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No 305/2011 of the European
Parliament and of the Council of 9
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MEMBER OF EOTA

European Technical Assessment ETA-09/0021 of 2014/01/10

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:

BB Joist Hangers type A, I and Split 2 mm

Product family to which the above construction product belongs:

EC PAC 13: Three-dimensional nailing plate (Joist hanger for wood to wood connections and wood to concrete or steel connections)

Manufacturer:

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Manufacturing plant:

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This European Technical Assessment contains:

31 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 previous ETA with the same number issued on 2009-01-27 and expiry on 2014-01-27

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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

BB joist hangers type A and I are one-piece non-welded, face-fixed joist hangers to be used in timber to timber connections. BB joist hangers type A are also used for connections between a timber joist and a concrete structure or a steel member.

BB joist hangers type split are two-piece non-welded, face-fixed joist hangers to be used in timber to timber connections.

The joist hangers are made from pre-galvanized steel Grade S 250 GD + Z (min Z275) according to EN 10346:2009. Dimensions, hole positions, steel type and typical installations are shown in Annex A.

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. The BB joist hangers type A are also intended for use in making an end-grain connection between a timber joist and a concrete structure or a steel member.

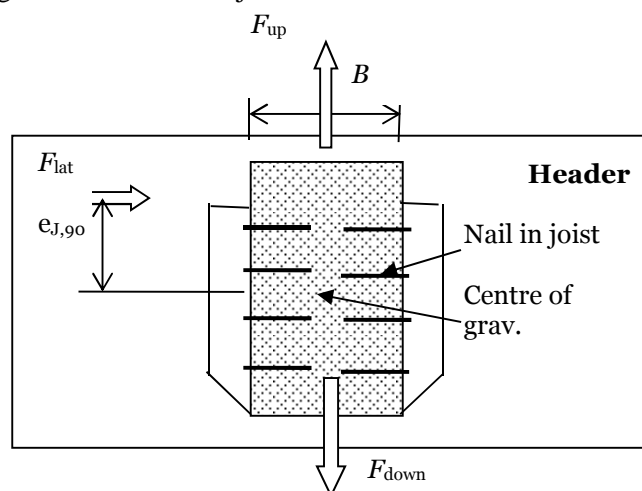
The joist hangers can be installed as connections between wood based members such as:

- 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,
- 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.

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.

Annex B states the formulas for the characteristic load-carrying capacities of the connections with joist hangers type A and I and a table with characteristic load-carrying-capacities of connections with joist hangers type split. The design of the connections shall be in accordance with Eurocode 5 or a similar national Timber Code.

It is assumed that the forces acting on the joist hanger connection are the following F_{up} , F_{down} and F_{lat} , as shown in the figure below. The forces F_{up} and F_{down} shall act in the middle of the joist hanger. The force F_{lat} is assumed to act $e_{J,90}$ 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.



It is assumed that the header beam is prevented from rotating. Similarly it is assumed that the concrete structure or the steel member to which the joist hanger is bolted does not rotate. If the header beam only has installed a joist hanger on one side the eccentricity moment $M_v = F_d \cdot (B_H / 2 + e_{J,0})$ 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%.

It is a condition for a force F_{lat} perpendicular to the vertical symmetry line that the joist hanger is connected to a wood-based header with nails in all holes (full nailing) or in all holes marked for partial nailing.

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

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

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

The hold downs may also be used for connections between a timber member and a member of concrete or steel.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the hold downs of 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

| Characteristic | Assessment of characteristic |
|--|--|
| 3.1 Mechanical resistance and stability*) (BR1) | |
| Characteristic load-carrying capacity | See Annex B |
| Stiffness | No performance determined |
| Ductility in cyclic testing | No performance determined |
| 3.2 Safety in case of fire (BR2) | |
| Reaction to fire | The joist hangers are made from steel classified as Euroclass A1 in accordance with EN 1350-1 and EC decision 96/603/EC, amended by EC Decision 2000/605/EC |
| 3.3 Hygiene, health and the environment (BR3) | |
| Influence on air quality | No dangerous materials |
| 3.4 Safety in use (BR4) | |
| Not relevant | |
| 3.5 Protection against noise (BR5) | |
| Not relevant | |
| 3.6 Energy economy and heat retention (BR6) | |
| Not relevant | |
| 3.7 Sustainable use of natural resources (BR7) | |
| Not relevant | |
| 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 A |

*) See additional information in section 3.8 – 3.9.

In addition to the specific clauses relating to dangerous substances contained in this European technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.9 Methods of verification

Safety principles and partial factors

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

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

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

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

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

3.10 Mechanical resistance and stability

See annex B for characteristic load-carrying capacities of the joist hangers.

The characteristic capacities of the joist hangers are determined by calculation assisted by 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 on page 13 in Annex A:

Threaded nails (ringed shank nails) in accordance to EN 14592

In the formulas in Annex B the capacities for threaded nails calculated from the formulas of Eurocode 5 are used assuming a thick steel plate when calculating the lateral nail load-carrying-capacity.

Further, the joist hangers may be fastened to a concrete structure or steel member by bolts with a diameter of 10 mm in holes with a diameter up to 2 mm larger than the bolt.

The load bearing capacities of the brackets has been determined based on the use of connector nails 4,0 x L mm in accordance with the German national approval for the nails.

The characteristic withdrawal capacity of the nails has to be determined by calculation in accordance with EN 1995-1-1: 2004, paragraph 8.3.2 (head pull-through is not relevant):

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

Where:

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

Based on tests by Versuchsanstalt für Stahl, Holz und Steine, University of Karlsruhe, the characteristic value of the withdrawal resistance for the threaded nails used can be calculated as:

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

Where:

| | |
|------------|--|
| σ_k | Characteristic density of the timber in kg/m^3 |
|------------|--|

The shape of the nail directly under the head shall be in the form of a truncated cone with a diameter under the nail head which exceeds the hole diameter.

4,0 mm threaded nails with a truncated cone below the head are used as fasteners, which are particularly suitable for nailed steel-to-timber connections. The specific shape below the head causes a clamping of nails in the steel plate.

No performance has been determined in relation to ductility of a joint under cyclic testing. The contribution to the performance of structures in seismic zones, therefore, has not been assessed.

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

3.11 Aspects related to the performance of the product

3.11.1 Corrosion protection in service class 1 and 2.

The joist hangers have a zinc coating weight of min Z275. The steel employed is S250 GD with min Z275 according to EN 10346:2009.

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

The hold downs 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

The nailing pattern used shall be either the maximum or the minimum pattern as defined in Annex A.

The following provisions concerning product performance apply:

Joist hanger connections

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

Header – support conditions

- The header beam 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 $M_{ec} = R_{joist} (b_{header}/2 + e_{1,0})$ shall be considered at the strength verification of the header.

| | |
|--------------|---|
| R_{joist} | Reaction force from the joists |
| b_{header} | Width of header |
| $e_{1,0}$ | Distance from the centroid of the nails in the joist to the surface 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 are fastened to wood-based members by nails.
- There shall be nails in all holes or a partial nailing pattern as prescribed in Annex A-D may be used.
- The characteristic capacity of the joist hanger connection is calculated according to the manufacturer's technical documentation, dated 2008-11-22.
- 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 the gap between the

surface of the end of the joist and that of the header shall be maximum 3 mm.

Joist hangers with inward flaps the gap between the surface of the nail heads in the inward flaps and the end of the joist shall be maximum 8 mm.

- For joist hangers A, I and split the width of the joist shall be at least $l + 4d$, where l is the length of the fasteners and d is the fastener diameter in the joist, for full nailing and partial nailing without staggering the fasteners in the joist. For nailing with staggered fasteners in the joist the width shall be at least the penetration length of the fasteners.
- 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 $B - 3$ mm, where B 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 fastener in the joist.
- Nails to be used shall have a diameter, which fits the holes of the joist hangers.

Wood to concrete or steel

The above mentioned rules for wood to wood connections are applicable also for the connection between the joist and the 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.
- The upper bolts shall have washers according to EN ISO 7094.

4 Attestation and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the decision 97/638/EC of the European Commission¹, as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 2+.

- a) Tasks for the manufacturer:
Factory production control,
 - (1) Initial type testing of the product,
- b) Tasks for the notified body:
 - (1) Initial inspection of the factory and the factory production control,
 - (2) Continuous surveillance

5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

5.1 Tasks of the manufacturer

5.1.1 Factory production control

The manufacturer has a factory production control system in the plant and exercises permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. This production control system ensures that the product is in conformity with the European Technical Assessment.

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the control plan¹. The incoming raw materials shall be subject to controls and tests by the manufacturer before acceptance. Check of materials, such as sheet metal, shall include control of the inspection documents presented by suppliers (comparison with nominal values) by verifying dimension and determining material properties, e.g. chemical composition, mechanical properties.

The manufactured components are checked visually and for dimensions.

The control plan, which is part of the technical documentation of this European Technical Assessment, includes details of the extent, nature and frequency of testing and controls to be performed within the factory

¹ The control plan has been deposited at ETA-Danmark and is only made available to the approved bodies involved in the AVCP procedure.

production control and has been agreed between the Assessment holder and ETA-Danmark.

The results of factory production control are recorded and evaluated. The records include at least the following information:

- Designation of the product, basic material and components;
- Type of control or testing;
- Date of manufacture of the product and date of testing of the product or basic material and components;
- Result of control and testing and, if appropriate, comparison with requirements;
- Signature of person responsible for factory production control.

The records shall be presented to ETA Danmark on request.

5.1.2 Initial type testing of the product

For initial type-testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary initial type testing has to be agreed between ETA-Danmark and the notified body.

5.2. Tasks of notified bodies

5.2.1 Initial inspection of factory and of factory production control

The Notified body shall ascertain that, in accordance with the control plan, the factory and the factory production control are suitable to ensure continuous and orderly manufacturing of the anchor according to the specifications mentioned in 2.1 as well as to the Annexes to the European Technical Assessment.

5.2.2 Continuous surveillance

The Notified body shall visit the factory at least once a year for regular inspection. It has to be verified that the system of factory production control and the specified automated manufacturing process are maintained taking account of the control plan.

Continuous surveillance and assessment of factory production control have to be performed according to the control plan.

The results of product certification and continuous surveillance shall be made available on demand by the certification body or inspection body, respectively, to ETA-Danmark. In cases where the provisions of the European Technical Assessment and the control plan are no longer fulfilled the conformity certificate shall be withdrawn.

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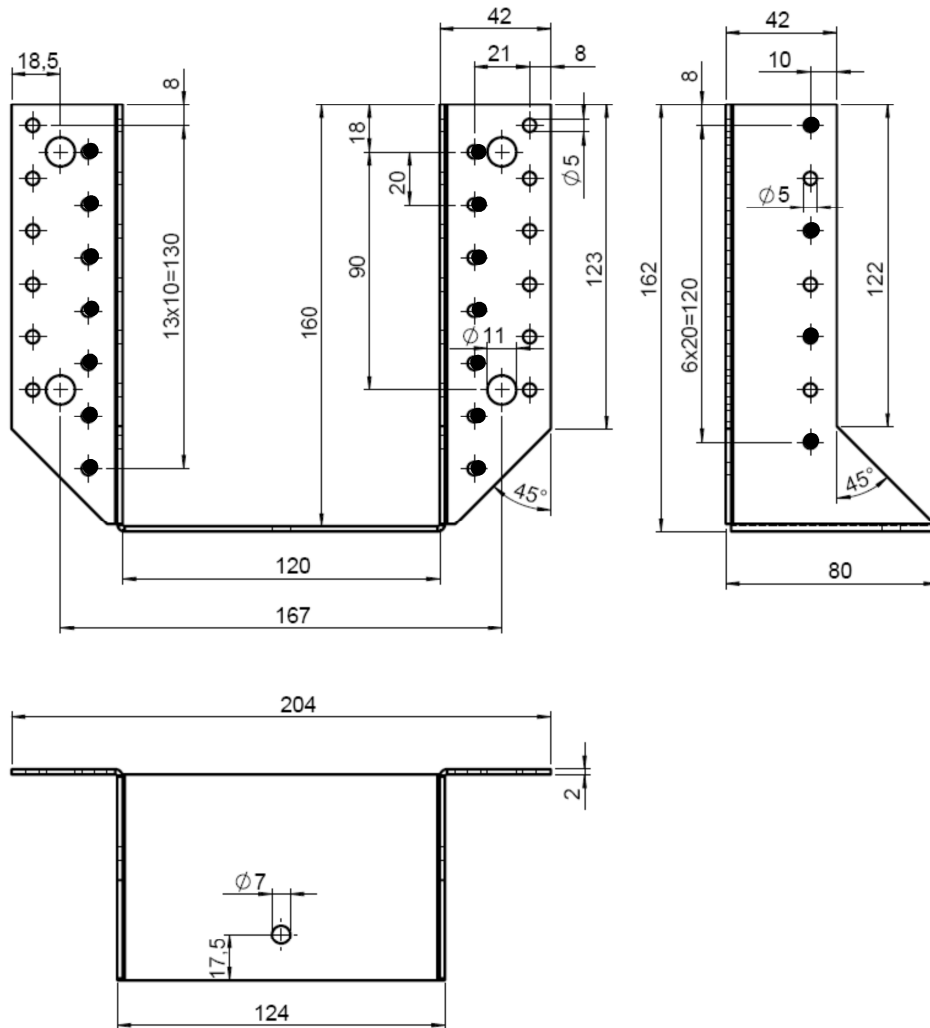
A handwritten signature in blue ink, appearing to read 'Thomas Bruun', is positioned above the printed name. The signature is fluid and cursive, with a prominent loop at the beginning.

Thomas Bruun
Manager, ETA-Danmark

Annex A
Product details and definitions

Joist hanger type A

Face mount hanger with external flanges. 2.0 mm thick pre-galvanized steel S250GD + Z (min Z275) according to EN 10326:2004 with tolerances according to EN 10143:1993.



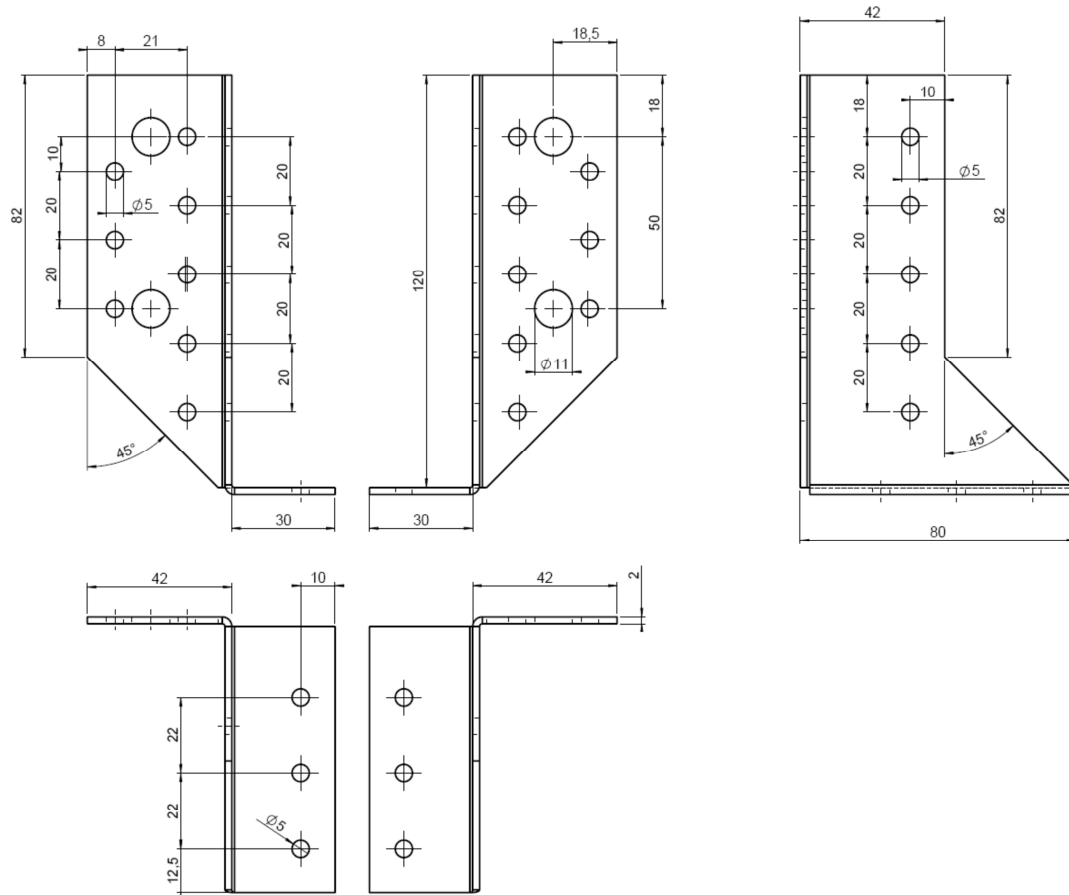
- Partial nailing; Drawing: Blank 440, 2,0 mm steel

| Blank | Total n° of nail holes | | Width interval | | Height interval | | Bolt holes | | A |
|-------|------------------------|----------------|----------------|-----|-----------------|-------|------------|----------|----------|
| | n _H | n _V | min | max | min | max | n° | Diameter | |
| 200 | 8 | 6 | 25 | 64 | 68 | 87,5 | 2 | 11 | = B + 84 |
| 210 | 10 | 6 | 25 | 50 | 80 | 92,5 | 2 | 11 | = B + 84 |
| 220 | 10 | 6 | 25 | 60 | 80 | 97,5 | 2 | 11 | = B + 84 |
| 240 | 10 | 6 | 32 | 80 | 80 | 104 | 2 | 11 | = B + 84 |
| 250 | 14 | 8 | 32 | 50 | 100 | 109 | 4 | 11 | = B + 84 |
| 260 | 14 | 8 | 40 | 60 | 100 | 110 | 4 | 11 | = B + 84 |
| 280 | 14 | 8 | 40 | 80 | 100 | 110 | 2 | 11 | = B + 84 |
| 300 | 14 | 8 | 45 | 100 | 100 | 127,5 | 4 | 11 | = B + 84 |
| 320 | 16 | 10 | 50 | 100 | 110 | 135 | 4 | 11 | = B + 84 |
| 340 | 18 | 10 | 50 | 100 | 120 | 145 | 4 | 11 | = B + 84 |
| 360 | 22 | 12 | 60 | 80 | 140 | 150 | 4 | 11 | = B + 84 |
| 380 | 24 | 12 | 60 | 76 | 152 | 160 | 4 | 11 | = B + 84 |
| 400 | 22 | 12 | 60 | 120 | 140 | 170 | 4 | 11 | = B + 84 |
| 420 | 26 | 14 | 80 | 100 | 160 | 170 | 4 | 11 | = B + 84 |
| 440 | 26 | 14 | 80 | 120 | 160 | 180 | 4 | 11 | = B + 84 |
| 480 | 30 | 16 | 80 | 120 | 180 | 200 | 6 | 11 | = B + 84 |
| 500 | 30 | 16 | 80 | 140 | 180 | 210 | 6 | 11 | = B + 84 |

Joist hanger's height = (blank – width)/2

Joist hanger type split

Face mount hanger with external flanges. 2.0 mm thick pre-galvanized steel S250GD + Z (min Z275) according to EN 10326:2004 with tolerances according to EN 10143:1993.



Drawing: Size 30 x 120, 2,0 mm steel

| Size | Total n° of nail holes | |
|----------|------------------------|----------------|
| | n _H | n _J |
| 30 x 80 | 10 | 6 |
| 30 x 100 | 14 | 8 |
| 30 x 120 | 16 | 10 |
| 30 x 140 | 22 | 12 |
| 30 x 160 | 24 | 12 |

Fastener types and sizes

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

| BOLTS diameter | Correspondence Hole diameter | Bolts type |
|----------------|--|---------------------------------------|
| 10.0 | Max. 2 mm. larger than the bolt diameter | See specification of the manufacturer |

Annex B

Characteristic values of load-carrying-capacities

Characteristic capacities of the joist hanger connections with nails only

The downward and the upward directed forces are assumed to act in the middle of the joist. The lateral force is assumed to act at an distance $e_{J,90}$ above the centre of gravity of the nails in the joist.

Two nails patterns are specified. A full nailing pattern, where there are nails in all the holes and a partial nailing pattern, where the number of nails in the joist and the header are at least half the numbers specified for full nailing. The nails in the joist may be staggered. The nails in the header shall be put in the holes closest to the bend line.

For BB joist hangers the width of the joist shall be at least $l+4d$, where l 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.

B.1 Joist hangers types A and I fastened with nails

Force downward toward the bottom plate:

$$F_{Z,Rd} = \min \left\{ \frac{(n_J + 2) \cdot F_{v,J,Rd}}{\sqrt{\left(\frac{1}{n_H \cdot F_{v,H,Rd}}\right)^2 + \left(\frac{1}{k_{H,1} \cdot F_{ax,H,Rd}}\right)^2}} \right. \quad (B.1.1.1)$$

Force upward away from the bottom plate:

$$F_{Z,Rd} = \min \left\{ \frac{n_J \cdot F_{v,J,Rd}}{\sqrt{\left(\frac{1}{n_H \cdot F_{v,H,Rd}}\right)^2 + \left(\frac{1}{k_{H,2} \cdot F_{ax,H,Rd}}\right)^2}} \right. \quad (B.1.1.2)$$

Lateral force:

$$F_{Y,Rd} = \min \left\{ \frac{n_J \cdot F_{v,J,Rd}}{\sqrt{\left(\frac{2 \cdot \sqrt{e_{J,0}^2 + e_{J,90}^2}}{b_J}\right)^2 + \left(\frac{F_{v,J,Rd}}{F_{ax,J,Rd}}\right)^2}} \right. \quad (B.1.1.3)$$

$$\left. \frac{F_{v,H,Rd}}{\sqrt{\left(\frac{1}{n_H} + \frac{e_H}{e_1}\right)^2 + \left(\frac{e_H}{e_2}\right)^2}} \right\}$$

n_J total number of nails in both sides of the joist

n_H total number of nails in the side of the header

$F_{v,Rd}$ Characteristic lateral load-carrying capacity of the fasteners in the joist or in the header indicated by the indices J or H

$F_{ax,Rd}$ Characteristic axial load-carrying capacity of the fasteners in the joist or in the header indicated by the indices J or H

b_J width of the joist hanger, see figure B1.

$e_{J,90}$ distance of the lateral force above the centre of gravity of the nails in the joist, see figure B1.

$e_{J,0}$ distance from the nails in the joist to the surface of the header, see figure B1.

e_H distance of the lateral force above the centre of gravity of the nails in the header.

e_1 joist hanger dimension, see Annex C

e_2 joist hanger dimension, see Annex C

$k_{H,1}$ form factor, see Annex C

$k_{H,2}$ form factor, see Annex C

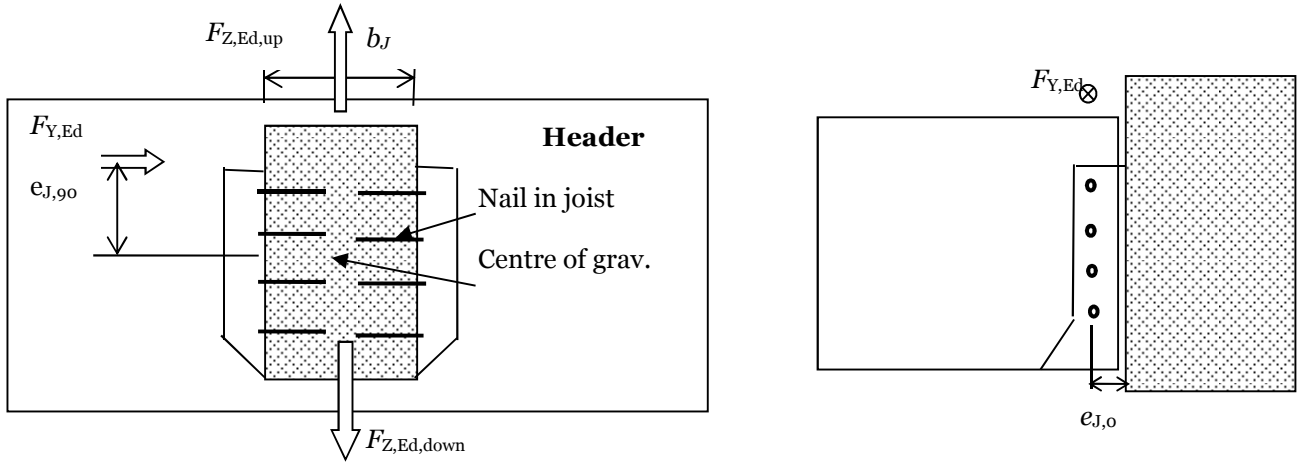


Figure B1: Definition of $e_{J,90}$ and $e_{J,0}$

B.1.2 Combined forces

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

$$\left(\frac{F_{Y,Ed}}{F_{Y,Rd}} \right)^2 + \left(\frac{F_{Z,Ed}}{F_{Z,Rd}} \right)^2 \leq 1 \quad (\text{B.1.2.1})$$

B.2 Joist hangers type split fastened with nails

| Type | Force downward towards or upward away from the bottom plate $F_{Z,Rk}$ [kN] | Lateral Force $F_{Y,Rk}$ [kN] | |
|----------|--|----------------------------------|-------|
| | Timber | Timber | Steel |
| 30 x 80 | 5,01 | 9,70 | 4,09 |
| 30 x 100 | 8,11 | 13,6 | 5,13 |
| 30 x 120 | 10,8 | 15,5 | 6,14 |
| 30 x 140 | 15,3 | 20,8 | 7,18 |
| 30 x 150 | 17,0 | 21,8 | 7,30 |
| 30 x 160 | 18,9 | 22,9 | 7,42 |

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

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

B.2.2 Combined forces

If the forces $F_{Y,Ed}$ and $F_{Z,Ed}$ act at the same time or if $e_H \neq 0$, the following inequality shall be fulfilled:

$$\left(\frac{F_{Y,Ed}}{F_{Y,Rd}} \right)^2 + \left(\frac{F_{Z,Ed} + 2 \cdot \Delta F_{Z,Ed}}{F_{Z,Rd}} \right)^2 \leq 1 \quad (\text{B.2.1})$$

Where:

$$\Delta F_{Z,Ed} = F_{Y,Ed} \cdot \frac{e_H}{B} \quad (\text{B.2.2})$$

B.3 Characteristic capacities of the joist hanger type A connections with bolts

For joist hangers type A 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, see clause B.1;
- The bolts shall always be positioned symmetrically about the vertical axis of the joist hanger;
- Washers according to EN ISO 7094 shall be installed at least under the upper 2 bolt heads or nuts.

Description of the static model

For a downward directed force toward the bottom plate the static behavior is basically the same as for a wood-wood connection with nails.

The nails in the joist are subjected to a lateral force, which is equally distributed over all nails in the joist.

Since the concrete and steel have a larger compressive strength than timber subjected perpendicular to the grain the rotation point may be assumed positioned at the top of the bottom plate.

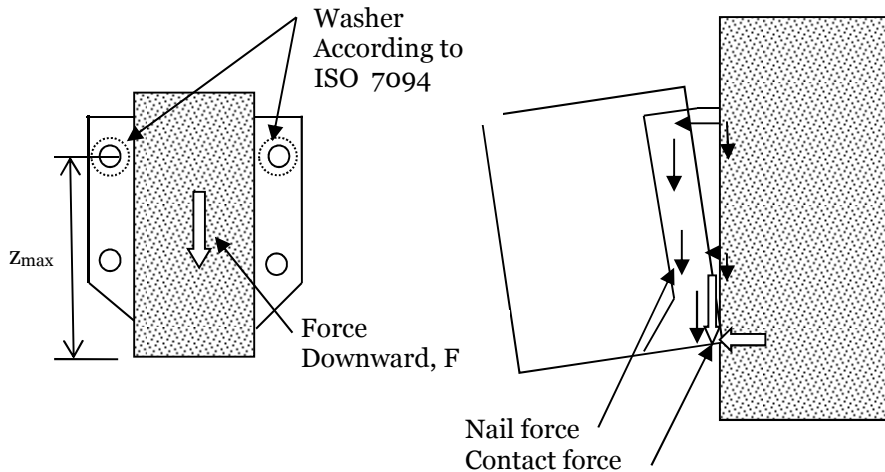


Figure B2 Left: Cross section in joist. Right: The joist will deflect and rotate, at the bottom a contact force will occur at the bottom plate, and the withdrawal forces in the bolts in the wall will vary linearly as assumed for nailed connections in the header.

The forces in the bolts will be partly lateral forces, partly withdrawal forces. The lateral forces are distributed evenly over all bolts. The withdrawal forces are on the safe side assumed to be taken by the 2 upper bolts with washers. The maximum withdrawal force in a upper bolt can be calculated from

$$F_{\text{ax,bolt}} = \frac{F \cdot e_{J,0}}{2 \cdot z_{\text{max}}} \quad (\text{B.3.1})$$

Where

F downward directed force toward the bottom plate;

$e_{J,0}$ eccentricity = distance from the nail column in the joist to the surface of the header;

z_{max} max distance from upper bolt to the bottom plate (rotation point).

The upper 2 bolts are critical. They are subjected to a lateral force and a withdrawal force. The lateral force is determined assuming an even distribution of the downward force F.

$$F_{\text{lat,bolt}} = F / n_{\text{bolt}} \quad (\text{B.3.2})$$

Characteristic capacities of a bolted joist hanger connection

The Characteristic capacity of the connection between the joist and the joist hanger may be calculated from the same assumptions and formulas as for joist hangers nailed to a wooden header beam.

$$F_{Z,Rk} = (n_J + 2) \cdot F_{v,J,Rk} \quad \text{for threaded nails} \quad (\text{B.3.3})$$

The upper 2 bolts are critical. They are subjected to a lateral force calculated from formula (B.3.2).

The withdrawal force in an upper bolt is calculated from (B.3.1).

Where

F downward directed force toward the bottom plate

n_{bolt} total number of bolts in the joist hanger

$e_{J,0}$ eccentricity = distance from the nail column in the joist to the surface of the header

z_{max} max distance from the upper bolt to the bottom plate (rotation point)

It shall be verified by the design of the bolted connection that the upper bolts have sufficient load-carrying capacity to carry the combined lateral and axial forces.

From the Characteristic load-carrying-capacity of the bearing resistance between the bolt and the plate of the joist hanger the following maximum characteristic capacity of the joist hanger connection can be determined.

$$F_{\text{bear,Rk}} = n_{\text{bolt}} \cdot f_{u,k} \cdot d \cdot t \quad (\text{B.3.4})$$

where

n_{bolt} total number of bolts in the 2 flaps

$f_{u,k}$ characteristic ultimate tensile strength of the steel

d diameter of the bolt

t thickness of the steel plate of the joist hanger

The characteristic load-carrying capacity of the joist hanger connections is the minimum of:

- The capacity determined from (B.3.3) from the fasteners in the joist;
- The capacity determined from (B.3.4) from the embedding strength of the steel plate against the bolt;
- The capacity controlled by the bolt forces given by (B.3.1) and (B.3.2).

Annex C
Form factors $k_{H,1}$ and $k_{H,2}$ and dimensions e_1 , e_2 and $e_{J,0}$

Table C1: Joist hanger type A with external flanges:
Form factors $k_{H,1}$ and $k_{H,2}$ and dimensions e_1 , e_2 ; $e_{J,0} = 32$ mm

| B [mm] | H [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] |
|--------------|-----------|-------|-------|-----------|-----------|---------------|---------------|-----------------|-------|-----------|-----------|---------------|---------------|
| Full nailing | | | | | | | | Partial nailing | | | | | |
| 25 | 87,5 | 8 | 6 | 12,3 | 1,17 | 835 | 272 | 4 | 4 | 5,75 | 0,81 | 240 | 126 |
| 32 | 84 | 8 | 6 | 11,5 | 1,23 | 975 | 296 | 4 | 4 | 5,35 | 0,85 | 292 | 137 |
| 36 | 82 | 8 | 6 | 11,0 | 1,27 | 1062 | 309 | 4 | 4 | 5,13 | 0,88 | 325 | 143 |
| 38 | 81 | 8 | 6 | 10,8 | 1,29 | 1107 | 316 | 4 | 4 | 5,02 | 0,89 | 342 | 146 |
| 40 | 80 | 8 | 6 | 10,6 | 1,31 | 1153 | 323 | 4 | 4 | 4,91 | 0,91 | 359 | 150 |
| 45 | 77,5 | 8 | 6 | 10,0 | 1,37 | 1272 | 341 | 4 | 4 | 4,63 | 0,95 | 406 | 158 |
| 50 | 75 | 8 | 4 | 9,43 | 1,43 | 1398 | 358 | 4 | 4 | 4,36 | 0,99 | 455 | 167 |
| 52 | 74 | 8 | 4 | 9,20 | 1,45 | 1450 | 366 | 4 | 4 | 4,25 | 1,00 | 476 | 170 |
| 54 | 73 | 8 | 4 | 8,98 | 1,48 | 1503 | 373 | 4 | 4 | 4,15 | 1,02 | 497 | 174 |
| 56 | 72 | 8 | 4 | 8,75 | 1,50 | 1558 | 380 | 4 | 4 | 4,04 | 1,04 | 519 | 177 |
| 58 | 71 | 8 | 4 | 8,53 | 1,53 | 1613 | 387 | 4 | 4 | 3,94 | 1,06 | 542 | 181 |
| 60 | 70 | 8 | 4 | 8,31 | 1,56 | 1670 | 394 | 4 | 4 | 3,83 | 1,08 | 565 | 184 |
| 62 | 69 | 8 | 4 | 8,09 | 1,59 | 1727 | 402 | 4 | 4 | 3,73 | 1,10 | 588 | 198 |
| 64 | 68 | 8 | 4 | 7,88 | 1,63 | 1786 | 409 | 4 | 4 | 3,63 | 1,13 | 612 | 202 |
| 25 | 92,5 | 10 | 6 | 13,3 | 2,52 | 726 | 316 | 6 | 4 | 8,15 | 1,68 | 283 | 218 |
| 32 | 89 | 10 | 6 | 12,3 | 2,64 | 851 | 344 | 6 | 4 | 7,57 | 1,76 | 341 | 231 |
| 36 | 87 | 10 | 6 | 11,8 | 2,72 | 928 | 360 | 6 | 4 | 7,25 | 1,81 | 378 | 240 |
| 38 | 86 | 10 | 6 | 11,5 | 2,76 | 968 | 369 | 6 | 4 | 7,09 | 1,84 | 397 | 244 |
| 40 | 85 | 10 | 6 | 11,2 | 2,80 | 1009 | 377 | 6 | 4 | 6,93 | 1,87 | 417 | 249 |
| 45 | 82,5 | 10 | 6 | 10,6 | 2,91 | 1116 | 399 | 6 | 4 | 6,53 | 1,94 | 469 | 260 |
| 50 | 80 | 10 | 6 | 9,90 | 3,02 | 1229 | 420 | 6 | 4 | 6,14 | 2,02 | 525 | 273 |
| 25 | 97,5 | 10 | 6 | 14,7 | 2,36 | 726 | 316 | 6 | 4 | 8,98 | 1,57 | 283 | 218 |
| 32 | 94 | 10 | 6 | 13,7 | 2,47 | 851 | 344 | 6 | 4 | 8,39 | 1,64 | 341 | 231 |
| 36 | 92 | 10 | 6 | 13,2 | 2,53 | 928 | 360 | 6 | 4 | 8,06 | 1,69 | 378 | 240 |
| 38 | 91 | 10 | 6 | 12,9 | 2,57 | 968 | 369 | 6 | 4 | 7,90 | 1,71 | 397 | 244 |
| 40 | 90 | 10 | 6 | 12,6 | 2,60 | 1009 | 377 | 6 | 4 | 7,74 | 1,74 | 417 | 249 |
| 45 | 87,5 | 10 | 6 | 11,9 | 2,70 | 1116 | 399 | 6 | 4 | 7,33 | 1,80 | 469 | 260 |
| 50 | 85 | 10 | 6 | 11,2 | 2,80 | 1229 | 420 | 6 | 4 | 6,93 | 1,87 | 525 | 273 |
| 52 | 84 | 10 | 6 | 11,0 | 2,84 | 1276 | 429 | 6 | 4 | 6,77 | 1,89 | 548 | 278 |
| 54 | 83 | 10 | 6 | 10,7 | 2,88 | 1324 | 438 | 6 | 4 | 6,61 | 1,92 | 572 | 283 |
| 56 | 82 | 10 | 6 | 10,4 | 2,93 | 1373 | 447 | 6 | 4 | 6,45 | 1,95 | 597 | 288 |
| 58 | 81 | 10 | 6 | 10,2 | 2,98 | 1423 | 455 | 6 | 4 | 6,30 | 1,98 | 622 | 293 |
| 60 | 80 | 10 | 6 | 9,90 | 3,02 | 1474 | 464 | 6 | 4 | 6,14 | 2,02 | 648 | 298 |
| 32 | 104 | 10 | 6 | 16,6 | 2,18 | 851 | 344 | 6 | 4 | 10,1 | 1,45 | 341 | 231 |
| 36 | 102 | 10 | 6 | 16,0 | 2,23 | 928 | 360 | 6 | 4 | 9,74 | 1,49 | 378 | 240 |
| 38 | 101 | 10 | 6 | 15,7 | 2,26 | 968 | 369 | 6 | 4 | 9,57 | 1,51 | 397 | 244 |
| 40 | 100 | 10 | 6 | 15,4 | 2,29 | 1009 | 377 | 6 | 4 | 9,40 | 1,52 | 417 | 249 |
| 45 | 97,5 | 10 | 6 | 14,7 | 2,36 | 1116 | 399 | 6 | 4 | 8,98 | 1,57 | 469 | 260 |
| 50 | 95 | 10 | 6 | 14,0 | 2,44 | 1229 | 420 | 6 | 4 | 8,56 | 1,62 | 525 | 273 |
| 52 | 94 | 10 | 6 | 13,7 | 2,47 | 1276 | 429 | 6 | 4 | 8,39 | 1,64 | 548 | 278 |
| 54 | 93 | 10 | 6 | 13,4 | 2,50 | 1324 | 438 | 6 | 4 | 8,23 | 1,67 | 572 | 283 |
| 56 | 92 | 10 | 6 | 13,2 | 2,53 | 1373 | 447 | 6 | 4 | 8,06 | 1,69 | 597 | 288 |
| 58 | 91 | 10 | 6 | 12,9 | 2,57 | 1423 | 455 | 6 | 4 | 7,90 | 1,71 | 622 | 293 |

Table C1 (contd.):

Joist hanger type A with external flanges:

Form factors $k_{H,1}$ and $k_{H,2}$ and dimensions e_1 , e_2 ; $e_{j,0} = 32$ mm

| B [mm] | H [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] |
|-----------|-----------|--------------|-------|-----------|-----------|---------------|---------------|-----------------|-------|-----------|-----------|---------------|---------------|
| | | Full nailing | | | | | | Partial nailing | | | | | |
| 60 | 90 | 10 | 6 | 12,6 | 2,60 | 1474 | 464 | 6 | 4 | 7,74 | 1,74 | 648 | 298 |
| 62 | 89 | 10 | 6 | 12,3 | 2,64 | 1526 | 473 | 6 | 4 | 7,57 | 1,76 | 674 | 303 |
| 64 | 88 | 10 | 6 | 12,1 | 2,68 | 1579 | 482 | 6 | 4 | 7,41 | 1,79 | 701 | 308 |
| 66 | 87 | 10 | 6 | 11,8 | 2,72 | 1633 | 491 | 6 | 4 | 7,25 | 1,81 | 729 | 313 |
| 68 | 86 | 10 | 6 | 11,5 | 2,76 | 1688 | 500 | 6 | 4 | 7,09 | 1,84 | 757 | 319 |
| 70 | 85 | 10 | 6 | 11,2 | 2,80 | 1744 | 509 | 6 | 4 | 6,93 | 1,87 | 786 | 324 |
| 72 | 84 | 10 | 6 | 11,0 | 2,84 | 1801 | 518 | 6 | 4 | 6,77 | 1,89 | 815 | 329 |
| 74 | 83 | 10 | 6 | 10,7 | 2,88 | 1859 | 527 | 6 | 4 | 6,61 | 1,92 | 845 | 335 |
| 76 | 82 | 10 | 6 | 10,4 | 2,93 | 1918 | 537 | 6 | 4 | 6,45 | 1,95 | 876 | 340 |
| 78 | 81 | 10 | 6 | 10,2 | 2,98 | 1978 | 546 | 6 | 4 | 6,30 | 1,98 | 907 | 345 |
| 80 | 80 | 10 | 6 | 9,90 | 3,02 | 2039 | 555 | 6 | 4 | 6,14 | 2,02 | 939 | 351 |
| 32 | 109 | 14 | 8 | 19,8 | 6,25 | 909 | 551 | 8 | 4 | 11,6 | 3,85 | 365 | 372 |
| 36 | 107 | 14 | 8 | 19,1 | 6,39 | 982 | 572 | 8 | 4 | 11,2 | 3,93 | 398 | 379 |
| 38 | 106 | 14 | 8 | 18,7 | 6,46 | 1020 | 583 | 8 | 4 | 11,0 | 3,98 | 415 | 383 |
| 40 | 105 | 14 | 8 | 18,3 | 6,54 | 1058 | 593 | 8 | 4 | 10,8 | 4,02 | 433 | 387 |
| 45 | 102,5 | 14 | 8 | 17,4 | 6,73 | 1159 | 621 | 8 | 4 | 10,3 | 4,14 | 479 | 399 |
| 50 | 100 | 14 | 8 | 16,6 | 6,94 | 1266 | 649 | 8 | 4 | 9,77 | 4,27 | 529 | 412 |
| 40 | 110 | 14 | 8 | 20,2 | 6,18 | 1058 | 593 | 14 | 8 | 20,2 | 6,18 | 1058 | 593 |
| 45 | 107,5 | 14 | 8 | 19,3 | 6,35 | 1159 | 621 | 14 | 8 | 19,3 | 6,35 | 1159 | 621 |
| 50 | 105 | 14 | 8 | 18,3 | 6,54 | 1266 | 649 | 14 | 8 | 18,3 | 6,54 | 1266 | 649 |
| 52 | 104 | 14 | 8 | 18,0 | 6,61 | 1311 | 661 | 14 | 8 | 18,0 | 6,61 | 1311 | 661 |
| 54 | 103 | 14 | 8 | 17,6 | 6,69 | 1356 | 672 | 14 | 8 | 17,6 | 6,69 | 1356 | 672 |
| 56 | 102 | 14 | 8 | 17,3 | 6,77 | 1402 | 684 | 14 | 8 | 17,3 | 6,77 | 1402 | 684 |
| 58 | 101 | 14 | 8 | 16,9 | 6,85 | 1450 | 696 | 14 | 8 | 16,9 | 6,85 | 1450 | 696 |
| 60 | 100 | 14 | 8 | 16,6 | 6,94 | 1498 | 708 | 14 | 8 | 16,6 | 6,94 | 1498 | 708 |
| 40 | 120 | 14 | 8 | 23,5 | 4,11 | 946 | 619 | 8 | 4 | 11,8 | 3,80 | 371 | 387 |
| 45 | 117,5 | 14 | 8 | 22,6 | 4,21 | 1033 | 646 | 8 | 4 | 11,3 | 3,91 | 411 | 399 |
| 50 | 115 | 14 | 8 | 21,6 | 4,32 | 1125 | 673 | 8 | 4 | 10,8 | 4,02 | 453 | 412 |
| 52 | 114 | 14 | 8 | 21,3 | 4,36 | 1163 | 684 | 8 | 4 | 10,6 | 4,07 | 471 | 417 |
| 54 | 113 | 14 | 8 | 20,9 | 4,41 | 1202 | 695 | 8 | 4 | 10,4 | 4,12 | 489 | 423 |
| 56 | 112 | 14 | 8 | 20,5 | 4,45 | 1241 | 706 | 8 | 4 | 10,2 | 4,17 | 508 | 428 |
| 58 | 111 | 14 | 8 | 20,2 | 4,50 | 1282 | 718 | 8 | 4 | 9,97 | 4,22 | 527 | 434 |
| 60 | 110 | 14 | 8 | 19,8 | 4,55 | 1323 | 729 | 8 | 4 | 9,77 | 4,27 | 547 | 440 |
| 62 | 109 | 14 | 8 | 19,5 | 4,60 | 1365 | 741 | 8 | 4 | 9,57 | 4,32 | 567 | 446 |
| 64 | 108 | 14 | 8 | 19,1 | 4,65 | 1408 | 752 | 8 | 4 | 9,38 | 4,38 | 587 | 452 |
| 66 | 107 | 14 | 8 | 18,7 | 4,71 | 1452 | 764 | 8 | 4 | 9,18 | 4,43 | 609 | 458 |
| 68 | 106 | 14 | 8 | 18,4 | 4,76 | 1496 | 776 | 8 | 4 | 8,99 | 4,49 | 630 | 464 |
| 70 | 105 | 14 | 8 | 18,0 | 4,81 | 1541 | 787 | 8 | 4 | 8,80 | 4,55 | 652 | 470 |
| 72 | 104 | 14 | 8 | 17,7 | 4,87 | 1587 | 799 | 8 | 4 | 8,61 | 4,61 | 674 | 477 |
| 74 | 103 | 14 | 8 | 17,3 | 4,93 | 1634 | 811 | 8 | 4 | 8,42 | 4,67 | 697 | 483 |
| 76 | 102 | 14 | 8 | 17,0 | 4,99 | 1682 | 823 | 8 | 4 | 8,23 | 4,73 | 721 | 490 |
| 78 | 101 | 14 | 8 | 16,6 | 5,05 | 1730 | 835 | 8 | 4 | 8,04 | 4,79 | 744 | 496 |
| 80 | 100 | 14 | 8 | 16,3 | 5,11 | 1780 | 847 | 8 | 4 | 7,86 | 4,86 | 769 | 503 |

Table C1 (contd.):

Joist hanger type A with external flanges:

Form factors $k_{H,1}$ and $k_{H,2}$ and dimensions e_1 , e_2 ; $e_{J,0} = 32$ mm

| B [mm] | H [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] |
|-----------|-----------|--------------|-------|-----------|-----------|---------------|---------------|-----------------|-------|-----------|-----------|---------------|---------------|
| | | Full nailing | | | | | | Partial nailing | | | | | |
| 45 | 127,5 | 14 | 8 | 26,9 | 5,19 | 1159 | 621 | 8 | 4 | 15,6 | 3,20 | 479 | 399 |
| 50 | 125 | 14 | 8 | 25,9 | 5,32 | 1266 | 649 | 8 | 4 | 15,0 | 3,27 | 529 | 412 |
| 52 | 124 | 14 | 8 | 25,5 | 5,37 | 1311 | 661 | 8 | 4 | 14,8 | 3,30 | 549 | 417 |
| 54 | 123 | 14 | 8 | 25,1 | 5,42 | 1356 | 672 | 8 | 4 | 14,6 | 3,33 | 571 | 423 |
| 56 | 122 | 14 | 8 | 24,7 | 5,47 | 1402 | 684 | 8 | 4 | 14,4 | 3,37 | 593 | 428 |
| 58 | 121 | 14 | 8 | 24,3 | 5,52 | 1450 | 696 | 8 | 4 | 14,1 | 3,40 | 615 | 434 |
| 60 | 120 | 14 | 8 | 24,0 | 5,58 | 1498 | 708 | 8 | 4 | 13,9 | 3,43 | 638 | 440 |
| 62 | 119 | 14 | 8 | 23,6 | 5,63 | 1547 | 719 | 8 | 4 | 13,7 | 3,47 | 661 | 446 |
| 64 | 118 | 14 | 8 | 23,2 | 5,69 | 1597 | 731 | 8 | 4 | 13,5 | 3,50 | 685 | 452 |
| 66 | 117 | 14 | 8 | 22,8 | 5,74 | 1648 | 743 | 8 | 4 | 13,3 | 3,54 | 710 | 458 |
| 68 | 116 | 14 | 8 | 22,4 | 5,80 | 1700 | 755 | 8 | 4 | 13,1 | 3,57 | 735 | 464 |
| 70 | 115 | 14 | 8 | 22,1 | 5,86 | 1752 | 767 | 8 | 4 | 12,9 | 3,61 | 761 | 470 |
| 72 | 114 | 14 | 8 | 21,7 | 5,92 | 1806 | 780 | 8 | 4 | 12,6 | 3,65 | 787 | 477 |
| 74 | 113 | 14 | 8 | 21,3 | 5,99 | 1861 | 792 | 8 | 4 | 12,4 | 3,68 | 813 | 483 |
| 76 | 112 | 14 | 8 | 20,9 | 6,05 | 1916 | 804 | 8 | 4 | 12,2 | 3,72 | 841 | 490 |
| 78 | 111 | 14 | 8 | 20,6 | 6,12 | 1973 | 816 | 8 | 4 | 12,0 | 3,76 | 868 | 496 |
| 80 | 110 | 14 | 8 | 20,2 | 6,18 | 2030 | 829 | 8 | 4 | 11,8 | 3,80 | 897 | 503 |
| 82 | 109 | 14 | 8 | 19,8 | 6,25 | 2089 | 841 | 8 | 4 | 11,6 | 3,85 | 925 | 509 |
| 84 | 108 | 14 | 8 | 19,4 | 6,32 | 2148 | 854 | 8 | 4 | 11,4 | 3,89 | 955 | 516 |
| 86 | 107 | 14 | 8 | 19,1 | 6,39 | 2208 | 866 | 8 | 4 | 11,2 | 3,93 | 985 | 523 |
| 88 | 106 | 14 | 8 | 18,7 | 6,46 | 2270 | 879 | 8 | 4 | 11,0 | 3,98 | 1015 | 530 |
| 90 | 105 | 14 | 8 | 18,3 | 6,54 | 2332 | 891 | 8 | 4 | 10,8 | 4,02 | 1046 | 536 |
| 92 | 104 | 14 | 8 | 18,0 | 6,61 | 2395 | 904 | 8 | 4 | 10,6 | 4,07 | 1077 | 543 |
| 94 | 103 | 14 | 8 | 17,6 | 6,69 | 2459 | 916 | 8 | 4 | 10,4 | 4,12 | 1109 | 550 |
| 96 | 102 | 14 | 8 | 17,3 | 6,77 | 2524 | 929 | 8 | 4 | 10,2 | 4,17 | 1142 | 557 |
| 98 | 101 | 14 | 8 | 16,9 | 6,85 | 2590 | 942 | 8 | 4 | 9,97 | 4,22 | 1175 | 564 |
| 100 | 100 | 14 | 8 | 16,6 | 6,94 | 2656 | 954 | 8 | 4 | 9,77 | 4,27 | 1209 | 571 |
| 50 | 135 | 16 | 10 | 32,5 | 7,12 | 1381 | 826 | 8 | 6 | 14,9 | 4,43 | 492 | 447 |
| 52 | 134 | 16 | 10 | 32,1 | 7,18 | 1426 | 839 | 8 | 6 | 14,7 | 4,47 | 509 | 451 |
| 54 | 133 | 16 | 10 | 31,6 | 7,24 | 1471 | 851 | 8 | 6 | 14,5 | 4,51 | 528 | 456 |
| 56 | 132 | 16 | 10 | 31,2 | 7,31 | 1518 | 864 | 8 | 6 | 14,3 | 4,55 | 547 | 461 |
| 58 | 131 | 16 | 10 | 30,7 | 7,37 | 1566 | 877 | 8 | 6 | 14,1 | 4,59 | 566 | 466 |
| 60 | 130 | 16 | 10 | 30,3 | 7,44 | 1614 | 890 | 8 | 6 | 13,9 | 4,63 | 585 | 471 |
| 62 | 129 | 16 | 10 | 29,9 | 7,50 | 1663 | 903 | 8 | 6 | 13,7 | 4,67 | 605 | 476 |
| 64 | 128 | 16 | 10 | 29,4 | 7,57 | 1714 | 916 | 8 | 6 | 13,5 | 4,72 | 626 | 482 |
| 66 | 127 | 16 | 10 | 29,0 | 7,64 | 1765 | 929 | 8 | 6 | 13,3 | 4,76 | 647 | 487 |
| 68 | 126 | 16 | 10 | 28,6 | 7,71 | 1817 | 942 | 8 | 6 | 13,1 | 4,80 | 669 | 493 |
| 70 | 125 | 16 | 10 | 28,2 | 7,78 | 1870 | 955 | 8 | 6 | 12,8 | 4,85 | 691 | 498 |
| 72 | 124 | 16 | 10 | 27,7 | 7,86 | 1924 | 969 | 8 | 6 | 12,6 | 4,89 | 713 | 504 |
| 74 | 123 | 16 | 10 | 27,3 | 7,93 | 1979 | 982 | 8 | 6 | 12,4 | 4,94 | 736 | 510 |
| 76 | 122 | 16 | 10 | 26,9 | 8,01 | 2035 | 996 | 8 | 6 | 12,2 | 4,99 | 759 | 516 |
| 78 | 121 | 16 | 10 | 26,5 | 8,09 | 2091 | 1010 | 8 | 6 | 12,0 | 5,04 | 783 | 522 |
| 80 | 120 | 16 | 10 | 26,0 | 8,16 | 2149 | 1023 | 8 | 6 | 11,8 | 5,09 | 807 | 528 |

Table C1 (contd.): Joist hanger type A with external flanges:
Form factors $k_{H,1}$ and $k_{H,2}$ and dimensions e_1 , e_2 ; $e_{J,0} = 32$ mm

| B [mm] | H [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] |
|-----------|-----------|--------------|-------|-----------|-----------|---------------|---------------|-----------------|-------|-----------|-----------|---------------|---------------|
| | | Full nailing | | | | | | Partial nailing | | | | | |
| 82 | 119 | 16 | 10 | 25,6 | 8,25 | 2207 | 1037 | 8 | 6 | 11,6 | 5,14 | 832 | 534 |
| 84 | 118 | 16 | 10 | 25,2 | 8,33 | 2267 | 1051 | 8 | 6 | 11,4 | 5,19 | 857 | 540 |
| 86 | 117 | 16 | 10 | 24,8 | 8,41 | 2327 | 1065 | 8 | 6 | 11,2 | 5,24 | 883 | 547 |
| 88 | 116 | 16 | 10 | 24,4 | 8,50 | 2388 | 1079 | 8 | 6 | 11,0 | 5,29 | 909 | 553 |
| 90 | 115 | 16 | 10 | 24,0 | 8,59 | 2451 | 1093 | 8 | 6 | 10,8 | 5,35 | 935 | 559 |
| 92 | 114 | 16 | 10 | 23,6 | 8,68 | 2514 | 1107 | 8 | 6 | 10,7 | 5,40 | 962 | 566 |
| 94 | 113 | 16 | 10 | 23,1 | 8,77 | 2578 | 1121 | 8 | 6 | 10,5 | 5,46 | 989 | 572 |
| 96 | 112 | 16 | 10 | 22,7 | 8,86 | 2643 | 1135 | 8 | 6 | 10,3 | 5,52 | 1017 | 579 |
| 98 | 111 | 16 | 10 | 22,3 | 8,95 | 2708 | 1149 | 8 | 6 | 10,1 | 5,58 | 1046 | 586 |
| 100 | 110 | 16 | 10 | 21,9 | 9,05 | 2775 | 1163 | 8 | 6 | 9,89 | 5,64 | 1075 | 592 |
| 50 | 145 | 18 | 10 | 36,8 | 9,71 | 1341 | 917 | 10 | 6 | 20,6 | 5,91 | 571 | 593 |
| 52 | 144 | 18 | 10 | 36,3 | 9,78 | 1384 | 931 | 10 | 6 | 20,3 | 5,95 | 590 | 598 |
| 54 | 143 | 18 | 10 | 35,8 | 9,86 | 1428 | 944 | 10 | 6 | 20,1 | 6,00 | 610 | 603 |
| 56 | 142 | 18 | 10 | 35,3 | 9,94 | 1473 | 958 | 10 | 6 | 19,8 | 6,05 | 631 | 608 |
| 58 | 141 | 18 | 10 | 34,8 | 10,0 | 1519 | 972 | 10 | 6 | 19,5 | 6,10 | 652 | 613 |
| 60 | 140 | 18 | 10 | 34,4 | 10,1 | 1566 | 986 | 10 | 6 | 19,3 | 6,15 | 673 | 619 |
| 62 | 139 | 18 | 10 | 33,9 | 10,2 | 1613 | 1000 | 10 | 6 | 19,0 | 6,20 | 695 | 625 |
| 64 | 138 | 18 | 10 | 33,4 | 10,3 | 1662 | 1015 | 10 | 6 | 18,8 | 6,25 | 718 | 631 |
| 66 | 137 | 18 | 10 | 32,9 | 10,4 | 1711 | 1029 | 10 | 6 | 18,5 | 6,30 | 741 | 637 |
| 68 | 136 | 18 | 10 | 32,4 | 10,4 | 1761 | 1044 | 10 | 6 | 18,2 | 6,36 | 764 | 643 |
| 70 | 135 | 18 | 10 | 32,0 | 10,5 | 1813 | 1058 | 10 | 6 | 18,0 | 6,41 | 788 | 650 |
| 72 | 134 | 18 | 10 | 31,5 | 10,6 | 1865 | 1073 | 10 | 6 | 17,7 | 6,47 | 813 | 657 |
| 74 | 133 | 18 | 10 | 31,0 | 10,7 | 1918 | 1088 | 10 | 6 | 17,5 | 6,52 | 838 | 663 |
| 76 | 132 | 18 | 10 | 30,6 | 10,8 | 1972 | 1103 | 10 | 6 | 17,2 | 6,58 | 863 | 670 |
| 78 | 131 | 18 | 10 | 30,1 | 10,9 | 2026 | 1118 | 10 | 6 | 16,9 | 6,64 | 889 | 677 |
| 80 | 130 | 18 | 10 | 29,6 | 11,0 | 2082 | 1133 | 10 | 6 | 16,7 | 6,70 | 916 | 685 |
| 82 | 129 | 18 | 10 | 29,2 | 11,1 | 2139 | 1148 | 10 | 6 | 16,4 | 6,76 | 943 | 692 |
| 84 | 128 | 18 | 10 | 28,7 | 11,2 | 2196 | 1164 | 10 | 6 | 16,2 | 6,82 | 970 | 699 |
| 86 | 127 | 18 | 10 | 28,2 | 11,3 | 2255 | 1179 | 10 | 6 | 15,9 | 6,88 | 998 | 707 |
| 88 | 126 | 18 | 10 | 27,8 | 11,4 | 2314 | 1194 | 10 | 6 | 15,7 | 6,94 | 1027 | 714 |
| 90 | 125 | 18 | 10 | 27,3 | 11,5 | 2374 | 1210 | 10 | 6 | 15,4 | 7,01 | 1056 | 722 |
| 92 | 124 | 18 | 10 | 26,9 | 11,6 | 2435 | 1225 | 10 | 6 | 15,2 | 7,08 | 1085 | 729 |
| 94 | 123 | 18 | 10 | 26,4 | 11,7 | 2497 | 1241 | 10 | 6 | 15,0 | 7,14 | 1115 | 737 |
| 96 | 122 | 18 | 10 | 26,0 | 11,9 | 2560 | 1257 | 10 | 6 | 14,7 | 7,21 | 1146 | 745 |
| 98 | 121 | 18 | 10 | 25,5 | 12,0 | 2624 | 1272 | 10 | 6 | 14,5 | 7,28 | 1177 | 753 |
| 100 | 120 | 18 | 10 | 25,1 | 12,1 | 2689 | 1288 | 10 | 6 | 14,2 | 7,35 | 1208 | 761 |
| 60 | 150 | 22 | 12 | 40,6 | 13,9 | 1573 | 1363 | 12 | 6 | 19,5 | 11,3 | 667 | 844 |
| 62 | 149 | 22 | 12 | 40,0 | 14,0 | 1616 | 1378 | 12 | 6 | 19,2 | 11,4 | 687 | 849 |
| 64 | 148 | 22 | 12 | 39,5 | 14,1 | 1659 | 1393 | 12 | 6 | 19,0 | 11,5 | 706 | 854 |
| 66 | 147 | 22 | 12 | 39,0 | 14,2 | 1703 | 1409 | 12 | 6 | 18,7 | 11,6 | 726 | 859 |
| 68 | 146 | 22 | 12 | 38,4 | 14,3 | 1748 | 1424 | 12 | 6 | 18,4 | 11,7 | 747 | 865 |
| 70 | 145 | 22 | 12 | 37,9 | 14,4 | 1794 | 1440 | 12 | 6 | 18,1 | 11,8 | 768 | 871 |
| 72 | 144 | 22 | 12 | 37,3 | 14,6 | 1840 | 1456 | 12 | 6 | 17,9 | 11,9 | 789 | 877 |

Table C1 (contd.): Joist hanger type A with external flanges:
Form factors $k_{H,1}$ and $k_{H,2}$ and dimensions e_1 , e_2 ; $e_{J,0} = 32$ mm

| B [mm] | H [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] |
|-----------|-----------|--------------|-------|-----------|-----------|---------------|---------------|-----------------|-------|-----------|-----------|---------------|---------------|
| | | Full nailing | | | | | | Partial nailing | | | | | |
| 74 | 143 | 22 | 12 | 36,8 | 14,7 | 1887 | 1472 | 12 | 6 | 17,6 | 12,0 | 811 | 883 |
| 76 | 142 | 22 | 12 | 36,3 | 14,8 | 1935 | 1489 | 12 | 6 | 17,3 | 12,1 | 833 | 890 |
| 78 | 141 | 22 | 12 | 35,8 | 14,9 | 1984 | 1505 | 12 | 6 | 17,0 | 12,2 | 856 | 897 |
| 80 | 140 | 22 | 12 | 35,2 | 15,0 | 2034 | 1522 | 12 | 6 | 16,8 | 12,3 | 879 | 904 |
| 60 | 160 | 24 | 12 | 46,6 | 22,6 | 1615 | 1526 | 14 | 6 | 25,6 | 16,0 | 815 | 1124 |
| 62 | 159 | 24 | 12 | 46,0 | 22,8 | 1657 | 1541 | 14 | 6 | 25,3 | 16,1 | 835 | 1126 |
| 64 | 158 | 24 | 12 | 45,4 | 22,9 | 1700 | 1557 | 14 | 6 | 25,0 | 16,3 | 856 | 1129 |
| 66 | 157 | 24 | 12 | 44,8 | 23,1 | 1743 | 1573 | 14 | 6 | 24,7 | 16,4 | 878 | 1133 |
| 68 | 156 | 24 | 12 | 44,3 | 23,3 | 1788 | 1589 | 14 | 6 | 24,4 | 16,5 | 900 | 1137 |
| 70 | 155 | 24 | 12 | 43,7 | 23,4 | 1833 | 1605 | 14 | 6 | 24,0 | 16,6 | 922 | 1141 |
| 72 | 154 | 24 | 12 | 43,1 | 23,6 | 1878 | 1622 | 14 | 6 | 23,7 | 16,7 | 945 | 1146 |
| 74 | 153 | 24 | 12 | 42,5 | 23,8 | 1925 | 1638 | 14 | 6 | 23,4 | 16,9 | 968 | 1151 |
| 76 | 152 | 24 | 12 | 42,0 | 24,0 | 1973 | 1655 | 14 | 6 | 23,1 | 17,0 | 992 | 1156 |
| 78 | 151 | 24 | 12 | 41,4 | 24,1 | 2021 | 1672 | 14 | 6 | 22,8 | 17,1 | 1016 | 1162 |
| 80 | 150 | 24 | 12 | 40,8 | 24,3 | 2070 | 1690 | 14 | 6 | 22,5 | 17,2 | 1041 | 1168 |
| 82 | 149 | 24 | 12 | 40,2 | 24,5 | 2120 | 1707 | 14 | 6 | 22,2 | 17,4 | 1066 | 1174 |
| 84 | 148 | 24 | 12 | 39,7 | 24,7 | 2170 | 1725 | 14 | 6 | 21,9 | 17,5 | 1092 | 1181 |
| 86 | 147 | 24 | 12 | 39,1 | 24,9 | 2222 | 1743 | 14 | 6 | 21,6 | 17,6 | 1118 | 1187 |
| 88 | 146 | 24 | 12 | 38,6 | 25,1 | 2274 | 1761 | 14 | 6 | 21,3 | 17,8 | 1145 | 1195 |
| 90 | 145 | 24 | 12 | 38,0 | 25,3 | 2327 | 1779 | 14 | 6 | 21,0 | 17,9 | 1172 | 1202 |
| 92 | 144 | 24 | 12 | 37,5 | 25,5 | 2381 | 1797 | 14 | 6 | 20,7 | 18,1 | 1199 | 1209 |
| 94 | 143 | 24 | 12 | 36,9 | 25,7 | 2436 | 1815 | 14 | 6 | 20,4 | 18,2 | 1227 | 1217 |
| 96 | 142 | 24 | 12 | 36,4 | 25,9 | 2491 | 1834 | 14 | 6 | 20,1 | 18,3 | 1256 | 1225 |
| 98 | 141 | 24 | 12 | 35,8 | 26,1 | 2548 | 1853 | 14 | 6 | 19,8 | 18,5 | 1285 | 1233 |
| 100 | 140 | 24 | 12 | 35,3 | 26,3 | 2605 | 1872 | 14 | 6 | 19,5 | 18,6 | 1314 | 1242 |
| 60 | 170 | 22 | 12 | 51,9 | 12,1 | 1573 | 1363 | 12 | 6 | 25,4 | 9,68 | 667 | 844 |
| 62 | 169 | 22 | 12 | 51,3 | 12,1 | 1616 | 1378 | 12 | 6 | 25,1 | 9,75 | 687 | 849 |
| 64 | 168 | 22 | 12 | 50,7 | 12,2 | 1659 | 1393 | 12 | 6 | 24,8 | 9,82 | 706 | 854 |
| 66 | 167 | 22 | 12 | 50,2 | 12,3 | 1703 | 1409 | 12 | 6 | 24,5 | 9,89 | 726 | 859 |
| 68 | 166 | 22 | 12 | 49,6 | 12,4 | 1748 | 1424 | 12 | 6 | 24,2 | 9,96 | 747 | 865 |
| 70 | 165 | 22 | 12 | 49,0 | 12,5 | 1794 | 1440 | 12 | 6 | 23,9 | 10,0 | 768 | 871 |
| 72 | 164 | 22 | 12 | 48,4 | 12,6 | 1840 | 1456 | 12 | 6 | 23,6 | 10,1 | 789 | 877 |
| 74 | 163 | 22 | 12 | 47,9 | 12,7 | 1887 | 1472 | 12 | 6 | 23,3 | 10,2 | 811 | 883 |
| 76 | 162 | 22 | 12 | 47,3 | 12,7 | 1935 | 1489 | 12 | 6 | 23,0 | 10,3 | 833 | 890 |
| 78 | 161 | 22 | 12 | 46,7 | 12,8 | 1984 | 1505 | 12 | 6 | 22,7 | 10,3 | 856 | 897 |
| 80 | 160 | 22 | 12 | 46,2 | 12,9 | 2034 | 1522 | 12 | 6 | 22,4 | 10,4 | 879 | 904 |
| 82 | 159 | 22 | 12 | 45,6 | 13,0 | 2084 | 1539 | 12 | 6 | 22,1 | 10,5 | 903 | 911 |
| 84 | 158 | 22 | 12 | 45,0 | 13,1 | 2136 | 1556 | 12 | 6 | 21,8 | 10,6 | 927 | 918 |
| 86 | 157 | 22 | 12 | 44,5 | 13,2 | 2188 | 1573 | 12 | 6 | 21,5 | 10,7 | 951 | 926 |
| 88 | 156 | 22 | 12 | 43,9 | 13,3 | 2241 | 1590 | 12 | 6 | 21,2 | 10,7 | 976 | 933 |
| 90 | 155 | 22 | 12 | 43,3 | 13,4 | 2294 | 1608 | 12 | 6 | 21,0 | 10,8 | 1001 | 941 |
| 92 | 154 | 22 | 12 | 42,8 | 13,5 | 2349 | 1625 | 12 | 6 | 20,7 | 10,9 | 1027 | 949 |
| 94 | 153 | 22 | 12 | 42,2 | 13,6 | 2404 | 1643 | 12 | 6 | 20,4 | 11,0 | 1053 | 957 |

Table C1 (contd.): Joist hanger type A with external flanges:
Form factors $k_{H,1}$ and $k_{H,2}$ and dimensions e_1 , e_2 ; $e_{1,0} = 32$ mm

| B [mm] | H [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] |
|-----------|-----------|--------------|-------|-----------|-----------|---------------|---------------|-----------------|-------|-----------|-----------|---------------|---------------|
| | | Full nailing | | | | | | Partial nailing | | | | | |
| 96 | 152 | 22 | 12 | 41,7 | 13,7 | 2460 | 1660 | 12 | 6 | 20,1 | 11,1 | 1080 | 966 |
| 98 | 151 | 22 | 12 | 41,1 | 13,8 | 2517 | 1678 | 12 | 6 | 19,8 | 11,2 | 1107 | 974 |
| 100 | 150 | 22 | 12 | 40,6 | 13,9 | 2575 | 1696 | 12 | 6 | 19,5 | 11,3 | 1134 | 982 |
| 102 | 149 | 22 | 12 | 40,0 | 14,0 | 2633 | 1714 | 12 | 6 | 19,2 | 11,4 | 1162 | 991 |
| 104 | 148 | 22 | 12 | 39,5 | 14,1 | 2692 | 1732 | 12 | 6 | 19,0 | 11,5 | 1191 | 1000 |
| 106 | 147 | 22 | 12 | 39,0 | 14,2 | 2753 | 1750 | 12 | 6 | 18,7 | 11,6 | 1219 | 1009 |
| 108 | 146 | 22 | 12 | 38,4 | 14,3 | 2813 | 1768 | 12 | 6 | 18,4 | 11,7 | 1249 | 1017 |
| 110 | 145 | 22 | 12 | 37,9 | 14,4 | 2875 | 1787 | 12 | 6 | 18,1 | 11,8 | 1278 | 1026 |
| 112 | 144 | 22 | 12 | 37,3 | 14,6 | 2938 | 1805 | 12 | 6 | 17,9 | 11,9 | 1308 | 1035 |
| 114 | 143 | 22 | 12 | 36,8 | 14,7 | 3001 | 1824 | 12 | 6 | 17,6 | 12,0 | 1339 | 1045 |
| 116 | 142 | 22 | 12 | 36,3 | 14,8 | 3065 | 1842 | 12 | 6 | 17,3 | 12,1 | 1370 | 1054 |
| 118 | 141 | 22 | 12 | 35,8 | 14,9 | 3130 | 1861 | 12 | 6 | 17,0 | 12,2 | 1401 | 1063 |
| 120 | 140 | 22 | 12 | 35,2 | 15,0 | 3195 | 1880 | 12 | 6 | 16,8 | 12,3 | 1433 | 1072 |
| 80 | 170 | 26 | 14 | 53,5 | 25,6 | 2327 | 1900 | 14 | 8 | 29,0 | 15,0 | 1041 | 1168 |
| 82 | 169 | 26 | 14 | 52,9 | 25,8 | 2382 | 1918 | 14 | 8 | 28,6 | 15,1 | 1066 | 1174 |
| 84 | 168 | 26 | 14 | 52,2 | 26,0 | 2437 | 1937 | 14 | 8 | 28,3 | 15,2 | 1092 | 1181 |
| 86 | 167 | 26 | 14 | 51,6 | 26,2 | 2494 | 1956 | 14 | 8 | 28,0 | 15,3 | 1118 | 1187 |
| 88 | 166 | 26 | 14 | 51,0 | 26,3 | 2551 | 1975 | 14 | 8 | 27,6 | 15,4 | 1145 | 1195 |
| 90 | 165 | 26 | 14 | 50,3 | 26,5 | 2610 | 1995 | 14 | 8 | 27,3 | 15,5 | 1172 | 1202 |
| 92 | 164 | 26 | 14 | 49,7 | 26,7 | 2669 | 2014 | 14 | 8 | 27,0 | 15,6 | 1199 | 1209 |
| 94 | 163 | 26 | 14 | 49,1 | 26,9 | 2729 | 2034 | 14 | 8 | 26,6 | 15,7 | 1227 | 1217 |
| 96 | 162 | 26 | 14 | 48,4 | 27,1 | 2790 | 2054 | 14 | 8 | 26,3 | 15,8 | 1256 | 1225 |
| 98 | 161 | 26 | 14 | 47,8 | 27,3 | 2851 | 2074 | 14 | 8 | 26,0 | 15,9 | 1285 | 1233 |
| 100 | 160 | 26 | 14 | 47,2 | 27,5 | 2914 | 2094 | 14 | 8 | 25,6 | 16,0 | 1314 | 1242 |
| 60 | 190 | 26 | 14 | 66,6 | 18,5 | 1736 | 1777 | 14 | 8 | 32,4 | 14,0 | 752 | 1124 |
| 62 | 189 | 26 | 14 | 65,9 | 18,6 | 1778 | 1792 | 14 | 8 | 32,1 | 14,1 | 771 | 1126 |
| 64 | 188 | 26 | 14 | 65,2 | 18,7 | 1822 | 1808 | 14 | 8 | 31,7 | 14,2 | 791 | 1129 |
| 66 | 187 | 26 | 14 | 64,5 | 18,9 | 1866 | 1824 | 14 | 8 | 31,4 | 14,3 | 810 | 1133 |
| 68 | 186 | 26 | 14 | 63,9 | 19,0 | 1911 | 1840 | 14 | 8 | 31,0 | 14,4 | 831 | 1137 |
| 70 | 185 | 26 | 14 | 63,2 | 19,1 | 1957 | 1857 | 14 | 8 | 30,7 | 14,5 | 851 | 1141 |
| 72 | 184 | 26 | 14 | 62,5 | 19,2 | 2003 | 1874 | 14 | 8 | 30,3 | 14,6 | 872 | 1146 |
| 74 | 183 | 26 | 14 | 61,9 | 19,3 | 2051 | 1891 | 14 | 8 | 30,0 | 14,7 | 894 | 1151 |
| 76 | 182 | 26 | 14 | 61,2 | 19,4 | 2099 | 1908 | 14 | 8 | 29,6 | 14,8 | 916 | 1156 |
| 78 | 181 | 26 | 14 | 60,6 | 19,5 | 2148 | 1926 | 14 | 8 | 29,3 | 14,9 | 938 | 1162 |
| 80 | 180 | 26 | 14 | 59,9 | 19,7 | 2198 | 1943 | 14 | 8 | 29,0 | 15,0 | 961 | 1168 |
| 82 | 179 | 26 | 14 | 59,2 | 19,8 | 2248 | 1962 | 14 | 8 | 28,6 | 15,1 | 984 | 1174 |
| 84 | 178 | 26 | 14 | 58,6 | 19,9 | 2300 | 1980 | 14 | 8 | 28,3 | 15,2 | 1008 | 1181 |
| 86 | 177 | 26 | 14 | 57,9 | 20,0 | 2352 | 1998 | 14 | 8 | 28,0 | 15,3 | 1032 | 1187 |
| 88 | 176 | 26 | 14 | 57,3 | 20,2 | 2405 | 2017 | 14 | 8 | 27,6 | 15,4 | 1057 | 1195 |
| 90 | 175 | 26 | 14 | 56,6 | 20,3 | 2459 | 2036 | 14 | 8 | 27,3 | 15,5 | 1082 | 1202 |
| 92 | 174 | 26 | 14 | 56,0 | 20,4 | 2513 | 2055 | 14 | 8 | 27,0 | 15,6 | 1107 | 1209 |
| 94 | 173 | 26 | 14 | 55,3 | 20,6 | 2569 | 2074 | 14 | 8 | 26,6 | 15,7 | 1133 | 1217 |
| 96 | 172 | 26 | 14 | 54,7 | 20,7 | 2625 | 2093 | 14 | 8 | 26,3 | 15,8 | 1159 | 1225 |

Table C1 (contd.): Joist hanger type A with external flanges:
Form factors $k_{H,1}$ and $k_{H,2}$ and dimensions e_1 , e_2 ; $e_{J,0} = 32$ mm

| B [mm] | H [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] |
|-----------|-----------|--------------|-------|-----------|-----------|---------------|---------------|-----------------|-------|-----------|-----------|---------------|---------------|
| | | Full nailing | | | | | | Partial nailing | | | | | |
| 98 | 171 | 26 | 14 | 54,1 | 20,8 | 2682 | 2113 | 14 | 8 | 26,0 | 15,9 | 1186 | 1233 |
| 100 | 170 | 26 | 14 | 53,4 | 21,0 | 2739 | 2133 | 14 | 8 | 25,6 | 16,0 | 1213 | 1242 |
| 102 | 169 | 26 | 14 | 52,8 | 21,1 | 2798 | 2152 | 14 | 8 | 25,3 | 16,1 | 1241 | 1250 |
| 104 | 168 | 26 | 14 | 52,2 | 21,2 | 2857 | 2172 | 14 | 8 | 25,0 | 16,3 | 1269 | 1259 |
| 106 | 167 | 26 | 14 | 51,5 | 21,4 | 2918 | 2192 | 14 | 8 | 24,7 | 16,4 | 1297 | 1268 |
| 108 | 166 | 26 | 14 | 50,9 | 21,5 | 2979 | 2213 | 14 | 8 | 24,4 | 16,5 | 1326 | 1277 |
| 110 | 165 | 26 | 14 | 50,3 | 21,7 | 3040 | 2233 | 14 | 8 | 24,0 | 16,6 | 1355 | 1286 |
| 112 | 164 | 26 | 14 | 49,7 | 21,8 | 3103 | 2254 | 14 | 8 | 23,7 | 16,7 | 1385 | 1295 |
| 114 | 163 | 26 | 14 | 49,0 | 22,0 | 3166 | 2274 | 14 | 8 | 23,4 | 16,9 | 1415 | 1305 |
| 116 | 162 | 26 | 14 | 48,4 | 22,1 | 3231 | 2295 | 14 | 8 | 23,1 | 17,0 | 1446 | 1314 |
| 118 | 161 | 26 | 14 | 47,8 | 22,3 | 3296 | 2316 | 14 | 8 | 22,8 | 17,1 | 1477 | 1324 |
| 120 | 160 | 26 | 14 | 47,2 | 22,4 | 3361 | 2337 | 14 | 8 | 22,5 | 17,2 | 1508 | 1334 |
| 80 | 200 | 30 | 16 | 75,4 | 33,5 | 2502 | 2383 | 16 | 8 | 40,2 | 19,2 | 1134 | 1484 |
| 82 | 199 | 30 | 16 | 74,6 | 33,7 | 2557 | 2402 | 16 | 8 | 39,8 | 19,3 | 1159 | 1489 |
| 84 | 198 | 30 | 16 | 73,9 | 33,9 | 2612 | 2422 | 16 | 8 | 39,4 | 19,4 | 1184 | 1493 |
| 86 | 197 | 30 | 16 | 73,1 | 34,1 | 2668 | 2441 | 16 | 8 | 39,1 | 19,6 | 1210 | 1499 |
| 88 | 196 | 30 | 16 | 72,4 | 34,3 | 2725 | 2461 | 16 | 8 | 38,7 | 19,7 | 1236 | 1504 |
| 90 | 195 | 30 | 16 | 71,7 | 34,5 | 2782 | 2481 | 16 | 8 | 38,3 | 19,8 | 1262 | 1510 |
| 92 | 194 | 30 | 16 | 70,9 | 34,7 | 2841 | 2502 | 16 | 8 | 37,9 | 19,9 | 1289 | 1517 |
| 94 | 193 | 30 | 16 | 70,2 | 34,9 | 2900 | 2522 | 16 | 8 | 37,5 | 20,0 | 1317 | 1523 |
| 96 | 192 | 30 | 16 | 69,4 | 35,1 | 2961 | 2543 | 16 | 8 | 37,1 | 20,1 | 1345 | 1530 |
| 98 | 191 | 30 | 16 | 68,7 | 35,3 | 3022 | 2564 | 16 | 8 | 36,7 | 20,2 | 1373 | 1538 |
| 100 | 190 | 30 | 16 | 68,0 | 35,5 | 3084 | 2585 | 16 | 8 | 36,3 | 20,3 | 1402 | 1545 |
| 102 | 189 | 30 | 16 | 67,2 | 35,7 | 3147 | 2607 | 16 | 8 | 36,0 | 20,5 | 1431 | 1553 |
| 104 | 188 | 30 | 16 | 66,5 | 35,9 | 3210 | 2628 | 16 | 8 | 35,6 | 20,6 | 1461 | 1561 |
| 106 | 187 | 30 | 16 | 65,8 | 36,1 | 3275 | 2650 | 16 | 8 | 35,2 | 20,7 | 1491 | 1569 |
| 108 | 186 | 30 | 16 | 65,1 | 36,3 | 3340 | 2672 | 16 | 8 | 34,8 | 20,8 | 1521 | 1578 |
| 110 | 185 | 30 | 16 | 64,3 | 36,5 | 3407 | 2695 | 16 | 8 | 34,5 | 21,0 | 1553 | 1587 |
| 112 | 184 | 30 | 16 | 63,6 | 36,7 | 3474 | 2717 | 16 | 8 | 34,1 | 21,1 | 1584 | 1595 |
| 114 | 183 | 30 | 16 | 62,9 | 37,0 | 3542 | 2740 | 16 | 8 | 33,7 | 21,2 | 1616 | 1605 |
| 116 | 182 | 30 | 16 | 62,2 | 37,2 | 3611 | 2762 | 16 | 8 | 33,3 | 21,3 | 1649 | 1614 |
| 118 | 181 | 30 | 16 | 61,5 | 37,4 | 3680 | 2785 | 16 | 8 | 33,0 | 21,5 | 1681 | 1623 |
| 120 | 180 | 30 | 16 | 60,8 | 37,7 | 3751 | 2808 | 16 | 8 | 32,6 | 21,6 | 1715 | 1633 |
| 60 | 220 | 30 | 16 | 90,8 | 30,2 | 2007 | 2212 | 16 | 8 | 48,3 | 17,3 | 913 | 1468 |
| 62 | 219 | 30 | 16 | 90,0 | 30,3 | 2052 | 2228 | 16 | 8 | 47,9 | 17,4 | 933 | 1467 |
| 64 | 218 | 30 | 16 | 89,3 | 30,5 | 2099 | 2243 | 16 | 8 | 47,5 | 17,5 | 953 | 1466 |
| 66 | 217 | 30 | 16 | 88,5 | 30,7 | 2146 | 2259 | 16 | 8 | 47,1 | 17,6 | 974 | 1467 |
| 68 | 216 | 30 | 16 | 87,7 | 30,8 | 2195 | 2276 | 16 | 8 | 46,7 | 17,7 | 996 | 1467 |
| 70 | 215 | 30 | 16 | 86,9 | 31,0 | 2244 | 2293 | 16 | 8 | 46,3 | 17,8 | 1018 | 1469 |
| 72 | 214 | 30 | 16 | 86,1 | 31,1 | 2294 | 2310 | 16 | 8 | 45,9 | 17,9 | 1040 | 1471 |
| 74 | 213 | 30 | 16 | 85,3 | 31,3 | 2345 | 2328 | 16 | 8 | 45,4 | 17,9 | 1063 | 1473 |
| 76 | 212 | 30 | 16 | 84,6 | 31,4 | 2396 | 2346 | 16 | 8 | 45,0 | 18,0 | 1086 | 1476 |
| 78 | 211 | 30 | 16 | 83,8 | 31,6 | 2449 | 2365 | 16 | 8 | 44,6 | 18,1 | 1110 | 1480 |

Table C1 (contd.): Joist hanger type A with external flanges:
Form factors $k_{H,1}$ and $k_{H,2}$ and dimensions e_1 , e_2 ; $e_{j,0} = 32$ mm

| B [mm] | H [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] |
|-----------|-----------|--------------|-------|-----------|-----------|---------------|---------------|-----------------|-------|-----------|-----------|---------------|---------------|
| | | Full nailing | | | | | | Partial nailing | | | | | |
| 80 | 210 | 30 | 16 | 83,0 | 31,8 | 2502 | 2383 | 16 | 8 | 44,2 | 18,2 | 1134 | 1484 |
| 82 | 209 | 30 | 16 | 82,2 | 31,9 | 2557 | 2402 | 16 | 8 | 43,8 | 18,3 | 1159 | 1489 |
| 84 | 208 | 30 | 16 | 81,5 | 32,1 | 2612 | 2422 | 16 | 8 | 43,4 | 18,4 | 1184 | 1493 |
| 86 | 207 | 30 | 16 | 80,7 | 32,3 | 2668 | 2441 | 16 | 8 | 43,0 | 18,5 | 1210 | 1499 |
| 88 | 206 | 30 | 16 | 79,9 | 32,4 | 2725 | 2461 | 16 | 8 | 42,6 | 18,6 | 1236 | 1504 |
| 90 | 205 | 30 | 16 | 79,2 | 32,6 | 2782 | 2481 | 16 | 8 | 42,2 | 18,7 | 1262 | 1510 |
| 92 | 204 | 30 | 16 | 78,4 | 32,8 | 2841 | 2502 | 16 | 8 | 41,8 | 18,8 | 1289 | 1517 |
| 94 | 203 | 30 | 16 | 77,7 | 33,0 | 2900 | 2522 | 16 | 8 | 41,4 | 18,9 | 1317 | 1523 |
| 96 | 202 | 30 | 16 | 76,9 | 33,2 | 2961 | 2543 | 16 | 8 | 41,0 | 19,0 | 1345 | 1530 |
| 98 | 201 | 30 | 16 | 76,1 | 33,3 | 3022 | 2564 | 16 | 8 | 40,6 | 19,1 | 1373 | 1538 |
| 100 | 200 | 30 | 16 | 75,4 | 33,5 | 3084 | 2585 | 16 | 8 | 40,2 | 19,2 | 1402 | 1545 |
| 102 | 199 | 30 | 16 | 74,6 | 33,7 | 3147 | 2607 | 16 | 8 | 39,8 | 19,3 | 1431 | 1553 |
| 104 | 198 | 30 | 16 | 73,9 | 33,9 | 3210 | 2628 | 16 | 8 | 39,4 | 19,4 | 1461 | 1561 |
| 106 | 197 | 30 | 16 | 73,1 | 34,1 | 3275 | 2650 | 16 | 8 | 39,1 | 19,6 | 1491 | 1569 |
| 108 | 196 | 30 | 16 | 72,4 | 34,3 | 3340 | 2672 | 16 | 8 | 38,7 | 19,7 | 1521 | 1578 |
| 110 | 195 | 30 | 16 | 71,7 | 34,5 | 3407 | 2695 | 16 | 8 | 38,3 | 19,8 | 1553 | 1587 |
| 112 | 194 | 30 | 16 | 70,9 | 34,7 | 3474 | 2717 | 16 | 8 | 37,9 | 19,9 | 1584 | 1595 |
| 114 | 193 | 30 | 16 | 70,2 | 34,9 | 3542 | 2740 | 16 | 8 | 37,5 | 20,0 | 1616 | 1605 |
| 116 | 192 | 30 | 16 | 69,4 | 35,1 | 3611 | 2762 | 16 | 8 | 37,1 | 20,1 | 1649 | 1614 |
| 118 | 191 | 30 | 16 | 68,7 | 35,3 | 3680 | 2785 | 16 | 8 | 36,7 | 20,2 | 1681 | 1623 |
| 120 | 190 | 30 | 16 | 68,0 | 35,5 | 3751 | 2808 | 16 | 8 | 36,3 | 20,3 | 1715 | 1633 |
| 122 | 189 | 30 | 16 | 67,2 | 35,7 | 3822 | 2831 | 16 | 8 | 36,0 | 20,5 | 1749 | 1643 |
| 124 | 188 | 30 | 16 | 66,5 | 35,9 | 3895 | 2855 | 16 | 8 | 35,6 | 20,6 | 1783 | 1653 |
| 126 | 187 | 30 | 16 | 65,8 | 36,1 | 3968 | 2878 | 16 | 8 | 35,2 | 20,7 | 1818 | 1663 |
| 128 | 186 | 30 | 16 | 65,1 | 36,3 | 4042 | 2902 | 16 | 8 | 34,8 | 20,8 | 1853 | 1674 |
| 130 | 185 | 30 | 16 | 64,3 | 36,5 | 4117 | 2926 | 16 | 8 | 34,5 | 21,0 | 1889 | 1684 |
| 132 | 184 | 30 | 16 | 63,6 | 36,7 | 4192 | 2949 | 16 | 8 | 34,1 | 21,1 | 1925 | 1695 |
| 134 | 183 | 30 | 16 | 62,9 | 37,0 | 4269 | 2973 | 16 | 8 | 33,7 | 21,2 | 1961 | 1705 |
| 136 | 182 | 30 | 16 | 62,2 | 37,2 | 4346 | 2998 | 16 | 8 | 33,3 | 21,3 | 1998 | 1716 |
| 138 | 181 | 30 | 16 | 61,5 | 37,4 | 4425 | 3022 | 16 | 8 | 33,0 | 21,5 | 2036 | 1727 |
| 140 | 180 | 30 | 16 | 60,8 | 37,7 | 4504 | 3046 | 16 | 8 | 32,6 | 21,6 | 2074 | 1738 |

Table C2:

Joist hanger type I with interior flanges:

Form factors $k_{H,1}$ and $k_{H,2}$ and dimensions e_1 , e_2 ; $e_{1,0} = 32$ mm

| B [mm] | H [mm] | n_H | n_J | k_{H,1} | k_{H,2} | e₁ [mm] | e₂ [mm] | n_H | n_J | k_{H,1} | k_{H,2} | e₁ [mm] | e₂ [mm] |
|------------------|------------------|----------------------|----------------------|------------------------|------------------------|------------------------------|------------------------------|----------------------|----------------------|------------------------|------------------------|------------------------------|------------------------------|
| | | Full nailing | | | | | | Partial nailing | | | | | |
| 46 | 102 | 8 | 8 | 10,2 | 4,17 | 169 | 440 | 8 | 4 | 10,2 | 4,17 | 169 | 440 |
| 48 | 101 | 8 | 8 | 10,0 | 4,22 | 175 | 420 | 8 | 4 | 10,0 | 4,22 | 175 | 420 |
| 50 | 100 | 8 | 8 | 9,77 | 4,27 | 182 | 404 | 8 | 4 | 9,77 | 4,27 | 182 | 404 |
| 46 | 107 | 8 | 8 | 11,2 | 3,93 | 186 | 398 | 8 | 4 | 11,2 | 3,93 | 186 | 398 |
| 48 | 106 | 8 | 8 | 11,0 | 3,98 | 193 | 387 | 8 | 4 | 11,0 | 3,98 | 193 | 387 |
| 50 | 105 | 8 | 8 | 10,8 | 4,02 | 202 | 378 | 8 | 4 | 10,8 | 4,02 | 202 | 378 |
| 52 | 104 | 8 | 8 | 10,6 | 4,07 | 210 | 371 | 8 | 4 | 10,6 | 4,07 | 210 | 371 |
| 54 | 103 | 8 | 8 | 10,4 | 4,12 | 220 | 366 | 8 | 4 | 10,4 | 4,12 | 220 | 366 |
| 56 | 102 | 8 | 8 | 10,2 | 4,17 | 230 | 363 | 8 | 4 | 10,2 | 4,17 | 230 | 363 |
| 58 | 101 | 8 | 8 | 10,0 | 4,22 | 240 | 360 | 8 | 4 | 10,0 | 4,22 | 240 | 360 |
| 60 | 100 | 8 | 8 | 9,77 | 4,27 | 251 | 358 | 8 | 4 | 9,77 | 4,27 | 251 | 358 |
| 80 | 100 | 16 | 8 | 19,5 | 8,54 | 431 | 529 | 8 | 4 | 9,77 | 4,27 | 300 | 368 |
| 80 | 110 | 14 | 8 | 20,2 | 6,18 | 418 | 440 | 8 | 4 | 11,8 | 3,80 | 350 | 368 |
| 82 | 109 | 14 | 8 | 19,8 | 6,25 | 437 | 444 | 8 | 4 | 11,6 | 3,85 | 365 | 372 |
| 84 | 108 | 14 | 8 | 19,4 | 6,32 | 457 | 449 | 8 | 4 | 11,4 | 3,89 | 381 | 375 |
| 86 | 107 | 14 | 8 | 19,1 | 6,39 | 478 | 455 | 8 | 4 | 11,2 | 3,93 | 398 | 379 |
| 88 | 106 | 14 | 8 | 18,7 | 6,46 | 500 | 461 | 8 | 4 | 11,0 | 3,98 | 415 | 383 |
| 90 | 105 | 14 | 8 | 18,3 | 6,54 | 522 | 468 | 8 | 4 | 10,8 | 4,02 | 433 | 387 |
| 92 | 104 | 14 | 8 | 18,0 | 6,61 | 546 | 475 | 8 | 4 | 10,6 | 4,07 | 451 | 392 |
| 94 | 103 | 14 | 8 | 17,6 | 6,69 | 571 | 482 | 8 | 4 | 10,4 | 4,12 | 469 | 397 |
| 96 | 102 | 14 | 8 | 17,3 | 6,77 | 596 | 490 | 8 | 4 | 10,2 | 4,17 | 489 | 402 |
| 98 | 101 | 14 | 8 | 16,9 | 6,85 | 623 | 498 | 8 | 4 | 10,0 | 4,22 | 508 | 407 |
| 100 | 100 | 14 | 8 | 16,6 | 6,94 | 650 | 507 | 8 | 4 | 9,77 | 4,27 | 529 | 412 |
| 60 | 130 | 10 | 10 | 14,2 | 9,15 | 293 | 713 | 10 | 6 | 14,2 | 9,15 | 293 | 713 |
| 62 | 129 | 10 | 10 | 13,9 | 9,23 | 301 | 696 | 10 | 6 | 13,9 | 9,23 | 301 | 696 |
| 64 | 128 | 10 | 10 | 13,7 | 9,32 | 310 | 681 | 10 | 6 | 13,7 | 9,32 | 310 | 681 |
| 66 | 127 | 10 | 10 | 13,5 | 9,40 | 320 | 669 | 10 | 6 | 13,5 | 9,40 | 320 | 669 |
| 68 | 126 | 10 | 10 | 13,2 | 9,49 | 329 | 659 | 10 | 6 | 13,2 | 9,49 | 329 | 659 |
| 70 | 125 | 10 | 10 | 13,0 | 9,58 | 340 | 650 | 10 | 6 | 13,0 | 9,58 | 340 | 650 |
| 72 | 124 | 10 | 10 | 12,8 | 9,67 | 350 | 643 | 10 | 6 | 12,8 | 9,67 | 350 | 643 |
| 74 | 123 | 10 | 10 | 12,6 | 9,76 | 361 | 638 | 10 | 6 | 12,6 | 9,76 | 361 | 638 |
| 76 | 122 | 10 | 10 | 12,4 | 9,86 | 373 | 633 | 10 | 6 | 12,4 | 9,86 | 373 | 633 |
| 78 | 121 | 10 | 10 | 12,1 | 9,95 | 385 | 630 | 10 | 6 | 12,1 | 9,95 | 385 | 630 |
| 80 | 120 | 18 | 10 | 25,9 | 13,5 | 531 | 839 | 10 | 6 | 11,9 | 10,0 | 397 | 627 |
| 82 | 119 | 18 | 10 | 25,4 | 13,6 | 547 | 835 | 10 | 6 | 11,7 | 10,1 | 410 | 626 |
| 84 | 118 | 18 | 10 | 25,0 | 13,8 | 564 | 832 | 10 | 6 | 11,5 | 10,3 | 424 | 625 |
| 86 | 117 | 18 | 10 | 24,6 | 13,9 | 582 | 831 | 10 | 6 | 11,3 | 10,4 | 437 | 625 |
| 88 | 116 | 18 | 10 | 24,2 | 14,0 | 600 | 831 | 10 | 6 | 11,1 | 10,5 | 452 | 625 |
| 90 | 115 | 18 | 10 | 23,7 | 14,2 | 620 | 832 | 10 | 6 | 10,9 | 10,6 | 466 | 626 |
| 60 | 160 | 14 | 12 | 25,9 | 15,1 | 421 | 1366 | 14 | 6 | 25,9 | 15,1 | 421 | 1366 |
| 62 | 159 | 14 | 12 | 25,6 | 15,2 | 430 | 1323 | 14 | 6 | 25,6 | 15,2 | 430 | 1323 |
| 64 | 158 | 14 | 12 | 25,3 | 15,3 | 439 | 1286 | 14 | 6 | 25,3 | 15,3 | 439 | 1286 |
| 66 | 157 | 14 | 12 | 25,0 | 15,4 | 449 | 1253 | 14 | 6 | 25,0 | 15,4 | 449 | 1253 |

Table C2 (contd.):

Joist hanger type I with interior flanges:

Form factors $k_{H,1}$ and $k_{H,2}$ and dimensions e_1 , e_2 ; $e_{J,0} = 32$ mm

| B [mm] | H [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] |
|-----------|-----------|--------------|-------|-----------|-----------|---------------|---------------|-----------------|-------|-----------|-----------|---------------|---------------|
| | | Full nailing | | | | | | Partial nailing | | | | | |
| 68 | 156 | 14 | 12 | 24,6 | 15,5 | 459 | 1225 | 14 | 6 | 24,6 | 15,5 | 459 | 1225 |
| 70 | 155 | 14 | 12 | 24,3 | 15,6 | 470 | 1200 | 14 | 6 | 24,3 | 15,6 | 470 | 1200 |
| 72 | 154 | 14 | 12 | 24,0 | 15,7 | 481 | 1179 | 14 | 6 | 24,0 | 15,7 | 481 | 1179 |
| 74 | 153 | 14 | 12 | 23,7 | 15,9 | 493 | 1160 | 14 | 6 | 23,7 | 15,9 | 493 | 1160 |
| 76 | 152 | 14 | 12 | 23,3 | 16,0 | 505 | 1144 | 14 | 6 | 23,3 | 16,0 | 505 | 1144 |
| 78 | 151 | 14 | 12 | 23,0 | 16,1 | 518 | 1129 | 14 | 6 | 20,0 | 17,4 | 518 | 1129 |
| 80 | 150 | 22 | 12 | 40,2 | 18,2 | 649 | 1139 | 12 | 6 | 22,4 | 10,4 | 475 | 833 |
| 82 | 149 | 22 | 12 | 39,7 | 18,4 | 667 | 1130 | 12 | 6 | 22,1 | 10,5 | 489 | 829 |
| 84 | 148 | 22 | 12 | 39,1 | 18,5 | 685 | 1123 | 12 | 6 | 21,8 | 10,6 | 503 | 825 |
| 86 | 147 | 22 | 12 | 38,6 | 18,7 | 705 | 1118 | 12 | 6 | 21,5 | 10,7 | 518 | 822 |
| 88 | 146 | 22 | 12 | 38,0 | 18,8 | 725 | 1115 | 12 | 6 | 21,2 | 10,7 | 534 | 821 |
| 90 | 145 | 22 | 12 | 37,5 | 18,9 | 746 | 1113 | 12 | 6 | 21,0 | 10,8 | 549 | 820 |
| 92 | 144 | 22 | 12 | 37,0 | 19,1 | 768 | 1113 | 12 | 6 | 20,7 | 10,9 | 566 | 820 |
| 94 | 143 | 22 | 12 | 36,4 | 19,3 | 791 | 1113 | 12 | 6 | 20,4 | 11,0 | 582 | 820 |
| 96 | 142 | 22 | 12 | 35,9 | 19,4 | 814 | 1115 | 12 | 6 | 20,1 | 11,1 | 600 | 822 |
| 98 | 141 | 22 | 12 | 35,4 | 19,6 | 839 | 1118 | 12 | 6 | 19,8 | 11,2 | 618 | 823 |
| 100 | 140 | 22 | 12 | 34,8 | 19,7 | 864 | 1122 | 12 | 6 | 19,5 | 11,3 | 636 | 826 |
| 60 | 190 | 14 | 16 | 31,7 | 16,5 | 458 | 1609 | 14 | 8 | 31,7 | 16,5 | 458 | 1609 |
| 62 | 189 | 14 | 16 | 31,4 | 16,6 | 466 | 1554 | 14 | 8 | 31,4 | 16,6 | 466 | 1554 |
| 64 | 188 | 14 | 16 | 31,1 | 16,7 | 475 | 1505 | 14 | 8 | 31,1 | 16,7 | 475 | 1505 |
| 66 | 187 | 14 | 16 | 30,7 | 16,8 | 484 | 1462 | 14 | 8 | 30,7 | 16,8 | 484 | 1462 |
| 68 | 186 | 14 | 16 | 30,4 | 16,9 | 493 | 1425 | 14 | 8 | 30,4 | 16,9 | 493 | 1425 |
| 70 | 185 | 14 | 16 | 30,1 | 17,0 | 503 | 1392 | 14 | 8 | 30,1 | 17,0 | 503 | 1392 |
| 72 | 184 | 14 | 16 | 29,7 | 17,1 | 513 | 1362 | 14 | 8 | 29,7 | 17,1 | 513 | 1362 |
| 74 | 183 | 14 | 16 | 29,4 | 17,2 | 524 | 1336 | 14 | 8 | 29,4 | 17,2 | 524 | 1336 |
| 76 | 182 | 14 | 16 | 29,1 | 17,3 | 535 | 1313 | 14 | 8 | 29,1 | 17,3 | 535 | 1313 |
| 78 | 181 | 14 | 16 | 28,7 | 17,4 | 547 | 1293 | 14 | 8 | 28,7 | 17,4 | 547 | 1293 |
| 80 | 180 | 26 | 16 | 60,1 | 26,0 | 1290 | 1729 | 14 | 8 | 28,4 | 17,5 | 891 | 1194 |
| 82 | 179 | 26 | 16 | 59,5 | 26,2 | 1322 | 1736 | 14 | 8 | 28,1 | 17,6 | 912 | 1197 |
| 84 | 178 | 26 | 16 | 58,8 | 26,3 | 1355 | 1744 | 14 | 8 | 27,7 | 17,7 | 933 | 1201 |
| 86 | 177 | 26 | 16 | 58,2 | 26,5 | 1388 | 1752 | 14 | 8 | 27,4 | 17,8 | 955 | 1206 |
| 88 | 176 | 26 | 16 | 57,5 | 26,7 | 1423 | 1761 | 14 | 8 | 27,1 | 18,0 | 978 | 1211 |
| 90 | 175 | 26 | 16 | 56,9 | 26,8 | 1458 | 1771 | 14 | 8 | 26,8 | 18,1 | 1001 | 1216 |
| 92 | 174 | 26 | 16 | 56,3 | 27,0 | 1493 | 1781 | 14 | 8 | 26,4 | 18,2 | 1024 | 1221 |
| 94 | 173 | 26 | 16 | 55,6 | 27,2 | 1530 | 1792 | 14 | 8 | 26,1 | 18,3 | 1048 | 1227 |
| 96 | 172 | 26 | 16 | 55,0 | 27,4 | 1567 | 1803 | 14 | 8 | 25,8 | 18,4 | 1072 | 1233 |
| 98 | 171 | 26 | 16 | 54,3 | 27,5 | 1606 | 1815 | 14 | 8 | 25,5 | 18,5 | 1096 | 1239 |
| 100 | 170 | 26 | 16 | 53,7 | 27,7 | 1645 | 1827 | 14 | 8 | 25,2 | 18,7 | 1121 | 1246 |
| 102 | 169 | 26 | 16 | 53,1 | 27,9 | 1684 | 1840 | 14 | 8 | 24,9 | 18,8 | 1147 | 1253 |
| 104 | 168 | 26 | 16 | 52,5 | 28,1 | 1725 | 1853 | 14 | 8 | 24,5 | 18,9 | 1173 | 1260 |
| 106 | 167 | 26 | 16 | 51,8 | 28,3 | 1766 | 1867 | 14 | 8 | 24,2 | 19,0 | 1199 | 1267 |
| 108 | 166 | 26 | 16 | 51,2 | 28,5 | 1809 | 1881 | 14 | 8 | 23,9 | 19,2 | 1226 | 1275 |
| 110 | 165 | 26 | 16 | 50,6 | 28,7 | 1852 | 1895 | 14 | 8 | 23,6 | 19,3 | 1253 | 1282 |

Table C2 (contd.): Joist hanger type I with interior flanges:
Form factors $k_{H,1}$ and $k_{H,2}$ and dimensions e_1 , e_2 ; $e_{J,0} = 32$ mm

| B [mm] | H [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] |
|-----------|-----------|--------------|-------|-----------|-----------|---------------|---------------|-----------------|-------|-----------|-----------|---------------|---------------|
| | | Full nailing | | | | | | Partial nailing | | | | | |
| 112 | 164 | 26 | 16 | 50,0 | 28,9 | 1895 | 1910 | 14 | 8 | 23,3 | 19,4 | 1280 | 1290 |
| 114 | 163 | 26 | 16 | 49,4 | 29,1 | 1940 | 1925 | 14 | 8 | 23,0 | 19,6 | 1308 | 1298 |
| 116 | 162 | 26 | 16 | 48,8 | 29,3 | 1986 | 1941 | 14 | 8 | 22,7 | 19,7 | 1337 | 1307 |
| 118 | 161 | 26 | 16 | 48,1 | 29,5 | 2032 | 1956 | 14 | 8 | 22,4 | 19,8 | 1366 | 1315 |
| 120 | 160 | 26 | 16 | 47,5 | 29,7 | 2079 | 1973 | 14 | 8 | 22,1 | 20,0 | 1395 | 1324 |
| 60 | 210 | 16 | 18 | 39,4 | 22,1 | 601 | 2273 | 16 | 10 | 39,4 | 22,1 | 601 | 2273 |
| 62 | 209 | 16 | 18 | 39,0 | 22,2 | 609 | 2188 | 16 | 10 | 39,0 | 22,2 | 609 | 2188 |
| 64 | 208 | 16 | 18 | 38,6 | 22,3 | 619 | 2112 | 16 | 10 | 38,6 | 22,3 | 619 | 2112 |
| 66 | 207 | 16 | 18 | 38,2 | 22,5 | 628 | 2045 | 16 | 10 | 38,2 | 22,5 | 628 | 2045 |
| 68 | 206 | 16 | 18 | 37,8 | 22,6 | 638 | 1986 | 16 | 10 | 37,8 | 22,6 | 638 | 1986 |
| 70 | 205 | 16 | 18 | 37,4 | 22,7 | 649 | 1932 | 16 | 10 | 37,4 | 22,7 | 649 | 1932 |
| 72 | 204 | 16 | 18 | 37,1 | 22,8 | 660 | 1885 | 16 | 10 | 37,1 | 22,8 | 660 | 1885 |
| 74 | 203 | 16 | 18 | 36,7 | 22,9 | 671 | 1842 | 16 | 10 | 36,7 | 22,9 | 671 | 1842 |
| 76 | 202 | 16 | 18 | 36,3 | 23,1 | 683 | 1804 | 16 | 10 | 36,3 | 23,1 | 683 | 1804 |
| 78 | 201 | 16 | 18 | 35,9 | 23,2 | 695 | 1770 | 16 | 10 | 35,9 | 23,2 | 695 | 1770 |
| 80 | 200 | 30 | 18 | 74,2 | 34,9 | 1000 | 2456 | 16 | 10 | 40,2 | 19,2 | 666 | 1635 |
| 82 | 199 | 30 | 18 | 73,5 | 35,0 | 1017 | 2413 | 16 | 10 | 39,8 | 19,3 | 679 | 1611 |
| 84 | 198 | 30 | 18 | 72,7 | 35,2 | 1035 | 2375 | 16 | 10 | 39,4 | 19,4 | 693 | 1590 |
| 86 | 197 | 30 | 18 | 72,0 | 35,4 | 1053 | 2341 | 16 | 10 | 39,1 | 19,6 | 707 | 1571 |
| 88 | 196 | 30 | 18 | 71,3 | 35,6 | 1073 | 2310 | 16 | 10 | 38,7 | 19,7 | 721 | 1554 |
| 90 | 195 | 30 | 18 | 70,5 | 35,8 | 1093 | 2284 | 16 | 10 | 38,3 | 19,8 | 737 | 1539 |
| 92 | 194 | 30 | 18 | 69,8 | 36,0 | 1114 | 2261 | 16 | 10 | 37,9 | 19,9 | 752 | 1526 |
| 94 | 193 | 30 | 18 | 69,1 | 36,3 | 1136 | 2240 | 16 | 10 | 37,5 | 20,0 | 768 | 1514 |
| 96 | 192 | 30 | 18 | 68,3 | 36,5 | 1159 | 2223 | 16 | 10 | 37,1 | 20,1 | 785 | 1505 |
| 98 | 191 | 30 | 18 | 67,6 | 36,7 | 1183 | 2208 | 16 | 10 | 36,7 | 20,2 | 801 | 1496 |
| 100 | 190 | 30 | 18 | 66,9 | 36,9 | 1207 | 2195 | 16 | 10 | 36,3 | 20,3 | 819 | 1489 |
| 102 | 189 | 30 | 18 | 66,2 | 37,1 | 1233 | 2184 | 16 | 10 | 36,0 | 20,5 | 837 | 1483 |
| 104 | 188 | 30 | 18 | 65,4 | 37,3 | 1259 | 2176 | 16 | 10 | 35,6 | 20,6 | 855 | 1478 |
| 106 | 187 | 30 | 18 | 64,7 | 37,5 | 1286 | 2169 | 16 | 10 | 35,2 | 20,7 | 874 | 1474 |
| 108 | 186 | 30 | 18 | 64,0 | 37,8 | 1314 | 2164 | 16 | 10 | 34,8 | 20,8 | 893 | 1471 |
| 110 | 185 | 30 | 18 | 63,3 | 38,0 | 1343 | 2161 | 16 | 10 | 34,5 | 21,0 | 913 | 1468 |
| 112 | 184 | 30 | 18 | 62,6 | 38,2 | 1373 | 2159 | 16 | 10 | 34,1 | 21,1 | 933 | 1467 |
| 114 | 183 | 30 | 18 | 61,9 | 38,4 | 1403 | 2159 | 16 | 10 | 33,7 | 21,2 | 953 | 1466 |
| 116 | 182 | 30 | 18 | 61,2 | 38,7 | 1435 | 2160 | 16 | 10 | 33,3 | 21,3 | 974 | 1467 |
| 118 | 181 | 30 | 18 | 60,5 | 38,9 | 1467 | 2162 | 16 | 10 | 33,0 | 21,5 | 996 | 1467 |
| 120 | 180 | 30 | 18 | 59,8 | 39,2 | 1500 | 2165 | 16 | 10 | 32,6 | 21,6 | 1018 | 1469 |
| 60 | 220 | 16 | 18 | 48,3 | 17,3 | 558 | 2112 | 16 | 10 | 48,3 | 17,3 | 558 | 2112 |
| 62 | 219 | 16 | 18 | 47,9 | 17,4 | 567 | 2035 | 16 | 10 | 47,9 | 17,4 | 567 | 2035 |
| 64 | 218 | 16 | 18 | 47,5 | 17,5 | 576 | 1967 | 16 | 10 | 47,5 | 17,5 | 576 | 1967 |
| 66 | 217 | 16 | 18 | 47,1 | 17,6 | 586 | 1907 | 16 | 10 | 47,1 | 17,6 | 586 | 1907 |
| 68 | 216 | 16 | 18 | 46,7 | 17,7 | 596 | 1853 | 16 | 10 | 46,7 | 17,7 | 596 | 1853 |
| 70 | 215 | 16 | 18 | 46,3 | 17,8 | 606 | 1806 | 16 | 10 | 46,3 | 17,8 | 606 | 1806 |
| 72 | 214 | 16 | 18 | 45,9 | 17,9 | 617 | 1763 | 16 | 10 | 45,9 | 17,9 | 617 | 1763 |

Table C2 (contd.):

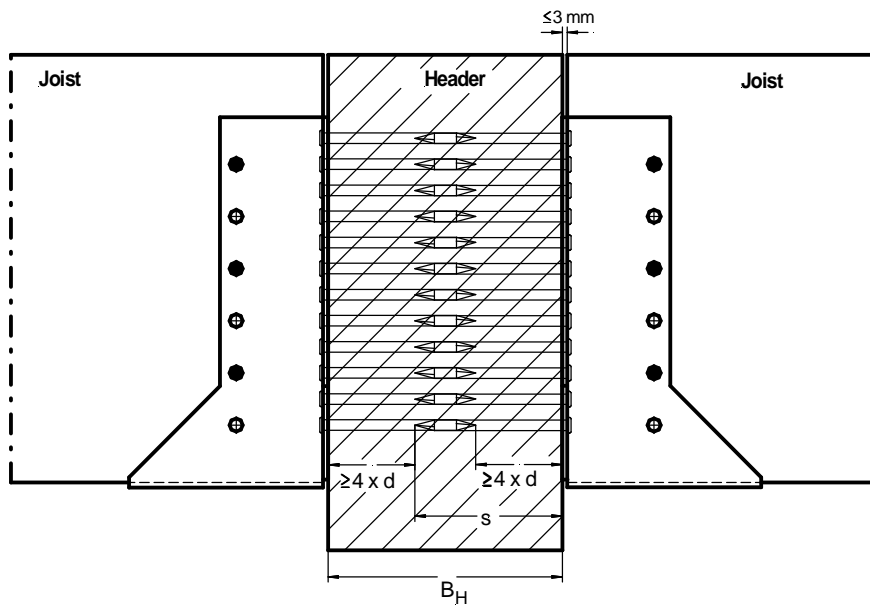
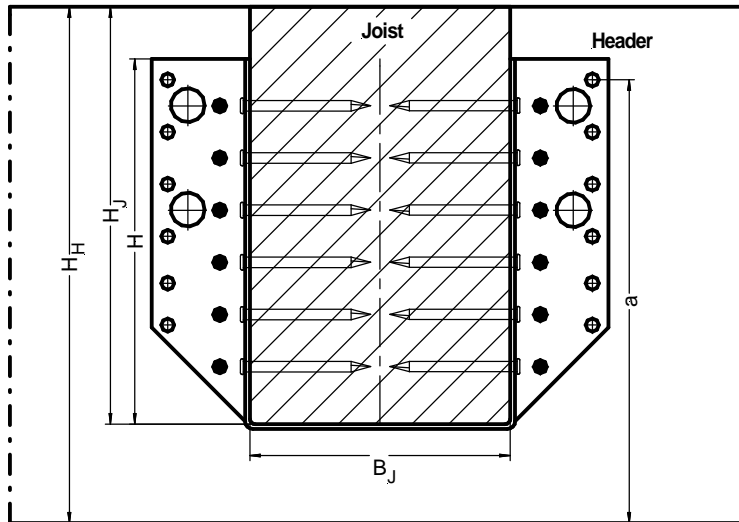
Joist hanger type I with interior flanges:

Form factors $k_{H,1}$ and $k_{H,2}$ and dimensions e_1 , e_2 ; $e_{J,0} = 32$ mm

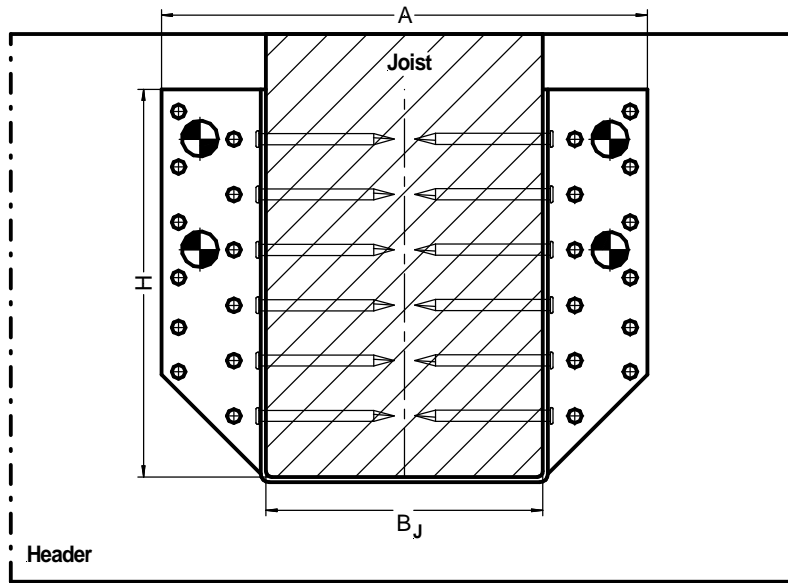
| B [mm] | H [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] | n_H | n_J | $k_{H,1}$ | $k_{H,2}$ | e_1 [mm] | e_2 [mm] |
|-----------|-----------|--------------|-------|-----------|-----------|---------------|---------------|-----------------|-------|-----------|-----------|---------------|---------------|
| | | Full nailing | | | | | | Partial nailing | | | | | |
| 74 | 213 | 16 | 18 | 45,4 | 17,9 | 629 | 1726 | 16 | 10 | 45,4 | 17,9 | 629 | 1726 |
| 76 | 212 | 16 | 18 | 45,0 | 18,0 | 641 | 1692 | 16 | 10 | 45,0 | 18,0 | 641 | 1692 |
| 78 | 211 | 16 | 18 | 44,6 | 18,1 | 609 | 1662 | 16 | 10 | 44,6 | 18,1 | 609 | 1662 |
| 80 | 210 | 30 | 18 | 81,8 | 33,0 | 1000 | 2456 | 16 | 10 | 44,2 | 18,2 | 666 | 1635 |
| 82 | 209 | 30 | 18 | 81,0 | 33,2 | 1017 | 2413 | 16 | 10 | 43,8 | 18,3 | 679 | 1611 |
| 84 | 208 | 30 | 18 | 80,3 | 33,4 | 1035 | 2375 | 16 | 10 | 43,4 | 18,4 | 693 | 1590 |
| 86 | 207 | 30 | 18 | 79,5 | 33,6 | 1053 | 2341 | 16 | 10 | 43,0 | 18,5 | 707 | 1571 |
| 88 | 206 | 30 | 18 | 78,7 | 33,7 | 1073 | 2310 | 16 | 10 | 42,6 | 18,6 | 721 | 1554 |
| 90 | 205 | 30 | 18 | 78,0 | 33,9 | 1093 | 2284 | 16 | 10 | 42,2 | 18,7 | 737 | 1539 |
| 92 | 204 | 30 | 18 | 77,2 | 34,1 | 1114 | 2261 | 16 | 10 | 41,8 | 18,8 | 752 | 1526 |
| 94 | 203 | 30 | 18 | 76,5 | 34,3 | 1136 | 2240 | 16 | 10 | 41,4 | 18,9 | 768 | 1514 |
| 96 | 202 | 30 | 18 | 75,7 | 34,5 | 1159 | 2223 | 16 | 10 | 41,0 | 19,0 | 785 | 1505 |
| 98 | 201 | 30 | 18 | 75,0 | 34,7 | 1183 | 2208 | 16 | 10 | 40,6 | 19,1 | 801 | 1496 |
| 100 | 200 | 30 | 18 | 74,2 | 34,9 | 1207 | 2195 | 16 | 10 | 40,2 | 19,2 | 819 | 1489 |
| 102 | 199 | 30 | 18 | 73,5 | 35,0 | 1233 | 2184 | 16 | 10 | 39,8 | 19,3 | 837 | 1483 |
| 104 | 198 | 30 | 18 | 72,7 | 35,2 | 1259 | 2176 | 16 | 10 | 39,4 | 19,4 | 855 | 1478 |
| 106 | 197 | 30 | 18 | 72,0 | 35,4 | 1286 | 2169 | 16 | 10 | 39,1 | 19,6 | 874 | 1474 |
| 108 | 196 | 30 | 18 | 71,3 | 35,6 | 1314 | 2164 | 16 | 10 | 38,7 | 19,7 | 893 | 1471 |
| 110 | 195 | 30 | 18 | 70,5 | 35,8 | 1343 | 2161 | 16 | 10 | 38,3 | 19,8 | 913 | 1468 |
| 112 | 194 | 30 | 18 | 69,8 | 36,0 | 1373 | 2159 | 16 | 10 | 37,9 | 19,9 | 933 | 1467 |
| 114 | 193 | 30 | 18 | 69,1 | 36,3 | 1403 | 2159 | 16 | 10 | 37,5 | 20,0 | 953 | 1466 |
| 116 | 192 | 30 | 18 | 68,3 | 36,5 | 1435 | 2160 | 16 | 10 | 37,1 | 20,1 | 974 | 1467 |
| 118 | 191 | 30 | 18 | 67,6 | 36,7 | 1467 | 2162 | 16 | 10 | 36,7 | 20,2 | 996 | 1467 |
| 120 | 190 | 30 | 18 | 66,9 | 36,9 | 1500 | 2165 | 16 | 10 | 36,3 | 20,3 | 1018 | 1469 |
| 122 | 189 | 30 | 18 | 66,2 | 37,1 | 1534 | 2169 | 16 | 10 | 36,0 | 20,5 | 1040 | 1471 |
| 124 | 188 | 30 | 18 | 65,4 | 37,3 | 1569 | 2175 | 16 | 10 | 35,6 | 20,6 | 1063 | 1473 |
| 126 | 187 | 30 | 18 | 64,7 | 37,5 | 1605 | 2181 | 16 | 10 | 35,2 | 20,7 | 1086 | 1476 |
| 128 | 186 | 30 | 18 | 64,0 | 37,8 | 1641 | 2188 | 16 | 10 | 34,8 | 20,8 | 1110 | 1480 |
| 130 | 185 | 30 | 18 | 63,3 | 38,0 | 1679 | 2196 | 16 | 10 | 34,5 | 21,0 | 1134 | 1484 |
| 132 | 184 | 30 | 18 | 62,6 | 38,2 | 1717 | 2205 | 16 | 10 | 34,1 | 21,1 | 1159 | 1489 |
| 134 | 183 | 30 | 18 | 61,9 | 38,4 | 1756 | 2215 | 16 | 10 | 33,7 | 21,2 | 1184 | 1493 |
| 136 | 182 | 30 | 18 | 61,2 | 38,7 | 1796 | 2225 | 16 | 10 | 33,3 | 21,3 | 1210 | 1499 |
| 138 | 181 | 30 | 18 | 60,5 | 38,9 | 1837 | 2236 | 16 | 10 | 33,0 | 21,5 | 1236 | 1504 |
| 140 | 180 | 30 | 18 | 59,8 | 39,2 | 1879 | 2248 | 16 | 10 | 32,6 | 21,6 | 1262 | 1510 |

Annex D Application of joist hangers

Joist hanger in wood/wood connection



**Joist hanger connected to concrete, lightweight concrete
or a steel member by bolts**



Bolts M10
Washer according to
EN ISO 7094

