Fasteners |
|---|---|---|---|---|---|---|
| | | ARS 4.0x50* | | SSH12.0x60 | | ARS 4.0x50* |
| | | Top | Face | Top | Face | |
| THAI1200 | Face Fix | - | 20 | - | - | 2 |
| | | - | - | - | 4 | 2 |
| | Wrap Over | 4 | 2 | - | - | 2 |

* *For width A ≤ 50 mm, ARS to be considered should be ARS 4.0x35*

## Parameters for THAI - F1 - timber to concrete

| Model | S | $B_{eff}$ | $z_{max}$ | e | d |
|---|---|---|---|---|---|
| THAI1200 | 49 | 109-0.32A | (1200-A)/2 - 310 | 37 | 1.1 |