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Designated according to Article 29 of Regulation (EU) No 305/2011

Member of EOTA
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European Technical Assessment

ETA-15/0667 of 22.04.2025

General part

Technical Assessment Body issuing the European Technical Assessment	Österreichisches Institut für Bautechnik (OIB) Austrian Institute of Construction Engineering
Trade name of the construction product	Knapp Clip connector type MEGANT series 60, 100, 150
Product family to which the construction product belongs	Three-dimensional nailing plate (connector for wood to wood connections and wood to concrete or steel connections)
Manufacturer	Knapp GmbH Wassergasse 31 3324 Euratsfeld AUSTRIA
Manufacturing plant	Knapp GmbH Wassergasse 31 3324 Euratsfeld AUSTRIA
This European Technical Assessment contains	71 pages including 8 Annexes which form an integral part of this assessment.
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	European Assessment Document (EAD) 130186-00-0603 “Three-dimensional nailing plates”.
This European Technical Assessment replaces	European Technical Assessment ETA-15/0667 of 16.08.2023.

Specific parts

1 Technical description of the product

1.1 General

This European Technical Assessment (ETA)[1] applies to the connector MEGANT to be used in load-bearing timber to timber or timber to steel or concrete connections. MEGANT consists of two connector plates installed into the timber with self-tapping screws with diameter 8 mm and to members made of steel or concrete with suitable fasteners. Clamping jaws are placed at the bottom and at the top of the connector plates and connected by a defined number of threaded rods fixed with hexagonal nuts, see Annex 1 and Annex 2. The overall thickness of MEGANT is 40 or 50 mm.

To increase the moment capacity of the MEGANT connectors, reinforcements may be arranged in the bending tension or bending compression zone of the members to be connected.

The production series MEGANT includes 12 different types of connectors for timber to timber or timber to steel connections in the following 3 configurations with variable height

- 60 mm width with two rows of screws and 40 mm thickness
- 100 mm width with three rows of screws and 40 mm thickness
- 150 mm width with four rows of screws and 50 mm thickness

MEGANT corresponds to the specifications given in the Annexes 1, 2 and 4. The material characteristics, dimensions and tolerances of MEGANT, not indicated in these Annexes, are given in the technical file[2] of the European Technical Assessment.

1.2 Connector plates

The connector plates together with their most important dimensions are shown in Annex 2. The connector plates are produced of aluminium EN AW - 6082 according to EN 755-2[3].

The different types of connector plates can be adapted for wood to steel or concrete connections, see Annex 2.

1.3 Screws

The screws for installation of the two connector plates into the timber are described in Annex 1 or are in accordance with an ETA. They are made of carbon steel or stainless steel.

1.4 Clamping jaw

Clamping jaws are placed at the bottom and at the top of the connector plates in order to connect the two plates by threaded rods. The clamping jaw at the bottom is provided with a thread.

The clamping jaws are described in Annex 2. They are made of aluminium EN AW - 6082 according to EN 755-2.

1.5 Threaded rods

The threaded rods (M16 or M20, property class 8.8) for connection of the connector plates by clamping jaws are described in Annex 1. They are made of carbon steel or stainless steel.

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[1] In 2015 ETA-15/0667 was firstly issued as European Technical Assessment ETA-15/0667 of 20.11.2015, amended in 2019 to ETA 15/0667 of 22.07.2019, amended in 2023 to ETA-15/0667 of 16.08.2023 and amended in 2025 to ETA-15/0667 of 22.04.2025.

[2] The technical file of the European Technical Assessment is deposited at Österreichisches Institut für Bautechnik and, in so far as is relevant to the tasks of the notified factory production control certification body involved in the assessment and verification of constancy of performance procedure, is handed over to the notified factory production control certification body.

[3] Reference documents are listed in Annex 8.

1.6 Hexagonal nuts and washers

The hexagonal nuts and washers, used to fix the threaded rods at the top of the connector, are described in Annex 1. The hexagonal nuts are produced according to EN ISO 4032 (strength class 8.8), the washers are produced according to ISO 7090. They are made of carbon steel or stainless steel.

1.7 Reinforcement to increase the moment capacity

Reinforcements in the bending tension zone are comprised of crosswise installed fully-threaded screws or steel components connected with dowel-type fasteners. Reinforcements in the bending compression zone are comprised of fully-threaded screws arranged under the clamping jaw. The load-bearing capacity and stiffness of the reinforcements shall be determined in accordance with EN 1995-1-1, EN 1993-1-1 or an ETA.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document

2.1 Intended use

The connectors are intended to be used in load bearing connections of timber structures as end grain to side grain, end grain to end grain or side grain to side grain connections, e.g. between beams as well as connections between timber and a concrete structure or a steel member.

The connectors are used for connections in load bearing timber structures between the following wood-based members:

- Solid timber of softwood/hardwood of strength class C24/D24 or better according to EN 338 and EN 14081-1,
- Glued laminated timber of strength class GL24c or better according to EN 14080
- Glued laminated timber of hardwood according to European Technical Assessments or national standards and regulations in force at the place of use,
- Laminated veneer lumber LVL according to EN 14374 or according to European Technical Assessments,
- Solid wood members similar to glued laminated timber (typically e.g. Duo- and Triobalken) according to EN 14080 or national standards and regulations in force at the place of use,
- Cross laminated timber according to European Technical Assessments or national standards and regulations in force at the place of use,
- Strand lumber (e.g. Laminated Strand Lumber – Intrallam LSL, Parallam PSL) according to European Technical Assessments or national standards and regulations in force at the place of use.

The typical installation of the connectors is shown in Annex 3.

The connectors shall be subjected to static and quasi static actions only.

The connectors are intended to be used in service classes 1 and 2 according to EN 1995-1-1.

2.2 General assumptions

MEGANT is manufactured in accordance with the provisions of the European Technical Assessment using the manufacturing process as identified in the inspection of the manufacturing plant by Österreichisches Institut für Bautechnik and laid down in the technical file.

The manufacturer shall ensure that the requirements in accordance with the Clauses 1, 2 and 3 as well as with the Annexes of the European Technical Assessment are made known to those who are concerned with design and execution of the works.

Design

The European Technical Assessment only applies to the manufacture and use of MEGANT. Verification of stability of the works including application of loads on the connector is not subject of the European Technical Assessment.

The following conditions shall be observed:

- Design of connections with MEGANT is carried out under the responsibility of an engineer experienced in timber structures.
- Design of the works shall account for the protection of the connections to maintain service class 1 or 2 according to EN 1995-1-1.
- MEGANT is installed correctly.
- It shall be checked in accordance with EN 1995-1-1 that splitting will not occur.

Design of connections with MEGANT may be according to EN 1995-1-1 and EN 1995-1-2 taking into account the Annexes of the European Technical Assessment. Standards and regulations in force at the place of use shall be considered.

Design of connections with connectors in wood to steel or concrete connections may be according to Eurocode 2, 3, 5 or 9 and Annex 5.

Packaging, transport, storage, maintenance, replacement and repair

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

Installation

It is assumed that the product will be installed according to the manufacturer’s instructions or (in absence of such instructions) according to the usual practice of the building professionals.

The beam hangers shall be screwed as specified in Annex 2. In hardwood connections the screws shall be driven in predrilled holes with diameter 6 mm. The inclined screws installed into glued laminated timber of hardwood or laminated veneer lumber of hardwood may be installed without predrilling whereas the moment screws shall be predrilled.

The structural members which are connected with MEGANT shall be

- torsional fixed, or for the case that the members are not torsional fixed, the characteristic load bearing capacity shall be attenuated by f_{R2} according to Annex 5;
- wood-based members according to clause 2.1;
- free from wane under the connector;
- with plane surfaces against the connector;
- without virtually gap between the timber members;
- with minimum spacing and edge distances are in accordance with EN 1995-1-1 or European Technical Assessment.

The rules for wood-to-wood connections are also applicable for the connection between wood to concrete or steel.

In addition, the following conditions shall be observed:

– The connector shall be close in contact with the concrete or steel over the whole face.

– The fastener shall have a diameter not less than the hole diameter minus 2 mm.

2.3 Assumed working life

The provisions made in the European Technical Assessment (ETA) are based on an assumed intended working life of MEGANT of 50 years, when installed in the works, provided that the product is subject to appropriate installation, use and maintenance (see clause 2.2). These provisions are based upon the current state of the art and the available knowledge and experience[4].

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA nor by the Technical Assessment Body, but are regarded only as a means for choosing the appropriate products in relation to the expected economically reasonable working life of the works.

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

3.1 Essential characteristics of the product

Table 1: Essential characteristics of the product and assessment methods

№	Essential characteristic	Product performance
Basic requirement for construction works 1: Mechanical resistance and stability		
1	Joint strength	3.1.1
2	Joint stiffness	3.1.2
3	Joint ductility	No performance assessed.
4	Resistance to seismic actions	No performance assessed.
5	Resistance to corrosion and deterioration	3.1.3
Basic requirement for construction works 2: Safety in case of fire		
6	Reaction to fire	3.1.4
7	Resistance to fire	No performance assessed.

3.1.1 Joint strength

The characteristic load bearing capacities of the connectors are determined by calculation assisted by testing. The connectors are installed with a defined number of screws with respective nominal diameter as specified in Annex 1 and Annex 2. Kinematic restraints are defined in Annex 4.

The values of the characteristic load bearing capacities for the loading directions F_1, M_{tor}, F_2, M_2, F_3 and F_{45}, as defined in Annex 4, are given in Annex 5.

[4] The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than referred to above.

If the connectors are connected to structural members made of steel or concrete, suitable fasteners are used. The same load bearing capacities shall be used as for timber-to-timber connections given in Annex 5, provided the fasteners are designed to exceed the load bearing capacities of the connector to timber connections. In addition, for loading in direction of insertion, the specifications for connections between wooden members and steel and concrete members given in Annex 5 shall be considered.

3.1.2 Joint stiffness

The stiffness of the connectors was determined by calculation assisted by testing. The connectors are installed with a defined number of screws with respective nominal diameter as specified in Annex 1 and Annex 2. The stiffness values are given in Annex 5.

3.1.3 Resistance to corrosion and deterioration

The product is intended to be used in service classes 1 and 2 according to EN 1995-1-1. The product and each member of the connection should at least be suitable for service classes 1 and 2, but not for service class 1 only.

The connector plates and clamping jaws are made of aluminium EN AW - 6082 according to EN 755-2 with durability class B according to EN 1999-1-1. Screws, threaded rods, hexagonal nuts and washers are made of carbon steel and galvanised or of stainless steel.

3.1.4 Reaction to fire

Connector plates and clamping jaws are made of aluminium and the screws, threaded rods, hexagonal nuts and washers are made of carbon steel or of stainless steel, all classified as Euroclass A1 in accordance with Commission Decision 96/603/EC as amended.

3.2 Assessment methods

3.2.1 General

The assessment of the essential characteristics in Clause 3.1 of MEGANT for the intended use, and in relation to the requirements for mechanical resistance and stability and for safety in case of fire in the sense of the basic requirements for construction works № 1 and 2 of Regulation (EU) № 305/2011 has been made in accordance with the European Assessment Document EAD 130186-00-0603 “Three-dimensional nailing plates”.

3.2.2 Identification

The European Technical Assessment for MEGANT is issued on the basis of agreed data that identify the assessed product. Changes to materials, to composition, to characteristics of the product, or to the production process could result in these deposited data being incorrect. Österreichisches Institut für Bautechnik should be notified before the changes are implemented, as an amendment of the European Technical Assessment is possibly necessary.

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

4.1 System of assessment and verification of constancy of performance

According to Commission Decision 97/638/EC the system of assessment and verification of constancy of performance to be applied to MEGANT is System 2+. System 2+ is detailed in Commission Delegated Regulation (EU) № 568/2014 of 18 February 2014, Annex, 1.3, and provides for the following items

(a) The manufacturer shall carry out:

- (i) an assessment of the performance of the construction product carried out on the basis of testing (including sampling), calculation, tabulated values or descriptive documentation of that product;
- (ii) factory production control;
- (iii) testing of samples taken at the manufacturing plant by the manufacturer in accordance with a prescribed test plan[5].

(b) The notified factory production control certification body shall decide on the issuing, restriction, suspension or withdrawal of the certificate of conformity of the factory production control on the basis of the outcome of the following assessments and verifications carried out by that body:

- (i) initial inspection of the manufacturing plant and of factory production control;
- (ii) continuing surveillance, assessment and evaluation of factory production control.

4.2 Construction products for which a European Technical Assessment has been issued

Manufacturers undertaking tasks under Systems 2+ shall consider the European Technical Assessment issued for the construction product in question as the assessment of the performance of that product. Manufacturers shall therefore not undertake the tasks referred to in point 4.1 (a)(i).

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

5.1 Tasks for the manufacturer

5.1.1 Factory production control

In the manufacturing plant the manufacturer shall establish and continuously maintain a factory production control. All procedures and specification adopted by the manufacturer shall be documented in a systematic manner. The factory production control shall ensure the constancy of performances of MEGANT with regard to the essential characteristics.

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the control plan. The incoming raw materials shall be subject to controls by the manufacturer before acceptance. Check of incoming materials shall include control of inspection documents presented by the manufacturer of the raw materials.

The frequencies of controls and tests conducted during manufacturing and on the assembled product are defined by taking account of the manufacturing process of the product and are laid down in the control plan.

[5] The prescribed test plan has been deposited with Österreichisches Institut für Bautechnik and is handed over only to the notified factory production control certification body involved in the procedure for the assessment and verification of constancy of performance. The prescribed test plan is also referred to as control plan.

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

- Designation of the product, basic materials and components
- Type of control or test
- Date of manufacture of the product and date of testing of the product or basic materials or components
- Results of controls and tests and, if appropriate, comparison with requirements
- Name and signature of person responsible for factory production control

The records shall be presented to the notified factory production control certification body involved in continuous surveillance. On request the records shall be presented to Österreichisches Institut für Bautechnik.

5.1.2 Declaration of performance

The manufacturer is responsible for preparing the declaration of performance. When all the criteria of the assessment and verification of constancy of performance are met, including the certificate of conformity of the factory production control issued by the notified factory production control certification body, the manufacturer shall draw up a declaration of performance.

5.2 Tasks for the notified factory production control certification body

5.2.1 Initial inspection of the manufacturing plant and of factory production control

The notified factory production control certification body shall verify the ability of the manufacturer for a continuous and orderly manufacturing of MEGANT according to the European Technical Assessment. In particular the following items shall be appropriately considered.

- Personnel and equipment
- The suitability of the factory production control established by the manufacturer
- Full implementation of the control plan

5.2.2 Continuing surveillance, assessment and evaluation of factory production control

The notified factory production control certification body shall visit the factory at least once a year for routine inspection. In particular the following items shall be appropriately considered.

- The manufacturing process including personnel and equipment
- The factory production control
- The implementation of the control plan

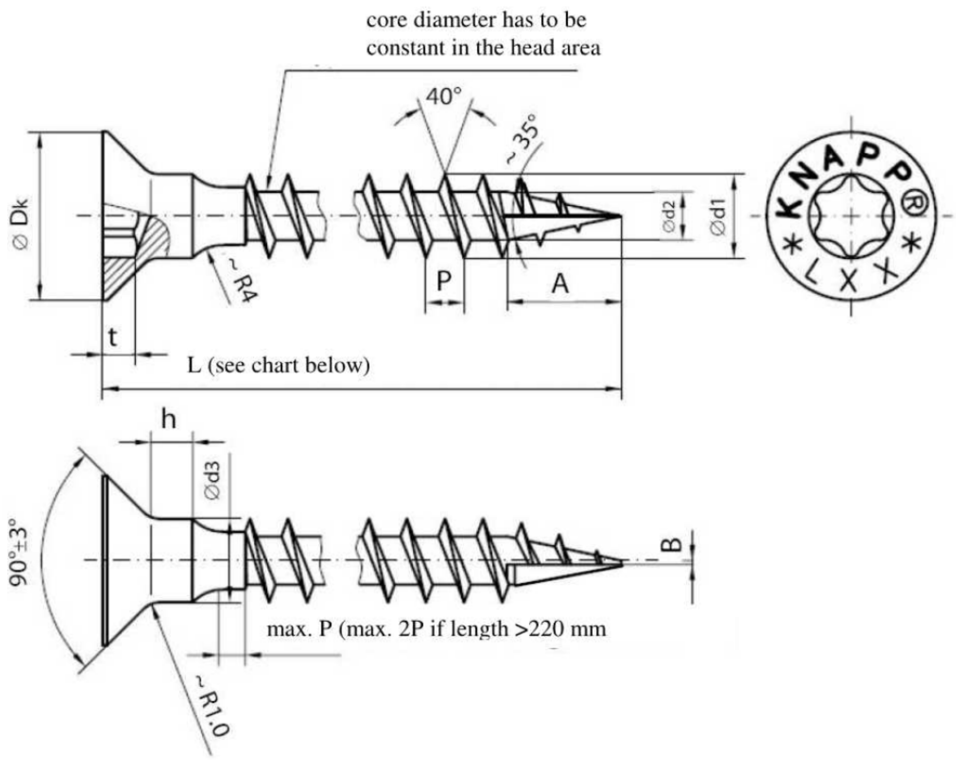
The results of continuous surveillance shall be made available on demand by the notified factory production control certification body to Österreichisches Institut für Bautechnik. When the provisions of the European Technical Assessment and the control plan are no longer fulfilled, the certificate of conformity of the factory production control shall be withdrawn.

Issued in Vienna on 22.04.2025
by Österreichisches Institut für Bautechnik

The original document is signed by:

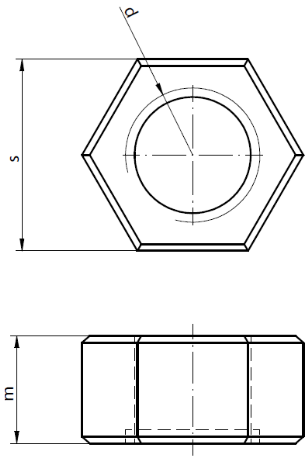
Thomas Rockenschaub

Deputy Managing Director

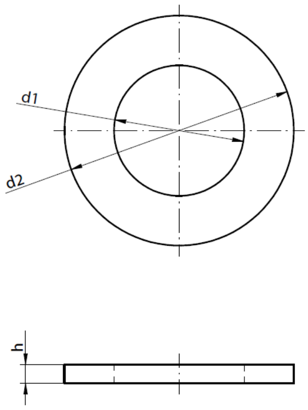


Self-tapping screw 8 x L mm	
E-Modulus	210 000 N/mm²
Min. char. tensile strength $f_{tens,k}$	20 kN
Min. char. yield moment $M_{y,k}$	20 Nm
Min. char. torsional strength $f_{tor,k}$	23 Nm
Head diameter D_k	15 mm
Outer thread diameter d_1	8 mm
Inner thread diameter d_2	5.1 mm
Length L	80 - 240 mm

MEGANT®	Annex 1
Fastener specification – self-tapping screw	of European Technical Assessment ETA-15/0667 of 22.04.2025

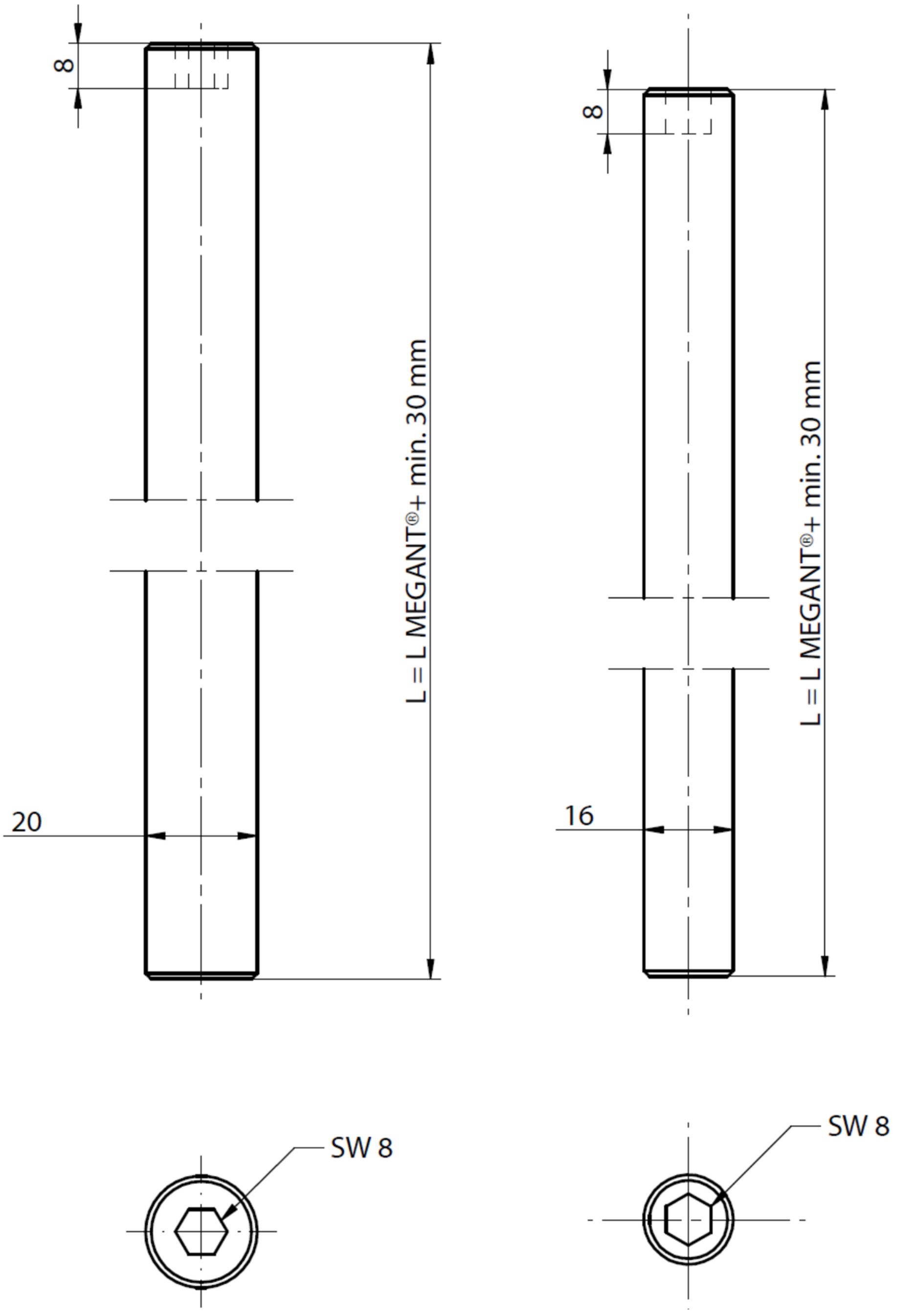


Hexagonal nut	Diameter d	Width across flat s	Thickness m
-	mm	mm	mm
M8	8	13	6.5
M10	10	17	8
M16	16	24	13
M20	20	30	16



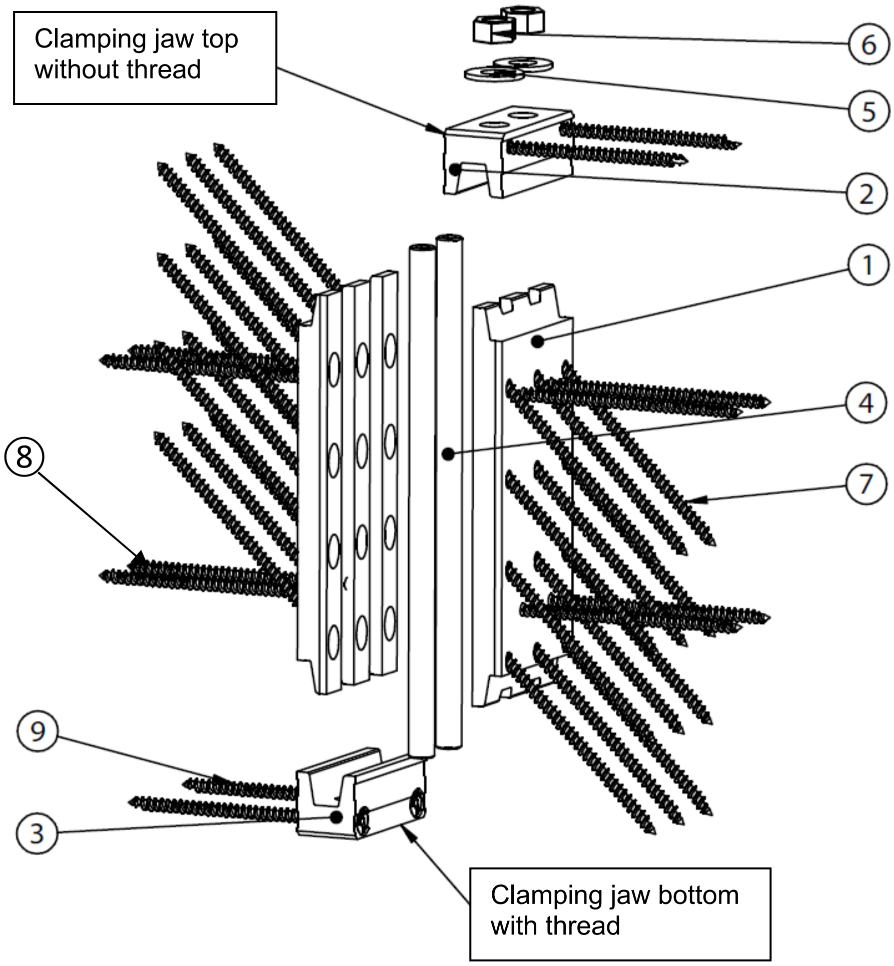
Washer	Inner diameter d_1	Outer diameter d_2	Thickness m
-	mm	mm	mm
M8	8.4	16	1.6
M10	10.5	20	2
M16	17	30	3
M20	21	37	3

MEGANT®	Annex 1
Fastener specification – hexagonal nut and washer	of European Technical Assessment ETA-15/0667 of 22.04.2025



dimensions in mm

MEGANT®	Annex 1
Fastener specification – threaded rod M16 and M20	of European Technical Assessment ETA-15/0667 of 22.04.2025



Position number	Name
1	Connector plate
2	Clamping jaw top
3	Clamping jaw bottom
4	Threaded rod
5	Washer
6	Hexagonal nut
7	Inclined screws
8	Horizontal (position) screws
9	Clamping jaw screws

MEGANT®	Annex 2
Product details definitions: assembling of the connector	of European Technical Assessment ETA-15/0667 of 22.04.2025

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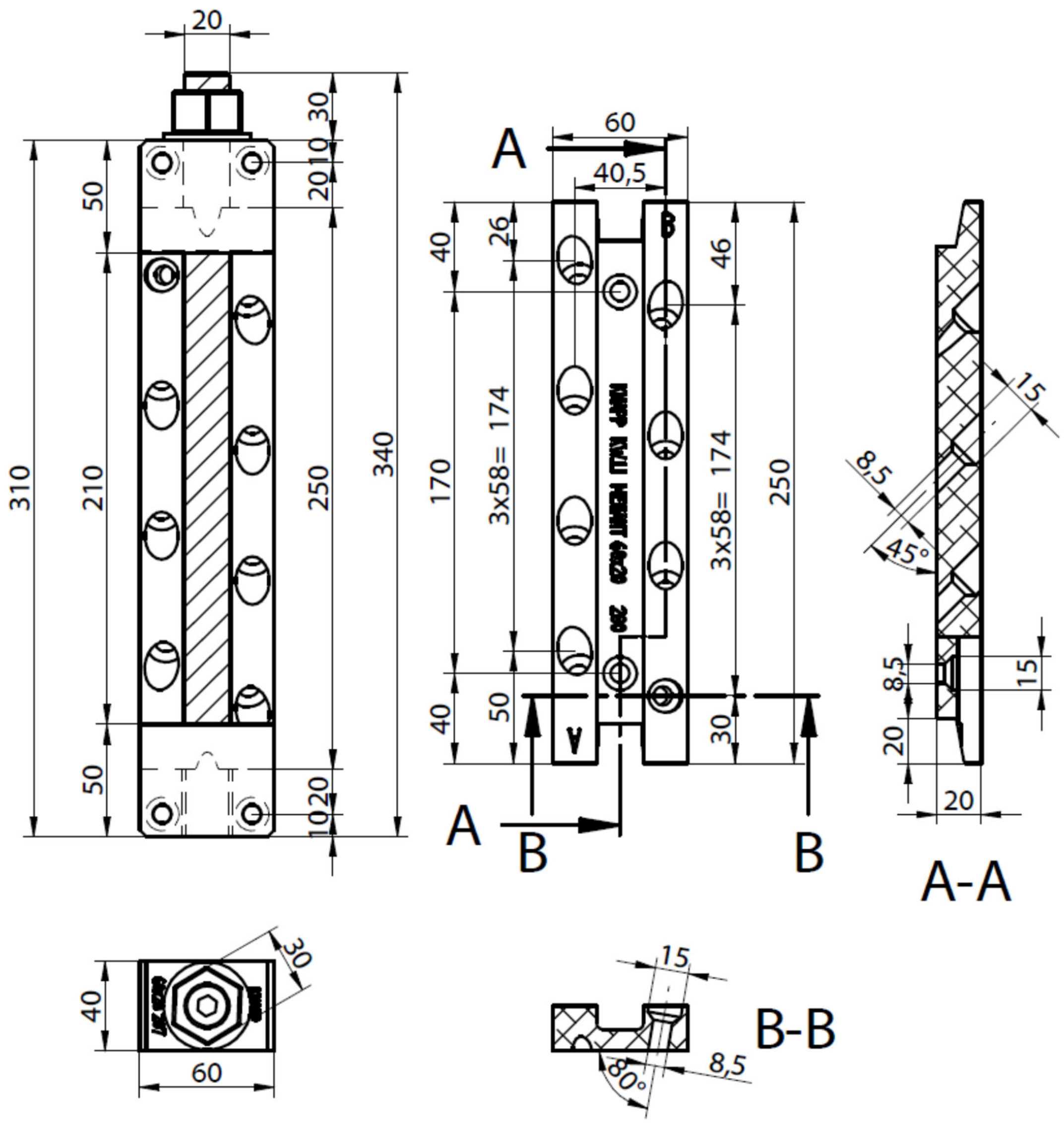
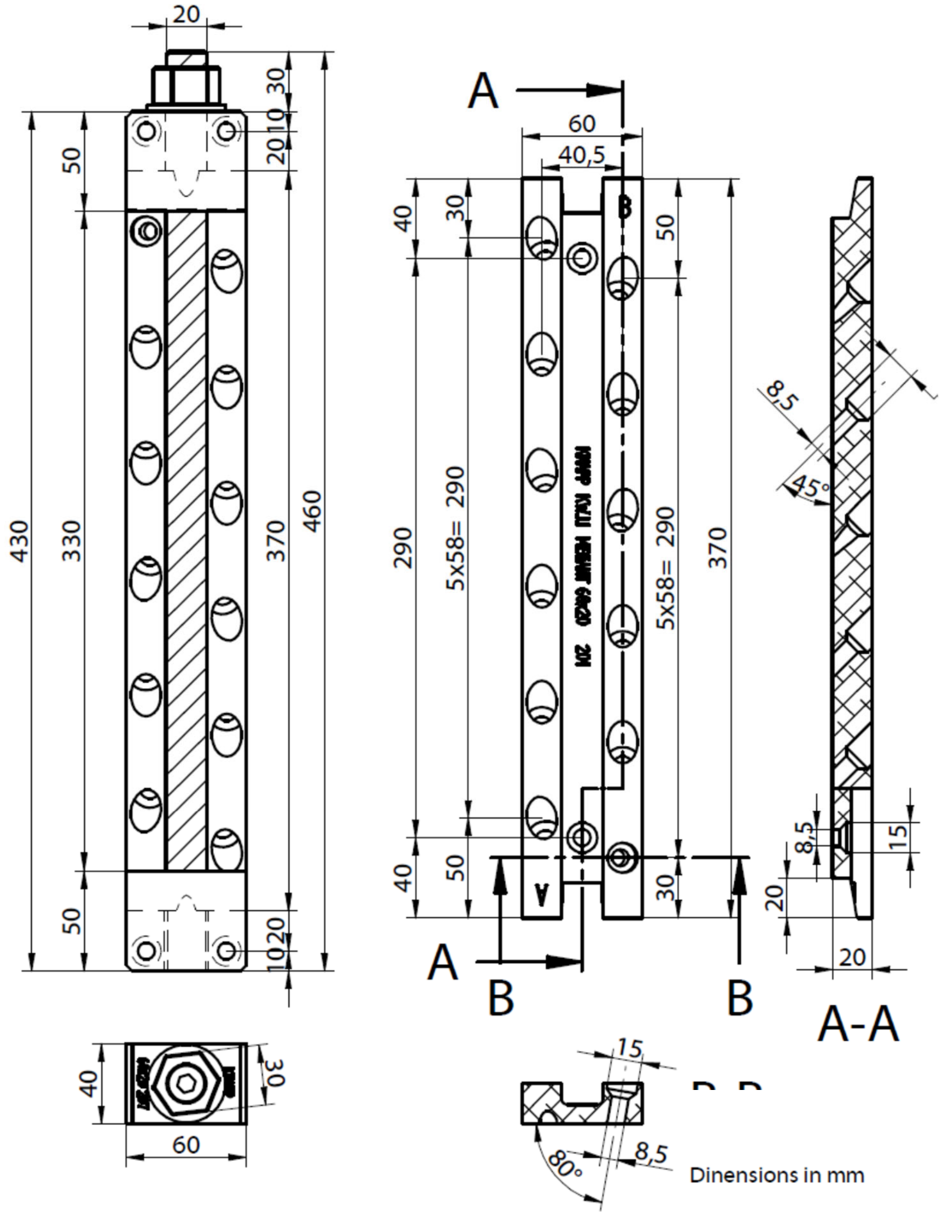


MEGANT® Dimension L/B/H	Number of screws in connector plate (joist and header)		Number of screws in clamping jaw	Number and dimension of threaded rod
mm	$n_{90,J/H}$	$n_{45,J/H}$	$n_{90,J/H}$	mm
310x60x40	3	7	2	1x M20x340

dimensions in mm

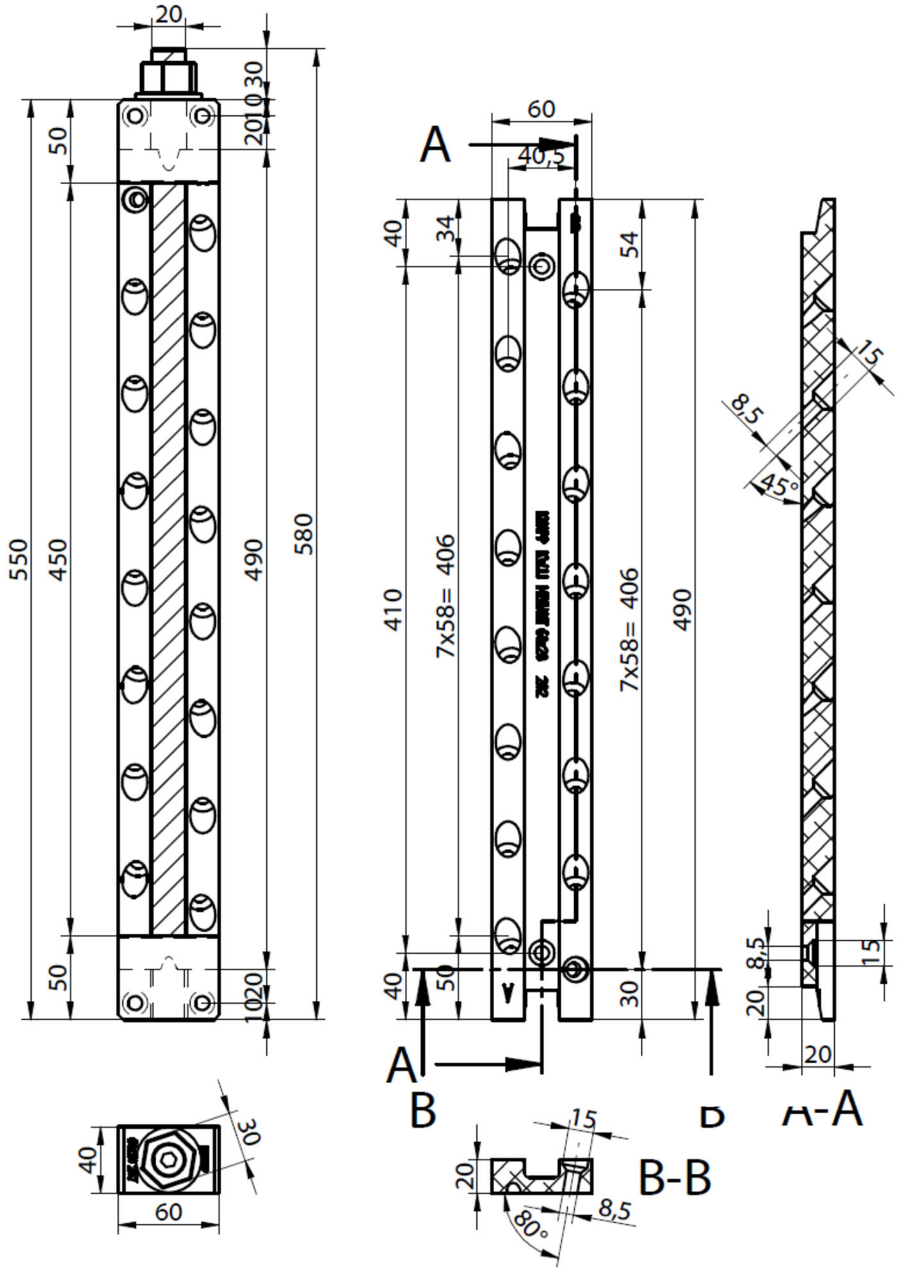
MEGANT® 60	Annex 2
Connector plate for wood Type: 310x60x40	of European Technical Assessment ETA-15/0667 of 22.04.2025



MEGANT® Dimension L/B/H	Number of screws in connector plate (joist and header)		Number of screws in clamping jaw	Number and dimension of threaded rod
mm	$n_{90,J/H}$	$n_{45,J/H}$	$n_{90,J/H}$	mm
430x60x40	3	11	2	1x M20x460

dimensions in mm

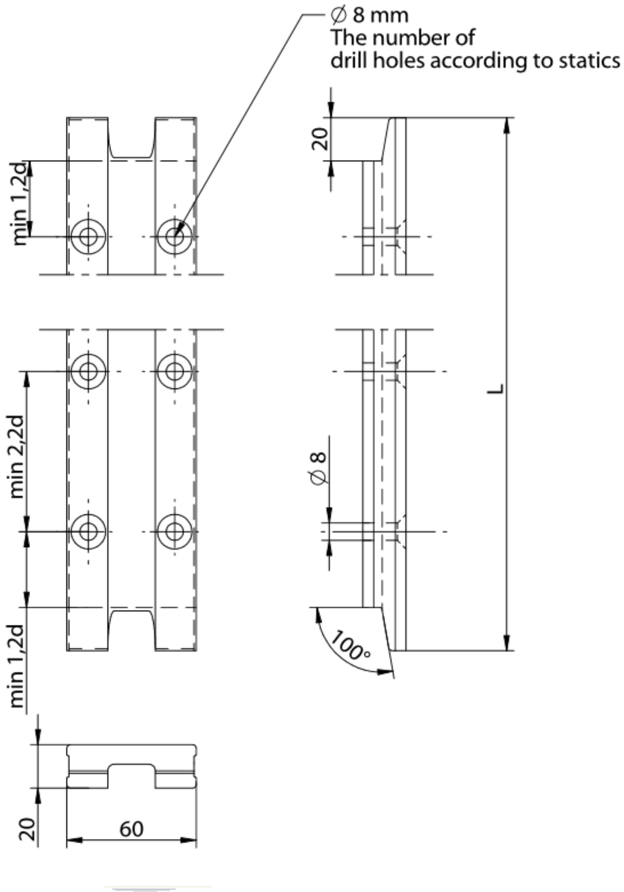
MEGANT® 60	Annex 2
Connector plate for <u>wood</u> Type: <u>430x60x40</u>	of European Technical Assessment ETA-15/0667 of 22.04.2025



MEGANT® Dimension L/B/H	Number of screws in connector plate (joist and header)		Number of screws in clamping jaw	Number and dimension of threaded rod
mm	$n_{90,J/H}$	$n_{45,J/H}$	$n_{90,J/H}$	mm
550x60x40	3	15	2	1x M20x580

dimensions in mm

MEGANT® 60	Annex 2
Connector plate for <u>wood</u> Type: <u>550x60x40</u>	of European Technical Assessment ETA-15/0667 of 22.04.2025

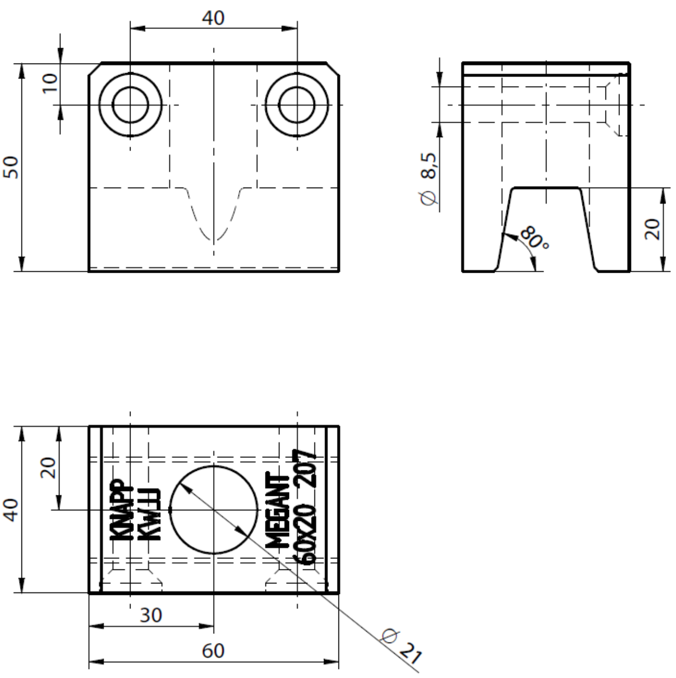


L according to the length of the connector to be mounted on the joist
Min. 2 x 3 and max. 2 x 6 countersunk holes with Ø 8 mm

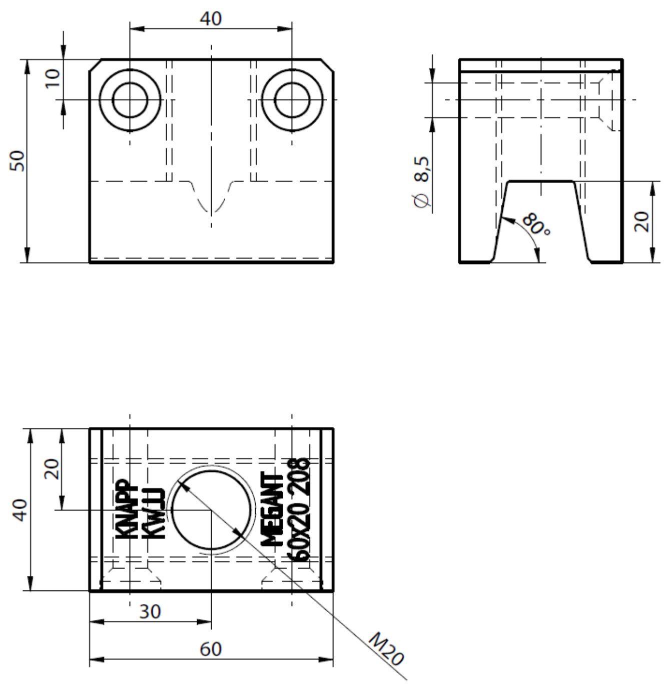
dimensions in mm

MEGANT® 60	Annex 2
Connector plate for <u>steel</u> Type: <u>all</u>	of European Technical Assessment ETA-15/0667 of 22.04.2025

Clamping jaw top

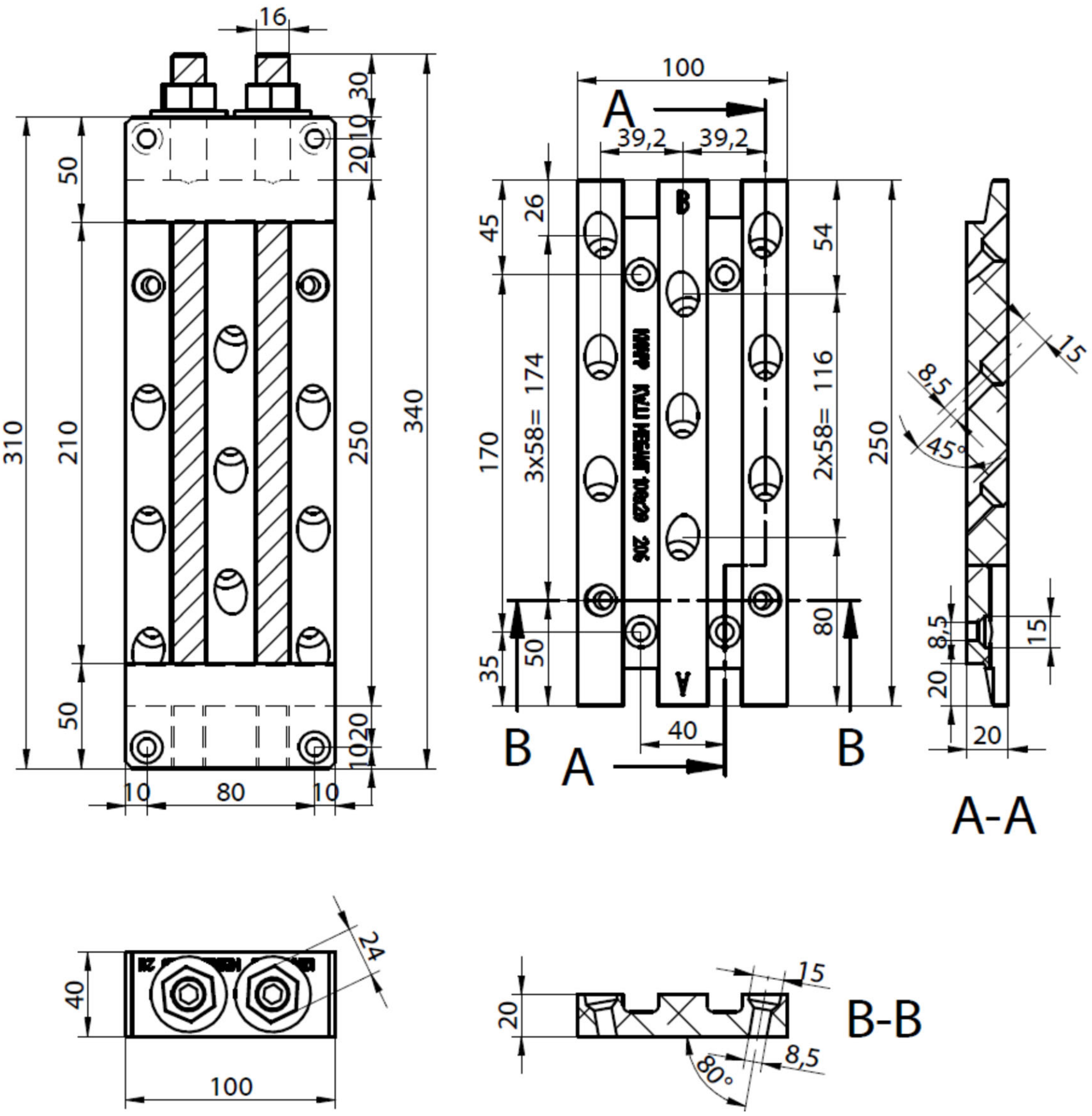


Clamping jaw bottom



dimensions in mm

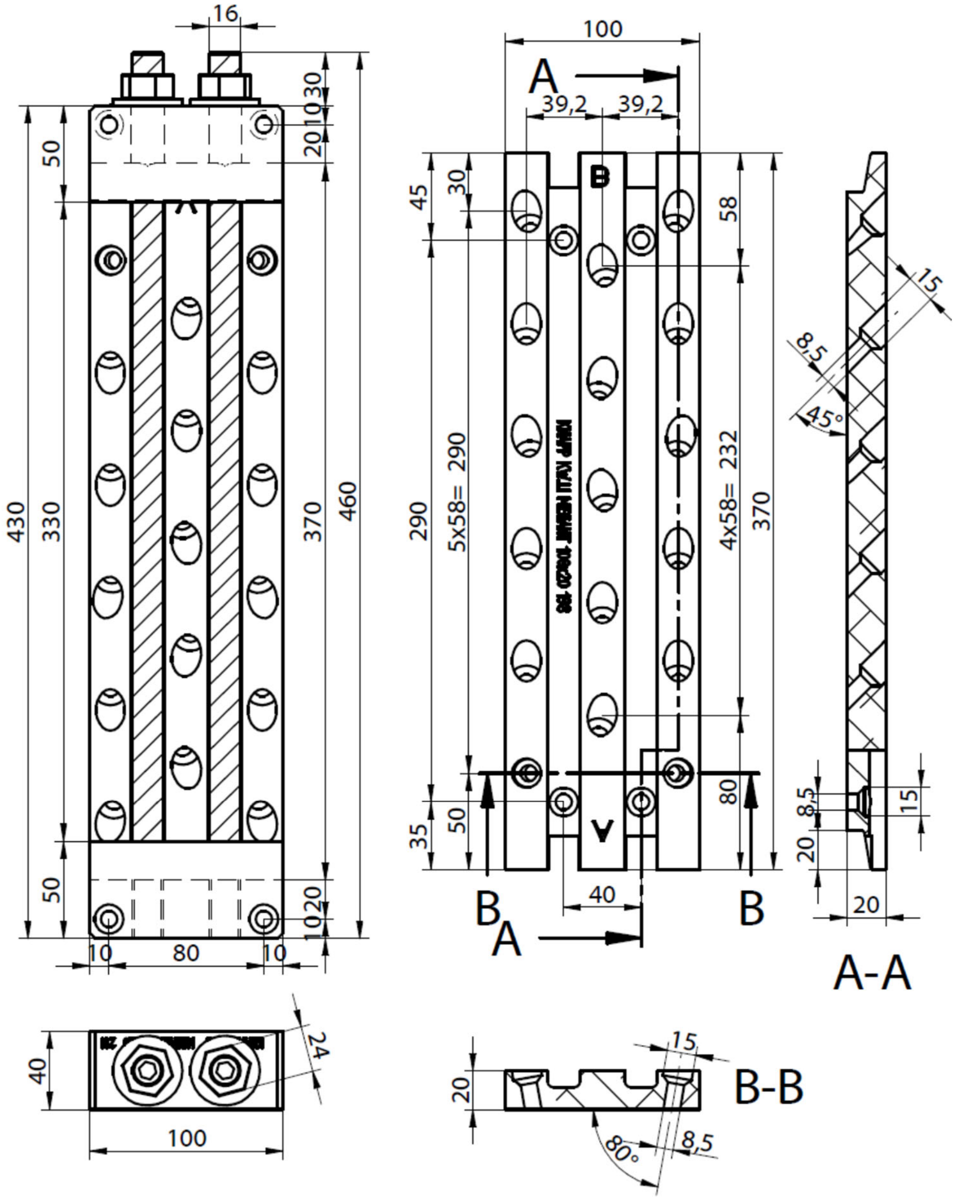
MEGANT® 60	Annex 2
Clamping jaws Type: <u>all</u>	of European Technical Assessment ETA-15/0667 of 22.04.2025



MEGANT® Dimension L/B/H	Number of screws in connector plate (joist and header)		Number of screws in clamping jaw	Number and dimension of threaded rod
mm	$n_{90,J/H}$	$n_{45,J/H}$	$n_{90,J/H}$	mm
310x100x40	6	9	2	2x M16x340

dimensions in mm

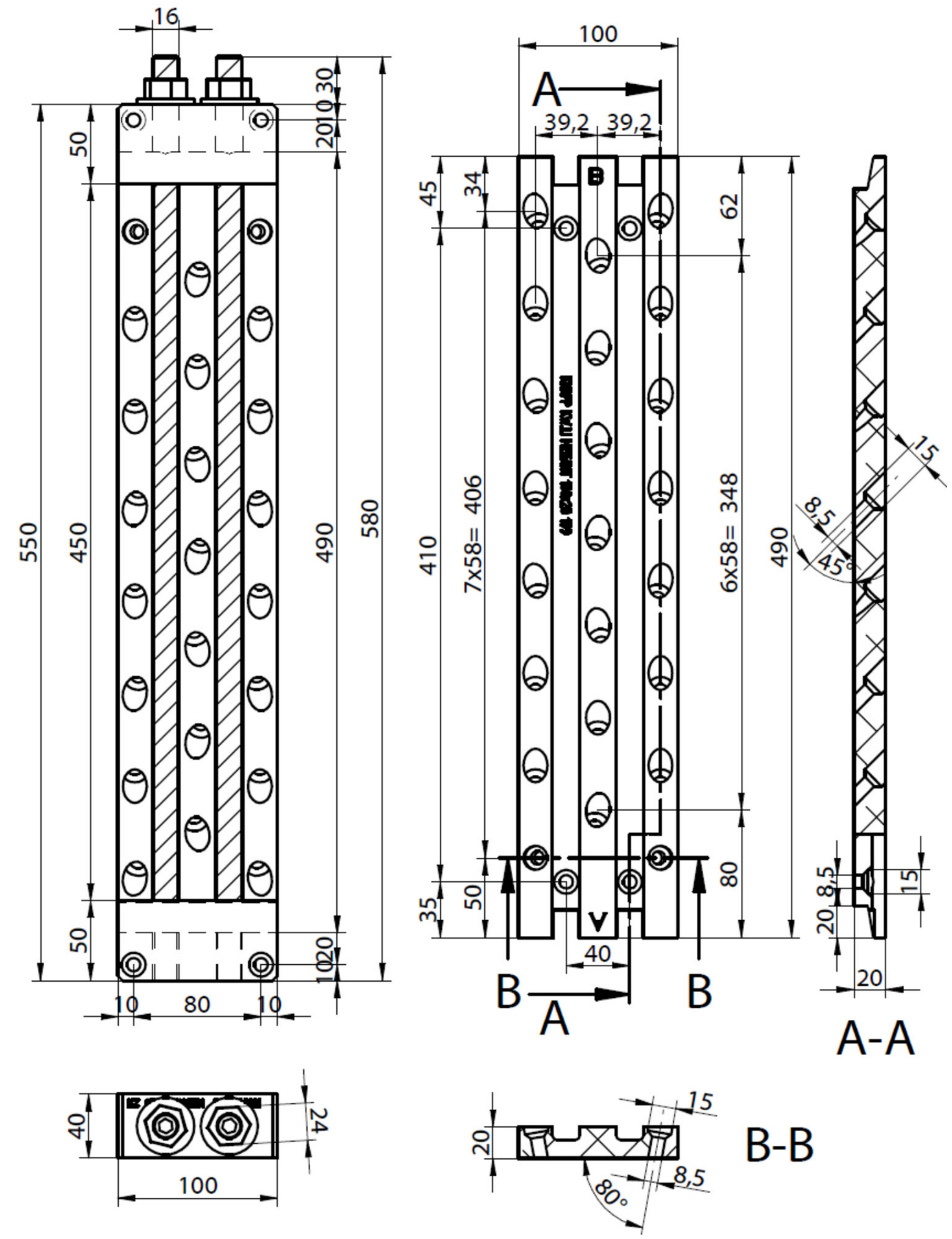
MEGANT® 100	Annex 2
Connector plate for wood Type: 310x100x40	of European Technical Assessment ETA-15/0667 of 22.04.2025



MEGANT® Dimension L/B/H	Number of screws in connector plate (joist and header)		Number of screws in clamping jaw	Number and dimension of threaded rod
mm	$n_{90,J/H}$	$n_{45,J/H}$	$n_{90,J/H}$	mm
430x100x40	6	15	2	2x M16x460

dimensions in mm

MEGANT® 100	Annex 2
Connector plate for wood Type: 430x100x40	of European Technical Assessment ETA-15/0667 of 22.04.2025

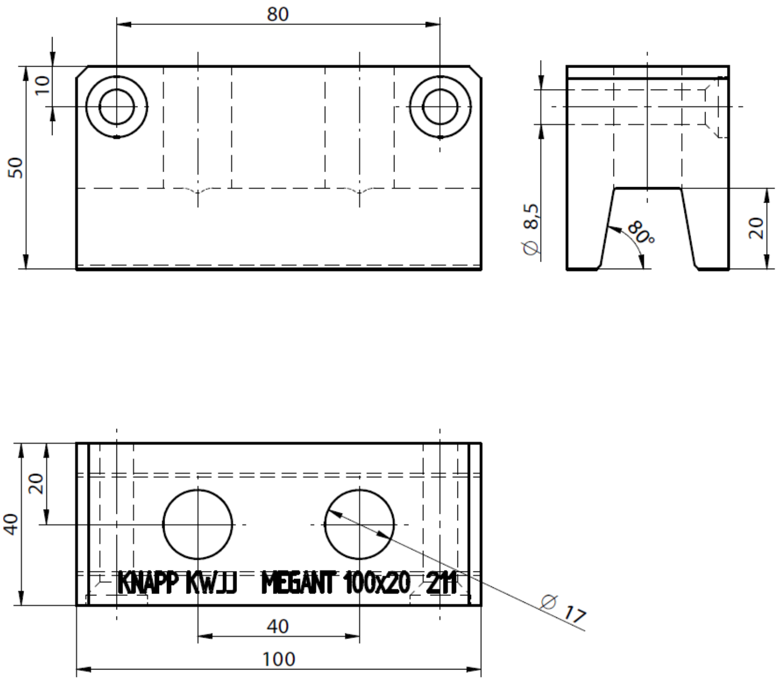


MEGANT® Dimension L/B/H	Number of screws in connector plate (joist and header)		Number of screws in clamping jaw	Number and dimension of threaded rod
mm	$n_{90,J/H}$	$n_{45,J/H}$	$n_{90,J/H}$	mm
550x100x40	6	21	2	2x M16x580

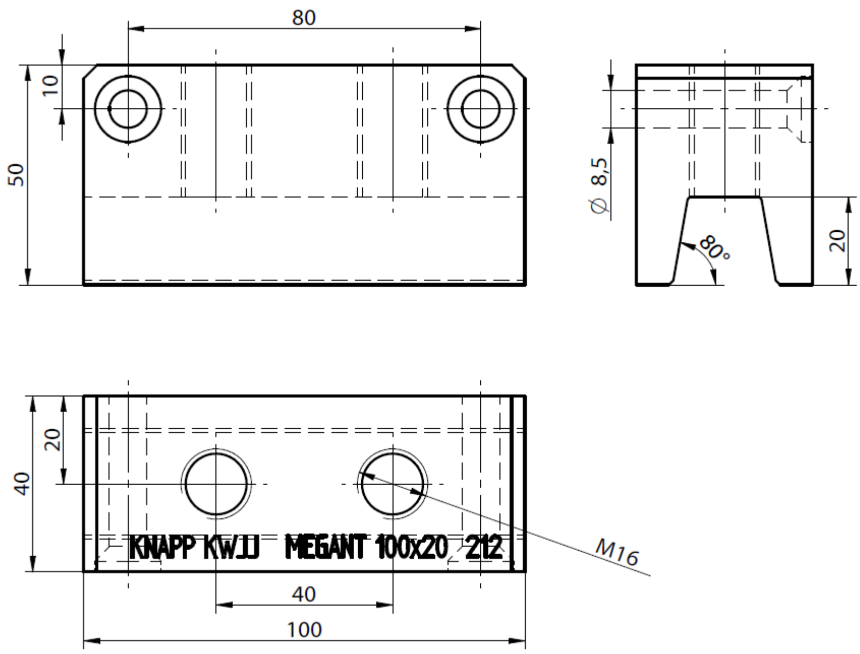
dimensions in mm

MEGANT® 100	Annex 2
Connector plate for <u>wood</u> Type: <u>550x100x40</u>	of European Technical Assessment ETA-15/0667 of 22.04.2025

Clamping jaw top

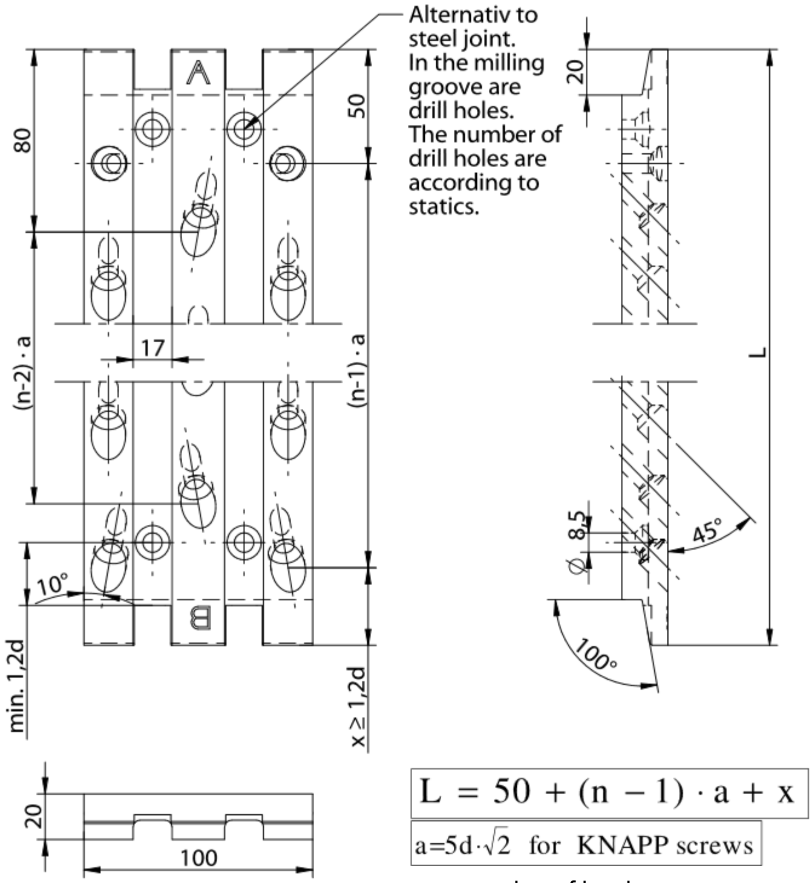


Clamping jaw bottom



dimensions in mm

MEGANT® 100	Annex 2
Clamping jaws Type: all	of European Technical Assessment ETA-15/0667 of 22.04.2025



$$L = 50 + (n - 1) \cdot a + x$$

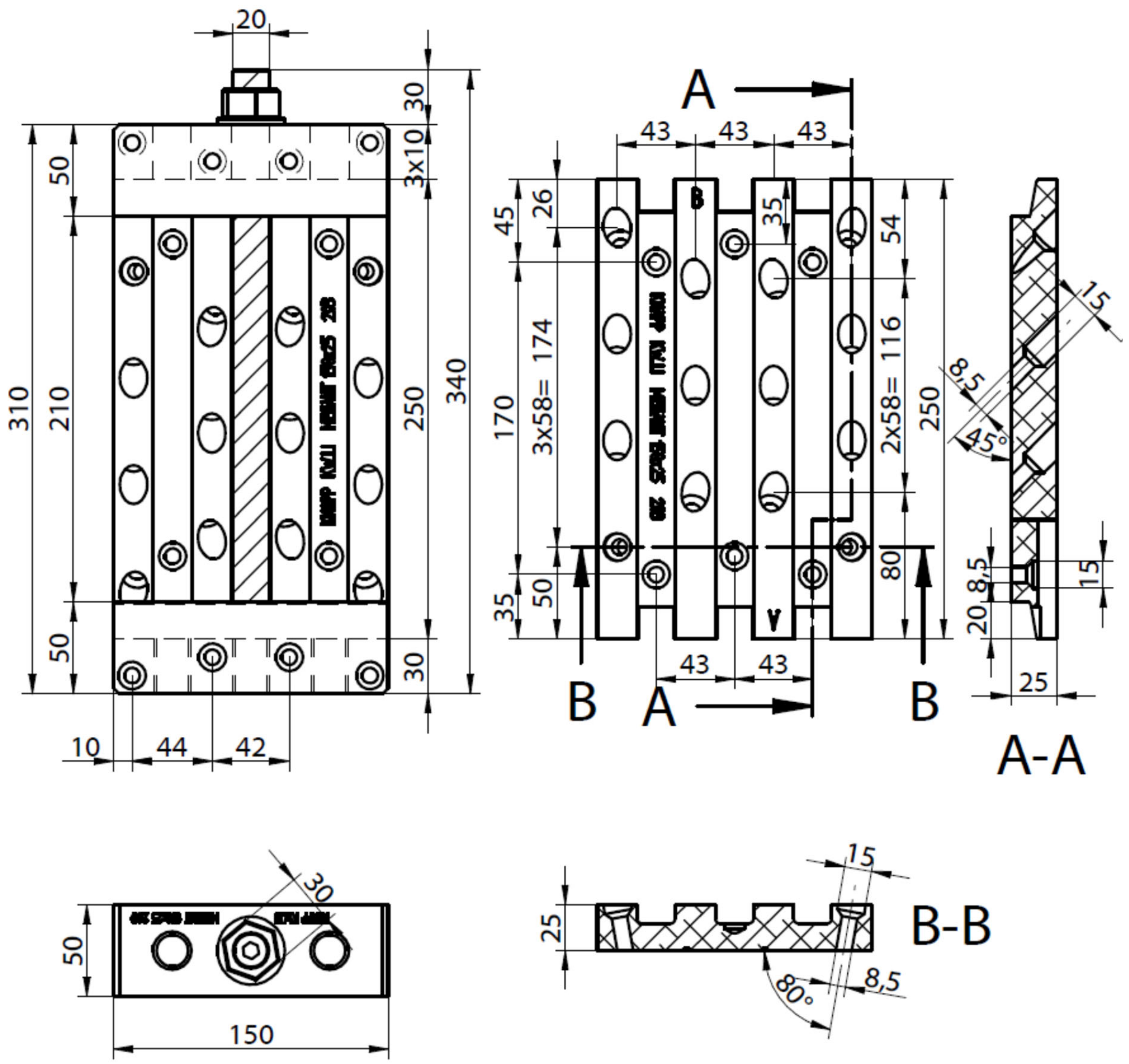
$a = 5d \cdot \sqrt{2}$ for KNAPP screws

n … number of levels
d … outer thread diameter of screw

The connector plate for use in steel connections is provided with min. 2 x 4 and max. 2 x 8 countersunk holes with Ø 8 mm instead of the holes for the n_{90} screws in the area of the threaded rods.

dimensions in mm

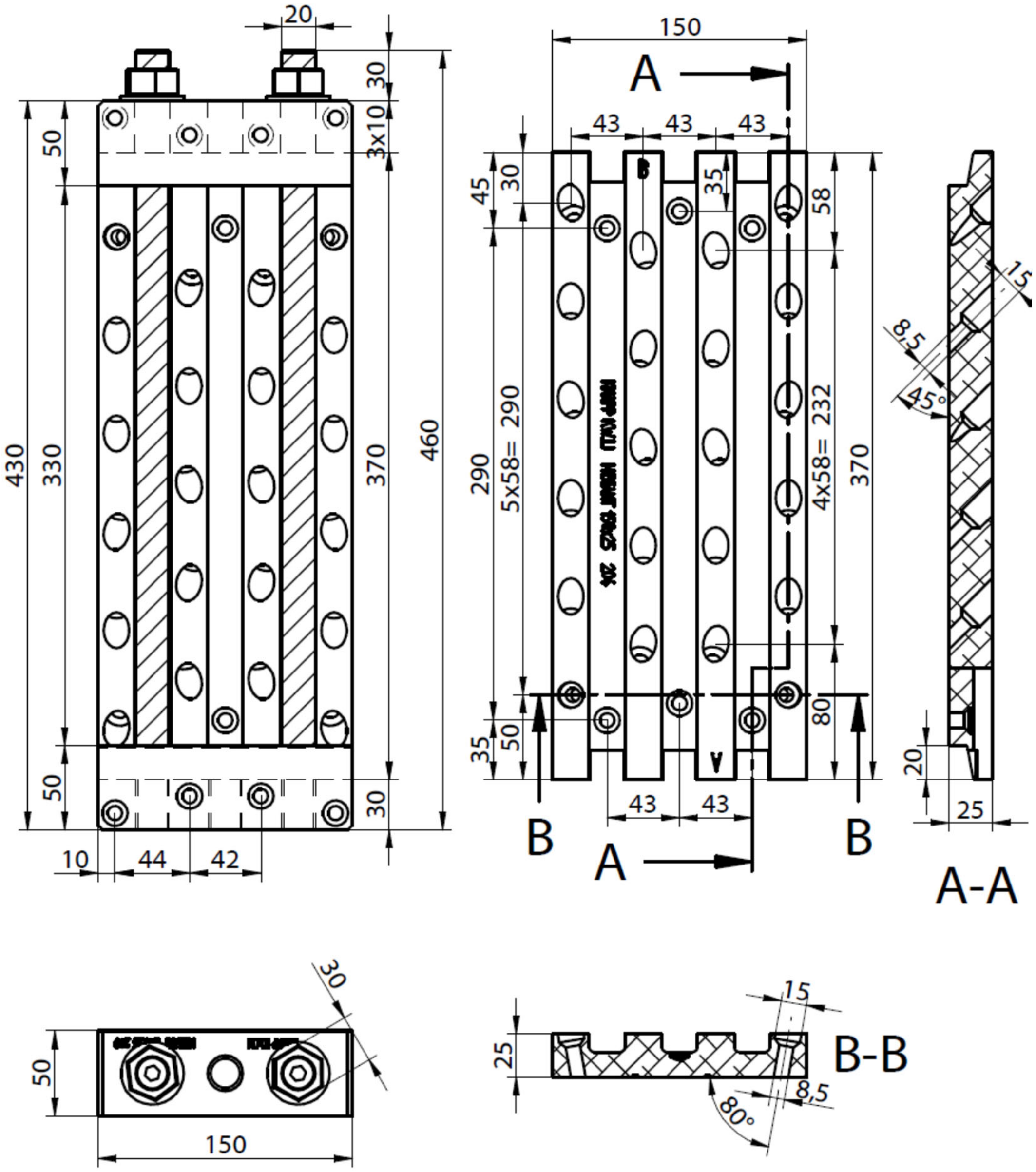
MEGANT® 100	Annex 2
Connector plate for steel Type: all	of European Technical Assessment ETA-15/0667 of 22.04.2025



MEGANT® Dimension L/B/H	Number of screws in connector plate (joist and header)		Number of screws in clamping jaw		Number and dimension of threaded rod
mm	$n_{90,J/H}$	$n_{45,J/H}$	$n_{90,J/H}$	$n_{45,J/H}$	mm
310x150x50	8	12	4	–	1-2 x M20x340

dimensions in mm

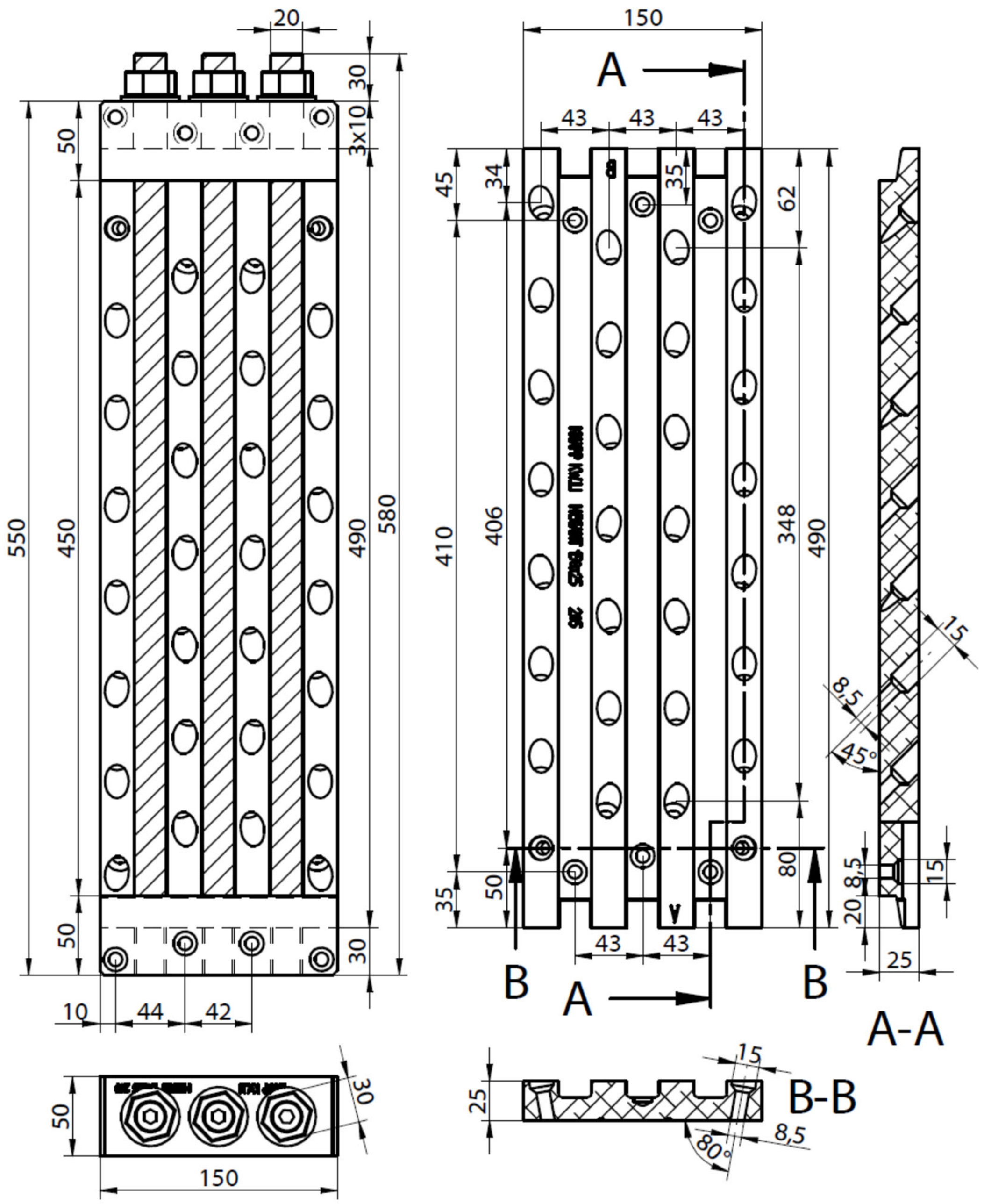
MEGANT® 150	Annex 2
Connector plate for wood Type: 310x150x50	of European Technical Assessment ETA-15/0667 of 22.04.2025



MEGANT® Dimension L/B/H	Number of screws in connector plate (joist and header)		Number of screws in clamping jaw		Number and dimension of threaded rod
mm	$n_{90,J/H}$	$n_{45,J/H}$	$n_{90,J/H}$	$n_{45,J/H}$	mm
430x150x50	8	20	4	–	2-3 x M20x460

dimensions in mm

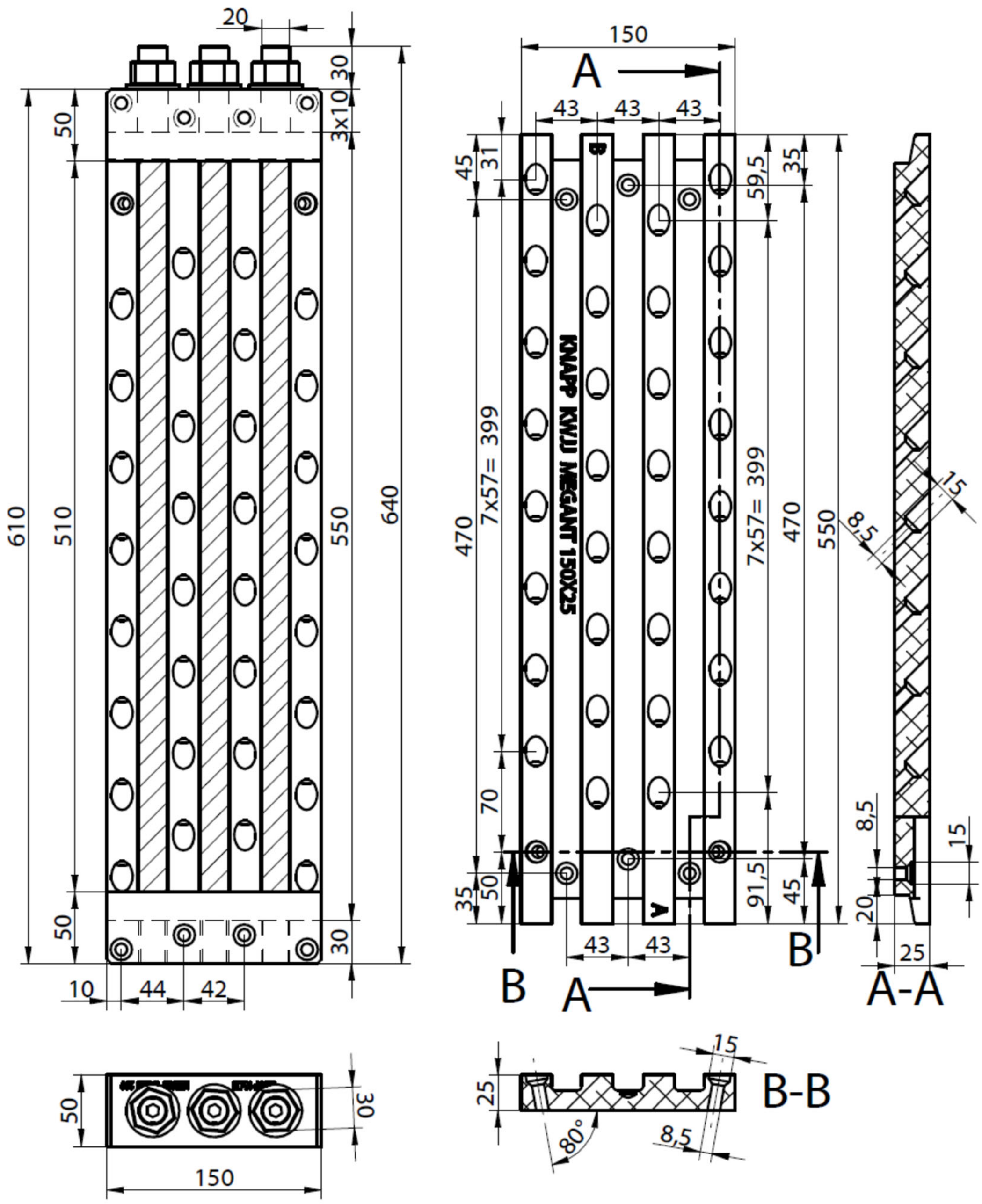
MEGANT® 150	Annex 2
Connector plate for wood Type: 430x150x50	of European Technical Assessment ETA-15/0667 of 22.04.2025



MEGANT® Dimension L/B/H	Number of screws in connector plate (joist and header)		Number of screws in clamping jaw		Number and dimension of threaded rod
mm	$n_{90,J/H}$	$n_{45,J/H}$	$n_{90,J/H}$	$n_{45,J/H}$	mm
550x150x50	8	28	4	–	3x M20x580

dimensions in mm

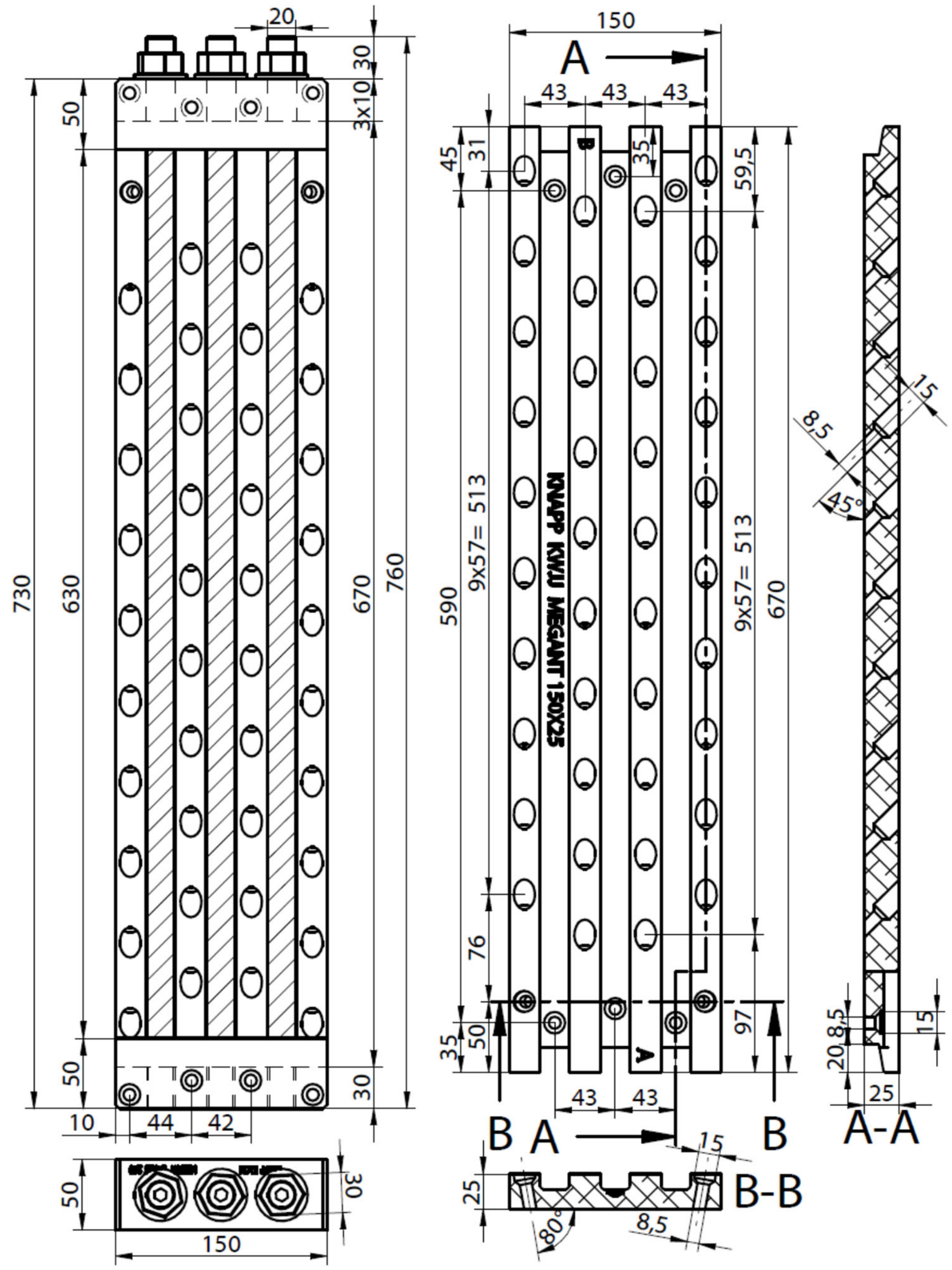
MEGANT® 150	Annex 2
Connector plate for wood Type: 550x150x50	of European Technical Assessment ETA-15/0667 of 22.04.2025



MEGANT® Dimension L/B/H	Number of screws in connector plate (joist and header)		Number of screws in clamping jaw		Number and dimension of threaded rod
mm	$n_{90,J/H}$	$n_{45,J/H}$	$n_{90,J/H}$	$n_{45,J/H}$	mm
610x150x50	8	32	4	–	3x M20x640

dimensions in mm

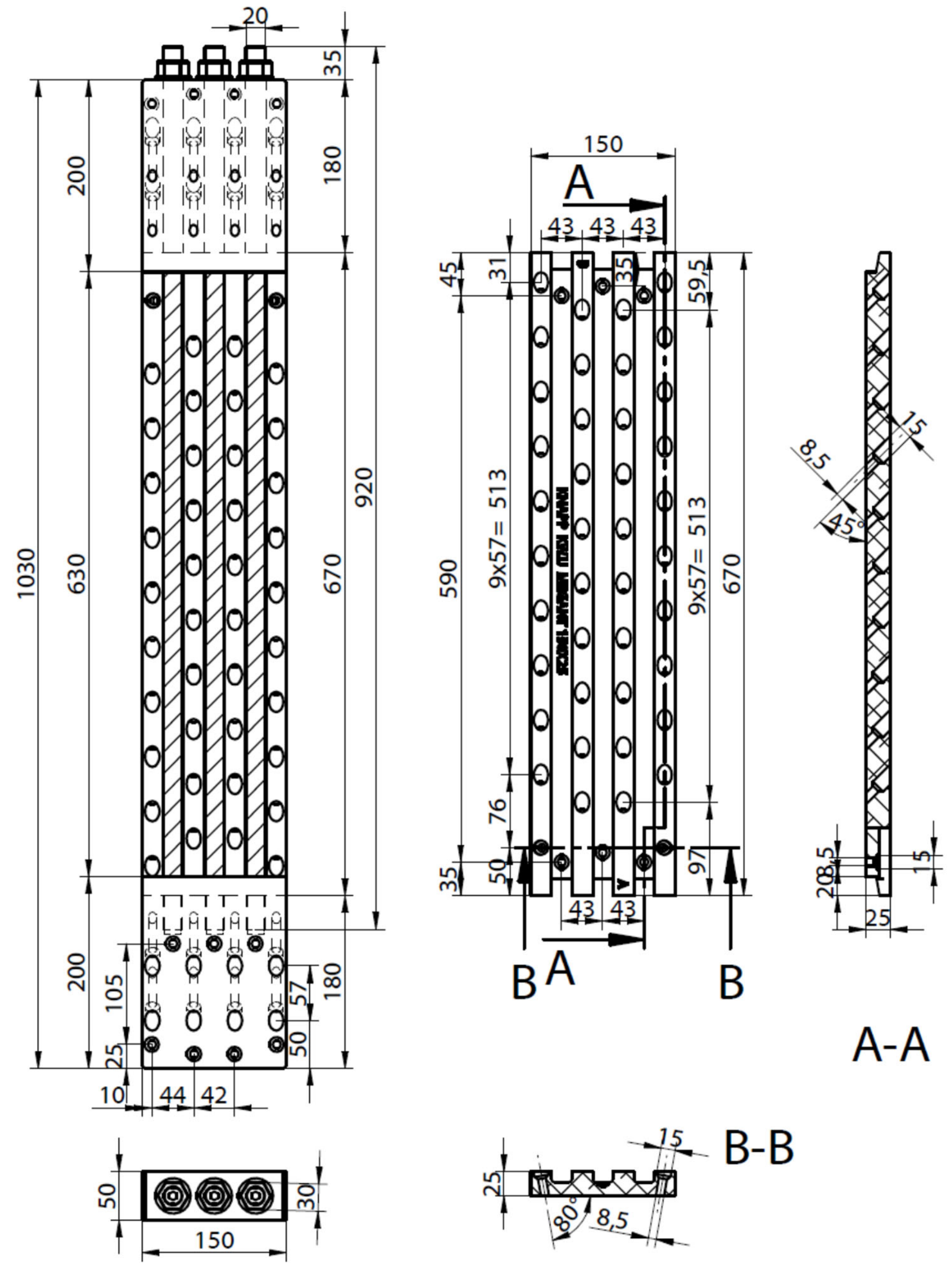
MEGANT® 150	Annex 2
Connector plate for wood Type: 610x150x50	of European Technical Assessment ETA-15/0667 of 22.04.2025



MEGANT® Dimension L/B/H	Number of screws in connector plate (joist and header)		Number of screws in clamping jaw		Number and dimension of threaded rod
mm	$n_{90,J/H}$	$n_{45,J/H}$	$n_{90,J/H}$	$n_{45,J/H}$	mm
730x150x50	8	40	4	–	3x M20x760

dimensions in mm

MEGANT® 150	Annex 2
Connector plate for wood Type: 730x150x50	of European Technical Assessment ETA-15/0667 of 22.04.2025

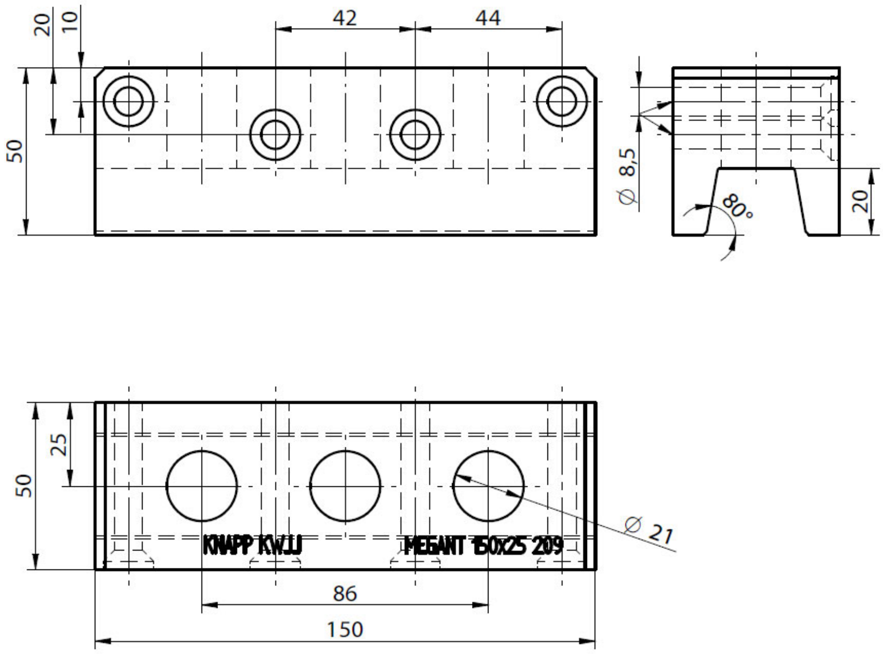


MEGANT® Dimension L/B/H	Number of screws in connector plate (joist and header)		Number of screws in clamping jaw		Number and dimension of threaded rod
mm	$n_{90,J/H}$	$n_{45,J/H}$	$n_{90,J/H}$	$n_{45,J/H}$	mm
1030x150x50 SL	8	40	4 top 7 bottom	8	3x M20x920

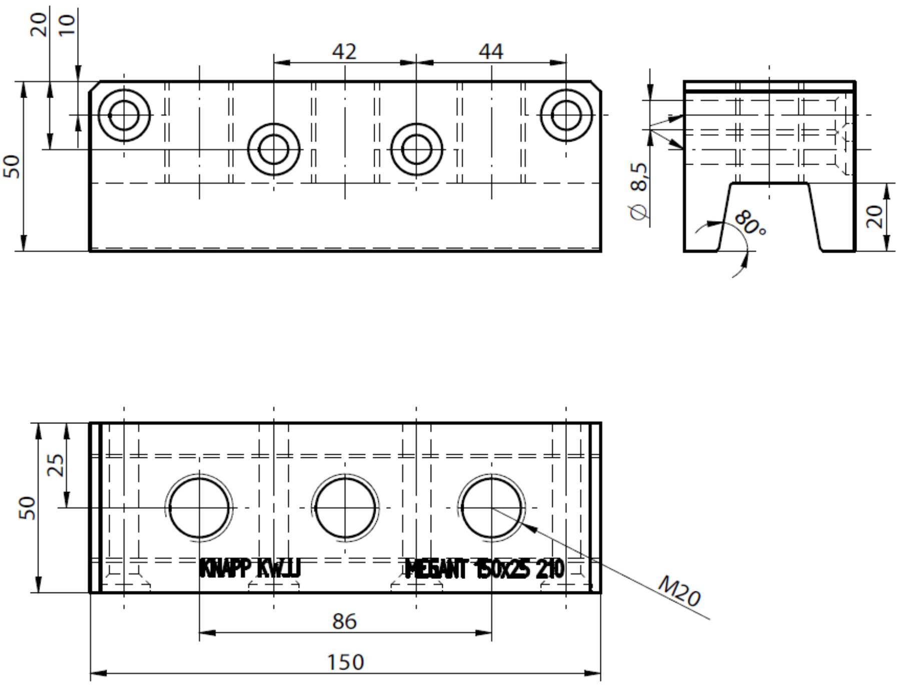
dimensions in mm

MEGANT® 150	Annex 2
Connector plate for wood Type: 1030x150x50 SL	of European Technical Assessment ETA-15/0667 of 22.04.2025

Clamping jaw top



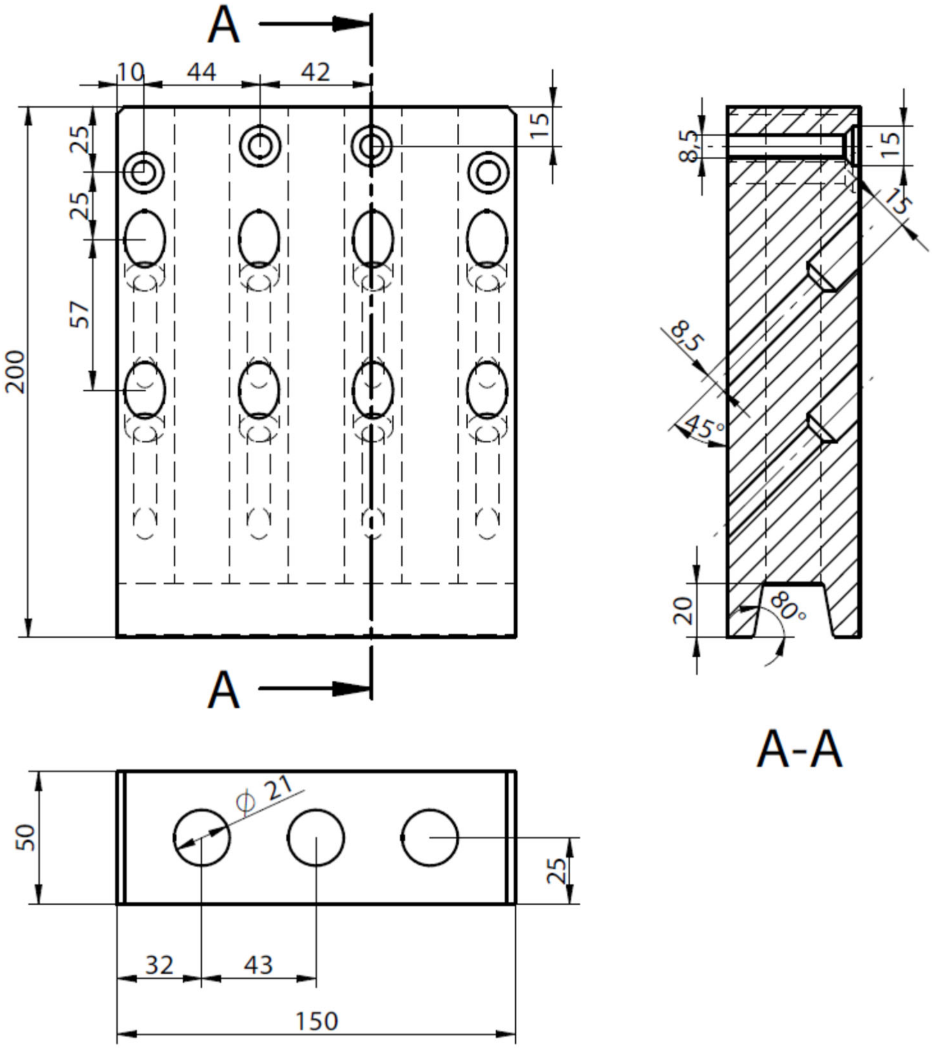
Clamping jaw bottom



dimensions in mm

MEGANT® 150	Annex 2
Clamping jaws Type: 310x150x50 to 1030x150x50	of European Technical Assessment ETA-15/0667 of 22.04.2025

Clamping jaw top

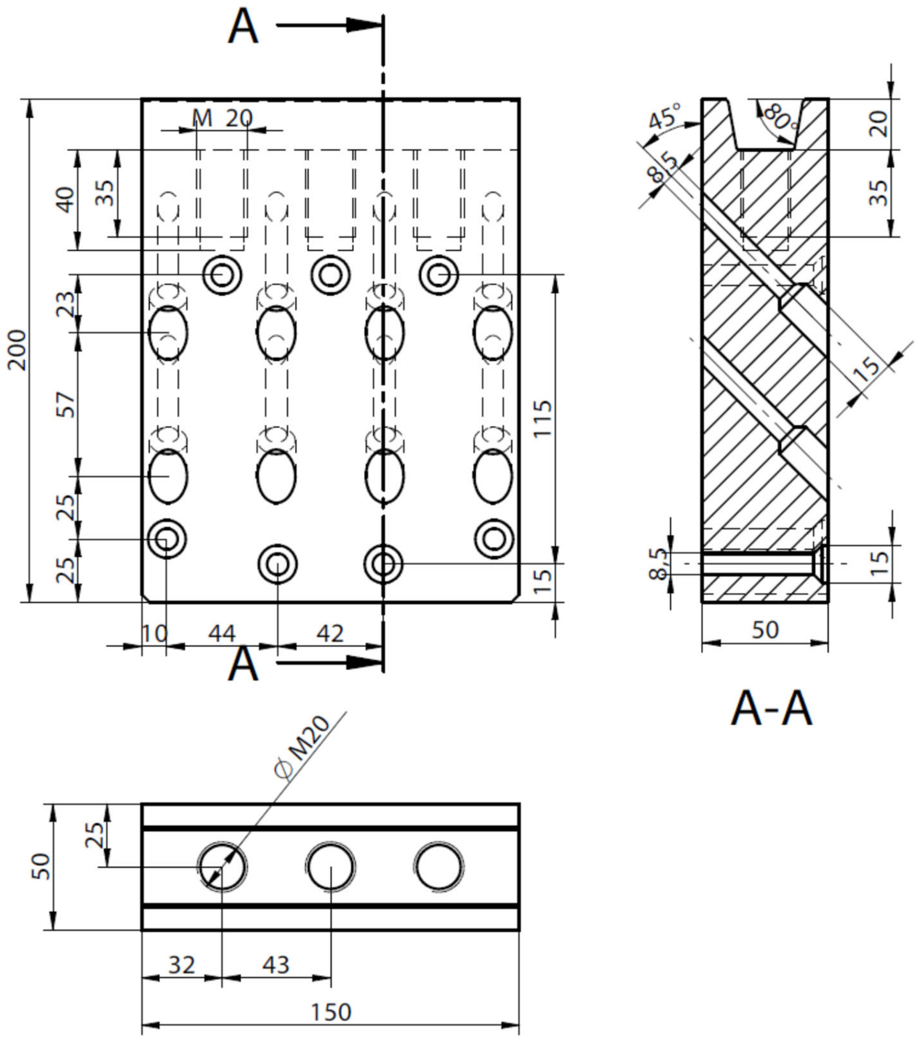


dimensions in mm

MEGANT® 150	Annex 2
Clamping jaw Type: 1030x150x50 SL	of European Technical Assessment ETA-15/0667 of 22.04.2025

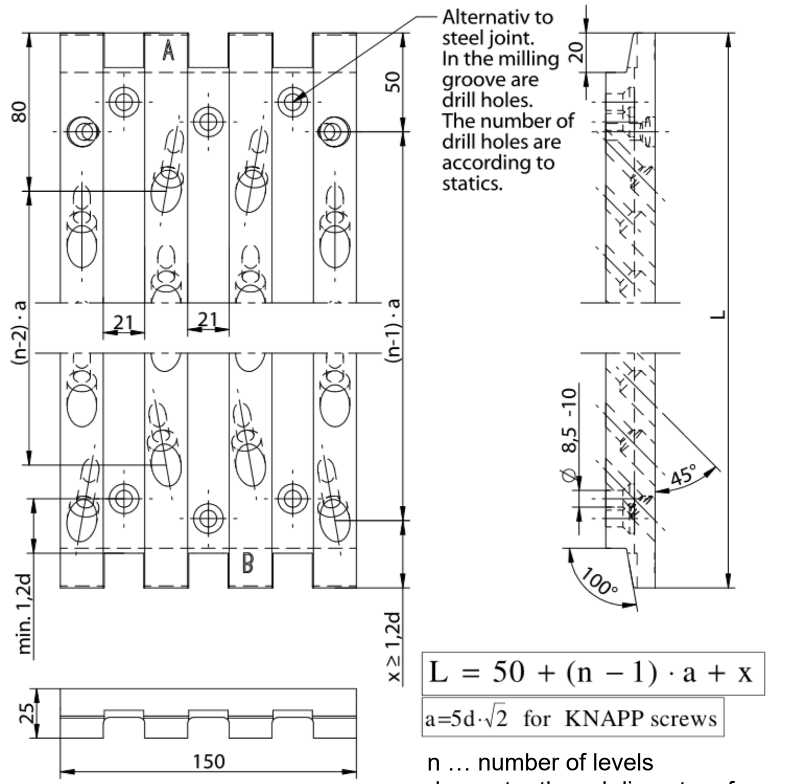
Member of EOTA

Clamping jaw for MEGANT® 1030x150x50 SL bottom



dimensions in mm

MEGANT® 150	Annex 2
Clamping jaw Type: 1030x150x50 SL	of European Technical Assessment ETA-15/0667 of 22.04.2025



$L = 50 + (n - 1) \cdot a + x$

$a = 5d \cdot \sqrt{2}$ for KNAPP screws

n … number of levels
d … outer thread diameter of screw

The connector plate for use in steel connections is provided with min. 3 x 2 and max. 3 x 6 countersunk holes with Ø 10 mm instead of the holes for the n_{90} screws in the area of the threaded rods.

dimensions in mm

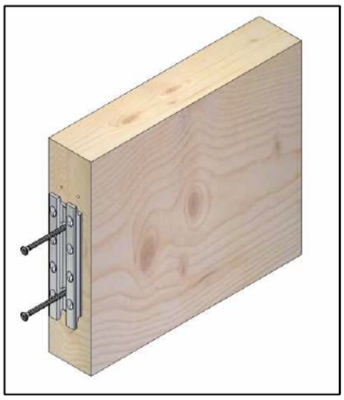
MEGANT® 150	Annex 2
Connector plate for <u>steel</u> Type: <u>all</u>	of European Technical Assessment ETA-15/0667 of 22.04.2025

Header 1: positioning screws

Header 2: 45° screws

Header 3: bottom clamoping jaw

Header 4: finished



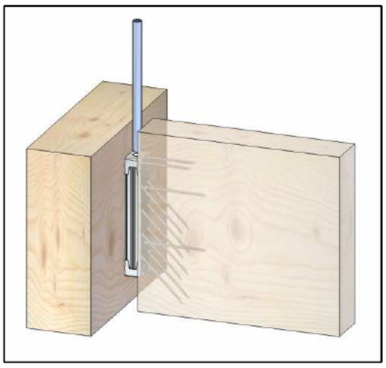
Joist 1: positioning screws

Joist 2: 45° screws

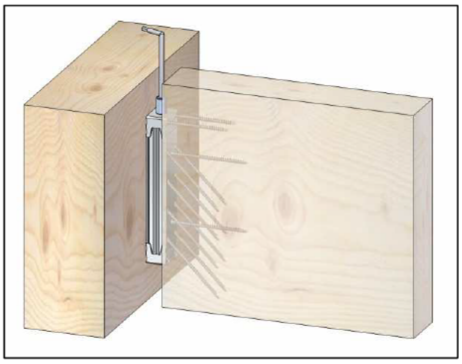
Joist 3: finished with top clamping jaw

MEGANT®	Annex 3
The typical installation of the connectors Assembling from the top	of European Technical Assessment ETA-15/0667 of 22.04.2025

Header with joist 1: hang in joist

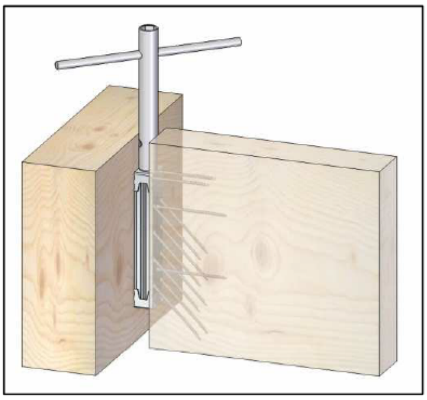


Header with joist 2: threaded rod

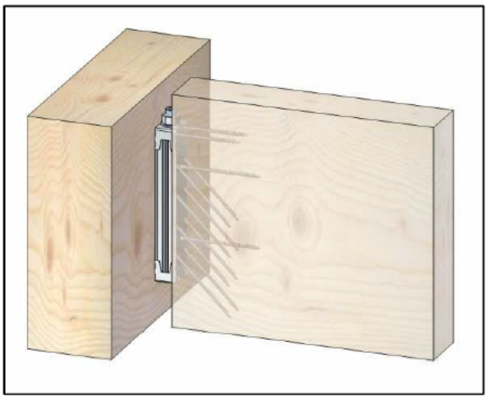


Header with joist 3: screw in threaded rod

Header with joist 4: washer and hex nut



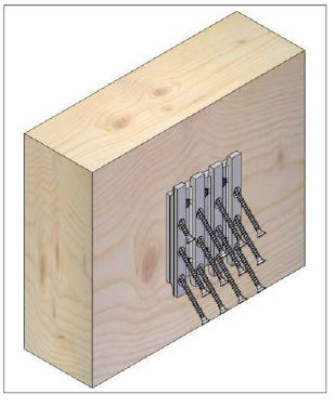
Header with joist 5: tighten hex nut



Header with joist 6: connection finished

MEGANT®	Annex 3
The typical installation of the connectors Assembling from the top	of European Technical Assessment ETA-15/0667 of 22.04.2025

Header 1: positioning screws

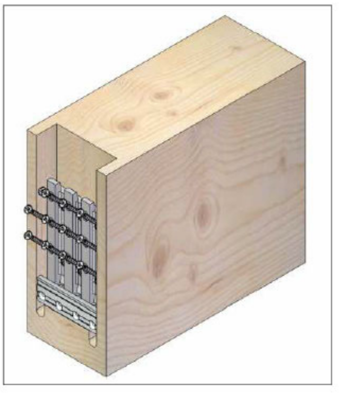


Header 2: 45° screws

Header 3: finished

Joist 1: bottom clamoping jaw in milling groove

Joist 2: positioning screws

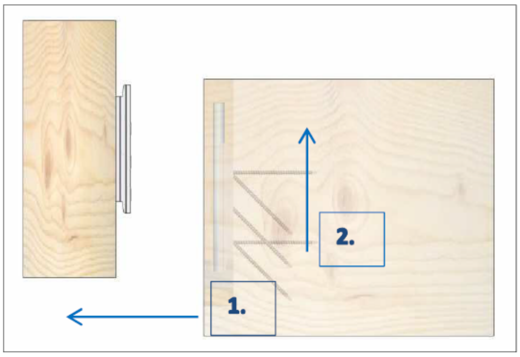


Joist 3: 45° screws

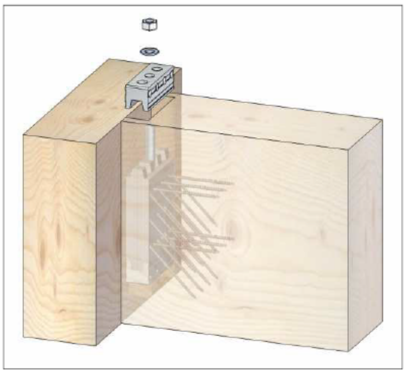
Joist 4: screw in threaded rod

MEGANT®	Annex 3
The typical installation of the connectors Assembling from the top	of European Technical Assessment ETA-15/0667 of 22.04.2025

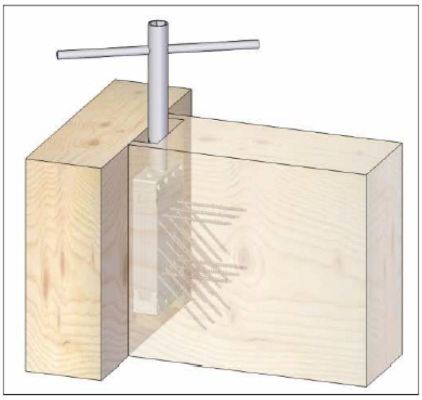
Header with joist 1: hang in joist



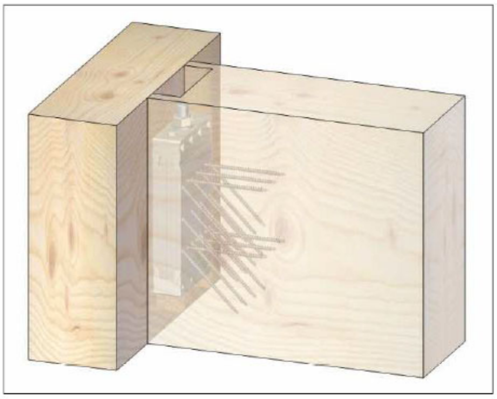
Header with joist 2: hang in joist from below



Header with joist 3: top clamping jaw,
washer and hex nut



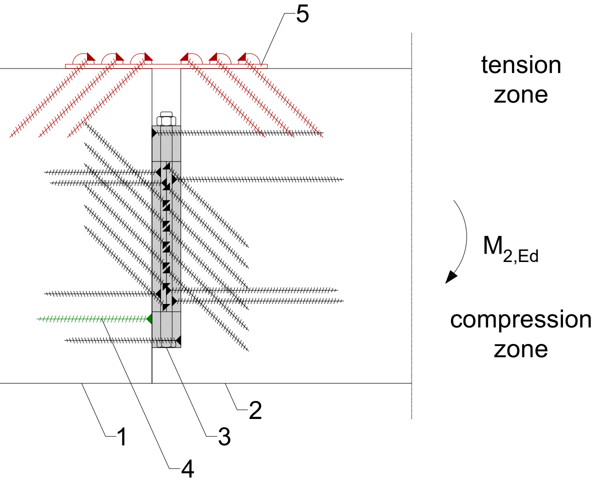
Header with joist 4: tighten hex nut



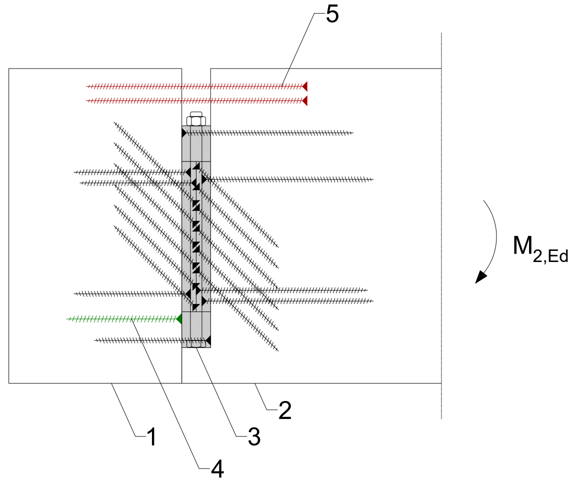
Header with joist 5: connection finished

MEGANT®	Annex 3
The typical installation of the connectors Assembling from the top	of European Technical Assessment ETA-15/0667 of 22.04.2025

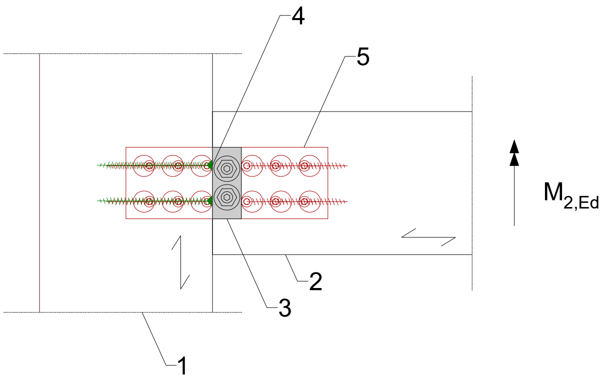
side view



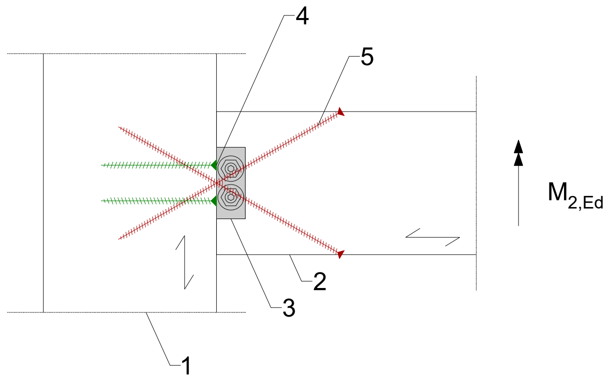
side view



top view



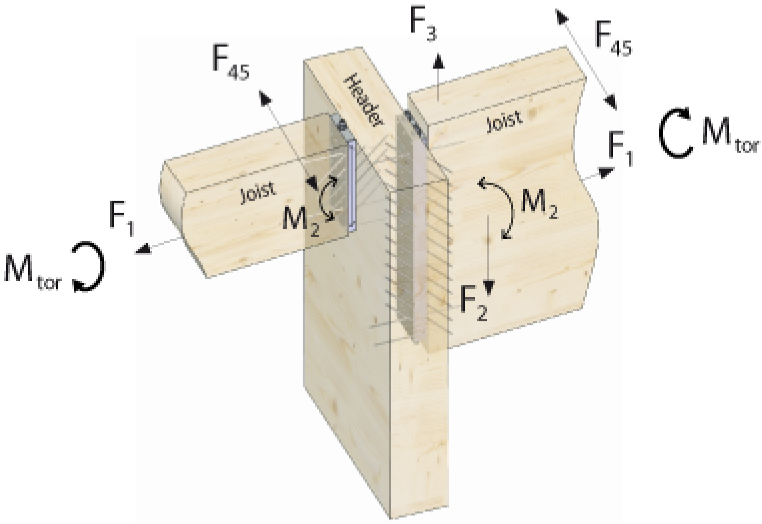
top view



Legend

1	header/column
2	joist
3	MEGANT connector
4	reinforcement in the compression zone
5	reinforcement in the tension zone

MEGANT®	Annex 3
Reinforcement to increase the moment capacity Examples	of European Technical Assessment ETA-15/0667 of 22.04.2025



Wooden structural components

Solid timber of softwood/hardwood of strength class C24/D24 or better according to EN 338 and EN 14081 1,

Glued laminated timber of strength class GL24c or better according to EN 14080

Glued laminated timber of hardwood according to European Technical Assessments or national standards and regulations in force at the place of use,

Laminated veneer lumber LVL according to EN 14374 or according to European Technical Assessments,

Solid wood members similar to glued laminated timber (typically e.g. Duo- and Triobalken) according to EN 14080 or national standards and regulations in force at the place of use,

Cross laminated timber according to European Technical Assessments or national standards and regulations in force at the place of use,

Strand lumber (e.g. Laminated Strand Lumber – Intrallam, Parallam) according to European Technical Assessments or national standards and regulations in force at the place of use.

The main beam (header) may also be of steel or concrete.

Forces and their directions

F_1 Force acting in direction of the secondary beam. Connection of main beam or column and secondary beam.

F_2 Force acting in direction of insertion. Connection of main beam or column and secondary beam. The member shall be prevented from rotation or eccentric loading, Annex 5, has to be considered.

F_3 Force acting against direction of insertion. Connection of main beam or column and secondary beam. The member shall be prevented from rotation or eccentric loading, Annex 5, has to be considered.

F_{45} Force acting perpendicular to direction of insertion. Connection of main beam or column and secondary beam. The member shall be prevented from rotation or eccentric loading, Annex 5, has to be considered.

M_{tor} Rotation moment. Connection of main beam or column and secondary beam.

M_2 Moment caused by an eccentric force F_2 or F_3.

MEGANT®	Annex 4
Definition of forces and their directions	of European Technical Assessment ETA-15/0667 of 22.04.2025

OiB Member of EOTA

MEGANT series 60 – Material: EN AW - 6082										
Dimensions L/B/H	Softwood material	Characteristic load bearing capacity and stiffness in softwood with KNAPP screws 8 x 160 mm								
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm	kNm/rad
310x60x40	C24	36.6	18.0	150.4 [1] 130.1 · f_{R2} [2]	85.7	35.0	36.9	32.0	2.5	200
	GL24h		20.3		92.4	37.3		33.6	2.7	227
430x60x40	C24		18.8		134.6	44.5	40.6	50.4	5.4	639
	GL24h		20.3		145.3	46.7		52.8	5.8	723
550x60x40	C24		18.8		183.5	53.6	44.3	68.7	9.5	1 569
	GL24h		20.3		198.1	56.5		72.0	10.2	1 775

$F_{2,,Rk}$ limited to 176.4 kN as $F_{t,Rk}$ of the M20 threaded rod (8.8)

$F_{1,KCC,Rk}$ / $F_{1,Rk}$ Characteristic load bearing capacity (aluminium failure/wood failure) in direction of secondary beam

$F_{2,KCC,Rk}$ / $F_{2,Rk}$ Characteristic load bearing capacity (aluminium failure/wood failure) in direction of insertion

$F_{3,Rk}$ Characteristic load bearing capacity (wood failure) against direction of insertion

$F_{4,KCC,Rk}$ / $F_{4,Rk}$ Characteristic load bearing capacity (aluminium failure/wood failure) perpendicular to direction of insertion

M_{tor} Characteristic rotation moment

MEGANT series 100 – Material: EN AW - 6082										
Dimensions L/B/H	Softwood material	Characteristic load bearing capacity and stiffness in softwood with KNAPP screws 8 x 160 mm								
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm	kNm/rad
310x100x40	C24	55.3	29.3	224.2 [1] 206.6 · f_{R2} [2]	110.1	51.5	62.4	41.2	4.1	346
	GL24h		31.6		118.8	54.4		43.2	4.4	391
430x100x40	C24		29.3		183.5	65.2	68.6	68.7	8.5	1 066
	GL24h		31.6		198.1	68.8		72.0	9.2	1 206
550x100x40	C24		29.3		257.0	78.9	74.9	96.1	14.7	2 443
	GL24h		31.6		277.3	83.2		100.8	15.9	2 764

$F_{2,,Rk}$ limited to 226.1 kN as $F_{t,Rk}$ of the 2 x M16 threaded rods (8.8)

[1] $F_{2,KCC,Rk}$ for torsional fixed header

[2] $F_{2,KCC,Rk} \cdot f_{R2}$ for not torsional fixed header and f_{R2} according to page 44

MEGANT®	Annex 5
Characteristic load-bearing capacities	of European Technical Assessment ETA-15/0667 of 22.04.2025

<table>
<tr><th colspan="11">MEGANT series 150 – Material: EN AW - 6082</th></tr>
<tr><th rowspan="2">Dimensions L/B/H</th><th rowspan="2">Softwood material</th><th colspan="9">Characteristic load bearing capacity and stiffness in softwood with KNAPP screws 8 x 160 mm</th></tr>
<tr><th>$F_{1,KCC,Rk}$</th><th>$F_{1,Rk}$</th><th>$F_{2,KCC,Rk}$</th><th>$F_{2,Rk}$</th><th>$F_{3,Rk}$</th><th>$F_{4KCC,Rk}$</th><th>$F_{4,Rk}$</th><th>$M_{tor,Rk}$</th><th>$K_{tor,ser}$</th></tr>
<tr><th>mm</th><th>-</th><th>kN</th><th>kN</th><th>kN</th><th>kN</th><th>kN</th><th>kN</th><th>kN</th><th>kNm</th><th>kNm/rad</th></tr>
<tr><td rowspan="2">310x150x50</td><td>C24</td><td rowspan="12">74.3</td><td>38.5</td><td rowspan="10">375.0 [1)]
366.5 · f_{R2} [2)]</td><td>146.4</td><td>57.9</td><td rowspan="2">68.0</td><td>54.9</td><td>3.9</td><td>304</td></tr>
<tr><td>GL24h</td><td>41.5</td><td>158.8</td><td>61.1</td><td>57.6</td><td>4.2</td><td>344</td></tr>
<tr><td rowspan="2">430x150x50</td><td>C24</td><td>38.5</td><td>243.9</td><td>76.2</td><td rowspan="2">74.8</td><td>91.6</td><td>12.3</td><td>1 594</td></tr>
<tr><td>GL24h</td><td>41.5</td><td>263.3</td><td>80.3</td><td>96.0</td><td>13.3</td><td>1 803</td></tr>
<tr><td rowspan="2">550x150x50</td><td>C24</td><td>38.5</td><td>341.5</td><td>94.6</td><td rowspan="8">81.6</td><td>128.2</td><td>20.7</td><td>3 488</td></tr>
<tr><td>GL24h</td><td>41.5</td><td>368.6</td><td>99.5</td><td>134.4</td><td>22.3</td><td>3 946</td></tr>
<tr><td rowspan="2">610x150x50</td><td>C24</td><td>38.5</td><td>390.3</td><td>94.6</td><td>128.2</td><td>20.7</td><td>3 488</td></tr>
<tr><td>GL24h</td><td>41.5</td><td>421.2</td><td>99.5</td><td>134.4</td><td>22.3</td><td>3 946</td></tr>
<tr><td rowspan="2">730x150x50</td><td>C24</td><td>38.5</td><td>487.9</td><td>94.6</td><td>128.2</td><td>20.7</td><td>3 488</td></tr>
<tr><td>GL24h</td><td>41.5</td><td>526.5</td><td>99.5</td><td>134.4</td><td>22.3</td><td>3 946</td></tr>
<tr><td rowspan="2">1030x150x50 SL</td><td>C24</td><td>38.8</td><td rowspan="2">650</td><td>585.5</td><td>94.7</td><td>128.2</td><td>20.7</td><td>3 488</td></tr>
<tr><td>GL24h</td><td>41.9</td><td>631.8</td><td>99.6</td><td>134.4</td><td>22.3</td><td>3 946</td></tr>
</table>

$F_{2,,Rk}$ limited to 176.4 kN as $F_{t,Rk}$ of the 1 x M20 threaded rod (8.8)
$F_{2,,Rk}$ limited to 352.8 kN as $F_{t,Rk}$ of the 2 x M20 threaded rods (8.8)
$F_{2,,Rk}$ limited to 529.1 kN as $F_{t,Rk}$ of the 3 x M20 threaded rods (8.8)

For deviating densities $K_{tor,ser}$ and $M_{tor,Rk}$ for GL24h are adapted by the factor k_{dens}

$$k_{dens} = \left(\frac{\rho_k}{385}\right)^c$$

Where

k_{dens} ... Factor to consider deviating densities

ρ_k .... Characteristic density of timber in kg/m³

c =0.8 from higher to lower density and

c =0.6 from lower to higher density

MEGANT®	Annex 5
Characteristic load-bearing capacities	of European Technical Assessment ETA-15/0667 of 22.04.2025

Reduction factor f_{R2} for not fixed header			
MEGANT	Header width B_H	Eccentricity e [3] $e = B_H/2 + H_{Megant}/2$	Reduction factor f_{R2}
series 60	$B_H \leq 140$ $140 \leq B_H \leq 320$	$e \leq 90$ $90 \leq e \leq 180$	$f_{R2} = 1.0$ $f_{R2} = (270-e)/180$
series 100	$B_H \leq 140$ $140 \leq B_H \leq 360$	$e \leq 90$ $90 \leq e \leq 200$	$f_{R2} = 1.0$ $f_{R2} = (310-e)/220$
series 150	$B_H \leq 200$ $200 \leq B_H \leq 450$	$e \leq 125$ $125 \leq e \leq 250$	$f_{R2} = 1.0$ $f_{R2} = (375-e)/250$

[3] For greater eccentricities, additional reinforcement is necessary.

Member of EOTA

MEGANT series 60, 100, and 150 – Material: EN AW - 6082					
Megant series: dimension L	Softwood material	Slip modulus in softwood with KNAPP screws 8 x 160 mm and horizontal KNAPP screws 8 x 240 mm in joist			
		$K_{1,ser}$	$K_{2,ser}$ 3)	$K_{2,ser}$ 4)	$K_{4,ser}$
mm	-	kN/mm	kN/mm	kN/mm	kN/mm
series 60: 310, 430, 550	C24	6.7	36.9	30.3	6.1
	GL24h	7.2	39.8	32.7	6.6
series 100: 310, 430, 550	C24	12.2	53.0	45.0	8.3
	GL24h	13.2	57.2	48.6	9.0
series 150: 310, 430, 550-1030	C24	19.5	81.7	67.5	12.1
	GL24h	21.0	88.2	72.8	13.1

For deviating densities K_{ser} for GL24h is adapted by the factor k_{dens}

$$k_{dens} = \left(\frac{\rho_k}{385}\right)^c$$

Where

k_{dens} ... Factor to consider deviating densities

ρ_k .... Characteristic density of timber in kg/m³

c =0.8 from higher to lower density and

c =0.6 from lower to higher density

3) $K_{2,ser}$ for torsional fixed header
4) $K_{2,ser}$ for not torsional fixed header

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 22.04.2025

MEGANT series 60/100/150 – Material: EN AW - 6082								
Bending tension	Position of bottom clamping jaw	Dimensions L/B/H	Moment capacity and stiffness in softwood with horizontal KNAPP screws 8 x 160 mm in header and 8 x 240 mm in joist					
			$M_{2,\varphi,Rk}$			$K_{2,\varphi,ser}$ 1)		
-	-	mm	kNm			kNm/rad		
			C24	GL24h	GL28h	C24	GL24h	GL28h
top	header	310x60x40	4.48	4.85	5.27	480	489	497
		430x60x40	6.54	7.07	7.67	1351	1399	1446
		550x60x40	8.61	9.31	10.1	2718	2838	2962
		310x100x40	5.74	6.22	6.76	631	632	631
		430x100x40	8.47	9.16	9.93	1922	1969	2011
		550x100x40	11.3	12.2	13.2	4013	4164	4312
		310x150x50	9.71	10.5	11.4	913	914	911
		430x150x50	14.4	15.6	16.9	2795	2864	2926
		550x150x50	19.1	20.7	22.4	5849	6066	6283
		610x150x50	21.5	23.3	25.2	7826	8152	8480
		730x150x50	26.3	28.4	30.8	12703	13307	13935
		1030x150x50 SL	40.8	44.0	47.7	34887	36871	38998
	joist	310x60x40	1.65	1.79	1.94	426	448	471
		430x60x40	2.35	2.54	2.76	1014	1068	1126
		550x60x40	3.08	3.33	3.61	1899	2009	2126
		310x100x40	3.31	3.58	3.89	699	731	766
		430x100x40	4.68	5.06	5.49	1710	1793	1879
		550x100x40	6.13	6.62	7.18	3280	3451	3632
		310x150x50	4.81	5.21	5.65	1029	1074	1121
		430x150x50	6.92	7.48	8.11	2522	2636	2753
		550x150x50	9.11	9.84	10.7	4848	5090	5341
		610x150x50	10.2	11.0	12.0	6332	6663	7008
		730x150x50	12.5	13.4	14.6	9931	10492	11090
		1030x150x50 SL	17.1	18.5	20.0	14931	15830	16799

MEGANT series 60/100/150 – Material: EN AW - 6082								
Bending tension	Position of bottom clamping jaw	Dimensions L/B/H	Moment capacity and stiffness in softwood with horizontal KNAPP screws 8 x 160 mm in header and 8 x 240 mm in joist					
			$M_{2,\varphi,Rk}$			$K_{2,\varphi,ser}$ 1)		
-	-	mm	kNm			kNm/rad		
			C24	GL24h	GL28h	C24	GL24h	GL28h
bottom	header	310x60x40	3.00	3.24	3.52	579	604	629
		430x60x40	4.47	4.83	5.24	1425	1492	1561
		550x60x40	5.96	6.44	6.98	2721	2861	3008
		310x100x40	5.74	6.22	6.75	882	918	955
		430x100x40	8.70	9.40	10.2	2228	2325	2425
		550x100x40	11.7	12.6	13.7	4340	4547	4765
		310x150x50	7.18	7.77	8.46	1214	1260	1308
		430x150x50	10.8	11.7	12.7	3078	3209	3337
		550x150x50	14.5	15.7	17.1	6012	6299	6588
		610x150x50	16.4	17.7	19.2	7895	8292	8693
		730x150x50	20.1	21.8	23.6	12472	13147	13843
		1030x150x50 SL	25.7	27.7	30.0	20027	21197	22455
	joist	310x60x40	2.68	2.88	3.09	411	425	440
		430x60x40	4.16	4.47	4.80	1120	1171	1225
		550x60x40	5.68	6.09	6.55	2220	2333	2454
		310x100x40	5.10	5.47	5.87	616	630	642
		430x100x40	8.00	8.58	9.22	1791	1860	1930
		550x100x40	11.0	11.8	12.7	3653	3823	4000
		310x150x50	7.09	7.56	8.07	932	954	972
		430x150x50	11.5	12.3	13.2	2667	2767	2868
		550x150x50	16.0	17.2	18.4	5415	5662	5919
		610x150x50	18.3	19.6	21.1	7187	7533	7896
		730x150x50	22.9	24.5	26.3	11543	12146	12786
		1030x150x50 SL	28.6	30.7	33.0	18246	19268	20366

1) $K_{2,\varphi}$ for the calculation of member forces and moments in a structural system shall be calculated as:

$$K_{2,\varphi} = \frac{2 \cdot K_{2,\varphi,ser}}{3 \cdot (1 + 2 \cdot \psi_2 \cdot k_{def})}$$

Where

ψ_2 ...... combination factor according to EN 1990 for the quasi-permanent value of the action causing the largest stress in relation to the strength

k_{def} ... deformation factor according to EN 1995-1-1

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Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 22.04.2025

MEGANT series 60 – Material: EN AW - 6082										
Dimensions L/B/H	Hardwood material	Characteristic load bearing capacity and stiffness in hardwood with screws ASSY PLUS VG 8 x 160 mm acc. to ETA-11/0190								
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm	kNm/rad
310x60x40	ρ_k = 530 kg/m³	36.6	11.2	150.4 [1)] 130.1 · f_{R2} [2)]	107.0	59.2	36.9	63.3	3.3	275
	ρ_k = 590 kg/m³		10.5		116.6	62.3		67.8	3.5	293
430x60x40	ρ_k = 530 kg/m³		10.5		168.1	77.7	40.6	99.4	7.0	811
	ρ_k = 590 kg/m³		10.5		183.2	82.2		106.5	7.5	843
550x60x40	ρ_k = 530 kg/m³		10.5		229.3	96.6	44.3	135.6	12.4	1991
	ρ_k = 590 kg/m³		10.5		249.8	102.1		145.3	13.2	2070

$F_{2,,Rk}$ limited to 176.4 kN as $F_{t,Rk}$ of the M20 threaded rod (8.8)

$F_{1,KCC,RK}$ / $F_{1,Rk}$ Characteristic load bearing capacity (aluminium failure/wood failure) in direction of secondary beam

$F_{2,KCC,RK}$ / $F_{2,Rk}$ Characteristic load bearing capacity (aluminium failure/wood failure) in direction of insertion

$F_{3,Rk}$ Characteristic load bearing capacity (wood failure) against direction of insertion

$F_{4,KCC,RK}$ / $F_{4,Rk}$ Characteristic load bearing capacity (aluminium failure/wood failure) perpendicular to direction of insertion

M_{tor} Characteristic rotation moment

MEGANT series 100 – Material: EN AW - 6082										
Dimensions L/B/H	Hardwood material	Characteristic load bearing capacity and stiffness in hardwood with screws ASSY PLUS VG 8 x 160 mm acc. to ETA-11/0190								
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm	kNm/rad
310x100x40	ρ_k = 530 kg/m³	55.3	17.4	224.2 [1)] 206.6 · f_{R2} [2)]	137.6	84.4	62.4	81.4	5.3	474
	ρ_k = 590 kg/m³		17.4		149.9	89.4		87.2	5.7	505
430x100x40	ρ_k = 530 kg/m³		17.4		229.3	112.7	68.6	135.6	11.1	1353
	ρ_k = 590 kg/m³		17.4		249.8	119.2		145.3	11.9	1406
550x100x40	ρ_k = 530 kg/m³		17.4		321.0	141.0	74.9	189.8	19.3	3101
	ρ_k = 590 kg/m³		16.7		349.7	148.7		203.4	20.5	3223

$F_{2,,Rk}$ limited to 226.1 kN as $F_{t,Rk}$ of the 2 x M16 threaded rods (8.8)

1) $F_{2,KCC,Rk}$ for torsional fixed header
2) $F_{2,KCC,Rk} \cdot f_{R2}$ for not torsional fixed header and f_{R2} according to page 44

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Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 22.04.2025

MEGANT series 150 – Material: EN AW - 6082

Dimensions L/B/H	Hardwood material	Characteristic load bearing capacity and stiffness in hardwood with screws ASSY PLUS VG 8 x 160 mm acc. to ETA-11/0190								
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm	kNm/rad
310x150x50	ρ_k = 530 kg/m³	74.3	22.5	375.0 [1)] 366.5 · f_{R2} [2)]	183.4	98.1	68.0	108.5	5.1	417
	ρ_k = 590 kg/m³		22.5		199.9	103.8		116.2	5.4	444
430x150x50	ρ_k = 530 kg/m³		22.5		305.7	135.8	74.8	180.8	16.1	2023
	ρ_k = 590 kg/m³		21.8		333.1	143.3		193.7	17.2	2103
550x150x50	ρ_k = 530 kg/m³		22.5		428.0	173.5	81.6	253.1	27.0	4427
	ρ_k = 590 kg/m³		21.8		466.3	183.1		271.2	28.8	4601
610x150x50	ρ_k = 530 kg/m³		22.5		489.1	173.5		253.1	27.0	4427
	ρ_k = 590 kg/m³		21.8		532.9	183.1		271.2	28.8	4601
730x150x50	ρ_k = 530 kg/m³		22.5		611.4	173.5		253.1	27.0	4427
	ρ_k = 590 kg/m³		21.8		666.2	183.1		271.2	28.8	4601
1030x150x50 SL	ρ_k = 530 kg/m³		22.2	650	733.7	173.4		253.1	27.0	4427
	ρ_k = 590 kg/m³		22.2		799.4	183.3		271.2	28.8	4601

$F_{2,,Rk}$ limited to 176.4 kN as $F_{t,Rk}$ of the 1 x M20 threaded rod (8.8)

$F_{2,,Rk}$ limited to 352.8 kN as $F_{t,Rk}$ of the 2 x M20 threaded rods (8.8)

$F_{2,,Rk}$ limited to 529.1 kN as $F_{t,Rk}$ of the 3 x M20 threaded rods (8.8)

MEGANT series 60, 100, and 150 – Material: EN AW - 6082					
Megant series: dimension L	Hardwood material	Slip modulus in hardwood with screws ASSY PLUS VG 8 x 160 mm acc. to ETA-11/0190			
		$K_{1,ser}$	$K_{2,ser}$ 3)	$K_{2,ser}$ 4)	$K_{4,ser}$
mm	-	kN/mm	kN/mm	kN/mm	kN/mm
series 60: 310, 430, 550	ρ_k = 530 kg/m³	8.7	48.2	39.6	8.0
	ρ_k = 590 kg/m³	9.3	51.4	42.2	8.5
series 100: 310, 430, 550	ρ_k = 530 kg/m³	16.0	69.3	58.9	10.9
	ρ_k = 590 kg/m³	17.1	73.9	62.8	11.6
series 150: 310, 430, 550-1030	ρ_k = 530 kg/m³	25.4	106.8	88.2	15.9
	ρ_k = 590 kg/m³	27.1	113.9	94.1	16.9

Member of EOTA

MEGANT series 60/100/150 – Material: EN AW - 6083								
Bending tension	Position of lower clamping jaw	Dimensions L/B/H	Moment capacity and stiffness in hardwood horizontal screws ASSY PLUS VG 8 x 160 mm acc. to ETA-11/0190					
			$M_{2,\varphi,Rk}$			$K_{2,\varphi,ser}$ 1)		
-	-	mm	kNm			kNm/rad		
			D30	D50	GL75	D30	D50	GL75
top	header	310x60x40	2.55	2.79	6.47	596	668	1044
		430x60x40	3.69	4.03	9.38	1432	1592	2584
		550x60x40	4.85	5.29	12.3	2638	2922	4865
		310x100x40	3.36	3.67	8.53	863	970	1482
		430x100x40	4.91	5.37	12.5	2125	2366	3804
		550x100x40	6.51	7.10	16.5	3960	4387	7298
		310x150x50	5.39	5.89	13.7	1245	1399	1996
		430x150x50	7.92	8.65	20.1	3098	3450	5213
		550x150x50	10.5	11.5	26.7	5805	6435	10104
		610x150x50	11.8	12.9	30.0	7484	8283	13193
		730x150x50	14.4	15.7	36.7	11495	12692	20688
		1030x150x50 SL	22.3	24.3	56.7	28811	31691	53907
	joist	310x60x40	1.04	1.14	2.66	378	418	822
		430x60x40	1.47	1.61	3.75	840	926	1857
		550x60x40	1.92	2.10	4.89	1500	1649	3352
		310x100x40	2.11	2.31	5.36	673	749	1350
		430x100x40	2.95	3.22	7.49	1531	1692	3164
		550x100x40	3.83	4.18	9.75	2772	3053	5841
		310x150x50	3.04	3.33	7.73	1001	1113	1943
		430x150x50	4.33	4.73	11.0	2278	2517	4575
		550x150x50	5.67	6.19	14.4	4124	4545	8476
		610x150x50	6.36	6.93	16.2	5265	5796	10917
		730x150x50	7.73	8.43	19.7	7984	8775	16790
		1030x150x50 SL	10.6	11.6	26.9	12219	13428	24547

Member of EOTA

MEGANT series 60/100/150 – Material: EN AW - 6083								
Bending tension	Position of lower clamping jaw	Dimensions L/B/H	Moment capacity and stiffness in hardwood with horizontal screws ASSY PLUS VG 8 x 160 mm acc. to ETA-11/0190					
			$M_{2,\varphi,Rk}$			$K_{2,\varphi,ser}$ [1)]		
-	-	mm	kNm			kNm/rad		
			D30	D50	GL75	D30	D50	GL75
bottom	header	310x60x40	1.88	2.06	4.78	575	639	1143
		430x60x40	2.79	3.04	7.09	1322	1462	2651
		550x60x40	3.70	4.04	9.42	2398	2646	4855
		310x100x40	3.64	3.98	9.26	935	1042	1685
		430x100x40	5.46	5.96	13.9	2215	2457	4062
		550x100x40	7.29	7.96	18.5	4092	4525	7621
		310x150x50	4.50	4.93	11.5	1263	1407	2284
		430x150x50	6.72	7.34	17.1	2977	3300	5510
		550x150x50	8.98	9.80	22.8	5490	6067	10360
		610x150x50	10.1	11.0	25.7	7052	7785	13417
		730x150x50	12.4	13.5	31.5	10793	11893	20817
		1030x150x50 SL	15.8	17.3	40.2	16749	18427	32332
	joist	310x60x40	2.63	2.88	3.96	493	550	795
		430x60x40	4.06	4.44	6.10	1211	1344	1999
		550x60x40	5.50	6.02	8.27	2264	2505	3797
		310x100x40	4.66	5.10	7.52	790	884	1234
		430x100x40	7.15	7.81	11.7	2003	2227	3230
		550x100x40	9.67	10.6	15.9	3804	4215	6271
		310x150x50	6.57	7.18	10.6	1172	1312	1778
		430x150x50	10.0	10.9	16.9	2934	3263	4633
		550x150x50	13.5	14.7	23.3	5541	6139	8987
		610x150x50	15.2	16.6	26.5	7167	7931	11746
		730x150x50	18.7	20.4	33.0	11070	12226	18448
		1030x150x50 SL	21.3	23.2	41.1	16827	18549	28688

[1)] $K_{2,\varphi}$ for the ultimate limit state shall be calculated as:

$$K_{2,\varphi} = \frac{2 \cdot K_{2,\varphi,ser}}{3 \cdot (1 + 2 \cdot \psi_2 \cdot k_{def})}$$

Where

ψ_2 ...... combination factor according to EN 1990 for the quasi-permanent value of the action causing the largest stress in relation to the strength

k_{def} ... deformation factor according to EN 1995-1-1

[2)] for Träger BauBuche according to ETA-14/0354 in service class 1

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 22.04.2025

1.) Calculation of characteristic load bearing capacities for connections between main beam or column and secondary beam

(a) $F_{1,Rk}$ – force acting in the direction of the secondary beam:

$$F_{1,Rk} = min \begin{cases} F_{1,J,Rk} & \dots see\ (i) \\ F_{1,H,Rk} & \dots see\ (i) \\ F_{t,Rk} & \dots see\ (ii) \\ F_{1,KCC,Rk} & \dots see\ (iii) \end{cases}$$

(i) Load bearing capacity of tension screws for Joist/Header $F_{1,J/H,Rk}$:

Characteristic withdrawal resistance in softwood:	$F_{1,J/H,Rk} = n_{ef,J/H} \cdot f_{ax,J/H,Rk} \cdot d \cdot l_{ef,J/H} \cdot k_{ax}$ or according to ETA for screws
Characteristic withdrawal resistance in hardwood ($\rho_k \leq 590 kg/m^3$):	according to ETA for screws in hardwood e.g. ETA-11/0190
Characteristic withdrawal resistance in Träger BauBuche according to ETA-14/0354:	$F_{1,J,Rk} = n_{ef,J} \cdot 11.7 \cdot d \cdot l_{ef,J}$ $F_{1,H,Rk} = n_{ef,H} \cdot 23.3 \cdot d \cdot l_{ef,H}$ or according to ETA for screws
with	
Characteristic withdrawal strength perpendicular to direction of grain:	$f_{ax,J/H,Rk} = 0.52 \cdot d^{-0.5} \cdot l_{ef,J/H}^{-0.1} \cdot \rho_k^{0.8}$ or according to ETA for screws
Number of screws acting in direction of force:	EN AW – 6082: series 60: $n_{ef,J/H} = 3.00$ series 100: $n_{ef,J/H} = 4.67$ series 150: $n_{ef,J/H} = 6.33$
Effective length of threaded part in the timber member:	$l_{ef,J/H} = l_{Scr,J/H} - 14\ mm$ $80\ mm \leq l_{scr} \leq 240\ mm$
Angle between screw axis and direction of grain:	$\alpha = 0°$ for Joist (end grain) $\alpha = 90°$ for Header (side grain)
Dimension coefficient	$k_{ax} = 0.3 + 0.7 \cdot \frac{\alpha}{45}$ for $0° \leq \alpha \leq 45°$ $k_{ax} = 1.0$ for for $45° \leq \alpha \leq 90°$
Coefficient	$k_\alpha = 0.7$ for Joist $k_\alpha = 1.0$ for Header
For calculation of design values	k_{mod} according to EN 1995-1-1 and $\gamma_m = 1.3$

(ii) Tensile strength of horizontal screws $F_{t,Rk}$:

Characteristic tensile resistance:	$F_{t,Rk} = n_{90} \cdot f_{tens}$
with	
Tensile strength of the screw:	$f_{tens} = 20\ kN$ for screws according to Annex 1 or according to ETA for screws
For calculation of design values	$\gamma_{m,2} = 1.25$ (EN 1993-1-1)

(iii) Maximum load bearing capacity of connector MEGANT:

Maximum load bearing capacity:	$F_{1,KCC,Rk}$ according to Annex 5
For calculation of design values	$\gamma_{m,2} = 1.25$ (EN 1999-1-1)

(b) $F_{2,Rk}$ – force acting in direction of insertion:

$$F_{2,Rk} = min \begin{cases} F_{2,J,Rk} & \dots see\ (i) \\ F_{2,H,Rk} & \dots see\ (i) \\ F_{2,KCC,Rk} & \dots see\ (ii) \\ F_{t,Rk} & \dots see\ (iii) \\ F_{\tau,Rk} & \dots see\ (iv) \end{cases}$$

(i) Load bearing capacity of 45° screws in softwood and hardwood for Joist/Header $F_{2,J/H,Rk}$:

Characteristic load bearing capacity of 45° screws:	$F_{2,J/H,Rk} = 1.25 \cdot \frac{n_{45,J/H}}{\sqrt{2}} \cdot min \begin{Bmatrix} 1{,}15 \cdot f_{tens,k} \\ F_{ax,45,J/H,Rk} \end{Bmatrix}$
with	
Characteristic withdrawal resistance for a single screw in softwood:	$F_{ax,45,J/H,Rk} = 0.52 \cdot d^{0.5} \cdot l_{ef,J/H}^{0.9} \cdot \rho_k^{0.8}$ or according to ETA for screws
Characteristic withdrawal resistance for a single screw in hardwood ($\rho_k \leq 590 kg/m^3$):	according to ETA for screws in hardwood e.g. ETA-11/0190
Characteristic withdrawal resistance in Träger BauBuche according to ETA-14/0354:	$F_{ax,45,J/H,Rk} = 28 \cdot d \cdot l_{ef,J/H}$ or according to ETA for screws in BauBuche
Tensile strength of the screw:	$f_{tens} = 20\ kN$ for screws according to Annex 1 or according to ETA for screws
Limit value for the eccentricity:	$e_{2,lim} = \frac{0.8 \cdot \sum z_i^2 + 2/3x \cdot \sum z_i}{n_{45,J/H} \cdot z_{max}}$
Number of 45° screws in Joist/Header:	$n_{45,J/H}$ according to Annex 2
Effective length of threaded part in the timber member:	$l_{ef,J/H} = l_{Scr,J/H} - 18\ mm$ for screws in the connector plates of MEGANT series 60/100/150 $l_{ef,J/H} = l_{Scr,J/H} - 50\ mm$ for the screws in the clamping jaw of MEGANT 1030x150x50 SL $80\ mm \leq l_{scr} \leq 240\ mm$
Distance of the centre of rotation of the joint to the end of the contact area, see (1) (e):	x
Distances from the centre of rotation of the joint of the inclined screws in the joist or header connection, see (1)(e):	z_i
Distance of the outermost inclined screw from the center of rotation of the joint:	z_{max}
For calculation of design values:	k_{mod} according to EN 1995-1-1 and $\gamma_m = 1.3$

(ii) Maximum load bearing capacity of connector MEGANT:

Maximum load bearing capacity:	$F_{2,KCC,Rk}$ according to Annex 5
For calculation of design values	$\gamma_{m,1} = 1.1$ (EN 1999-1-1)

(iii) Tensile strength of threaded rods $F_{t,Rk}$:

Tensile strength of threaded rods:	$F_{t,Rk} = n \cdot k_2 \cdot f_{u,b} \cdot A_s$
with	
Number of threaded rods:	n according to Annex 2
Characteristic tensile strength of threaded rod:	$f_{u,b}$
Cross section of core of threaded rod:	$A_s = 157\ mm^2$ for rod diameter 16 mm $A_s = 245\ mm^2$ for rod diameter 20 mm
Factor	$k_2 = 0.9$
For calculation of design values	$\gamma_{m,2} = 1.25$ (EN 1993-1-1)

(iv) Embedding strength of thread in aluminium $F_{\tau,Rk}$:

Embedding strength of thread in aluminium:	$F_{\tau,Rk} = R_{p0.2,k} \cdot A_M \cdot \beta_M$
with	
0,2 % yield strength	$R_{p0.2,k} = f_O = 240\ N/mm^2$ for EN AW – 6082
Cross section of thread:	$A_M = n \cdot d_B \cdot t \cdot \pi$

Number of threaded rods:	n according to Annex 2
Diameter of thread:	d_B according to Annex 2
Length of thread in aluminium:	t according to Annex 2
Reduction factor:	$\beta_M = 0.4$
For calculation of design values	$\gamma_{m,1} = 1.1$ (EN 1999-1-1)

(c) $F_{3,Rk}$ – force acting against direction of insertion:

$$F_{3,Rk} = min\begin{cases} F_{3,J,Rk} \\ F_{3,H,Rk} \end{cases}$$

Characteristic load bearing against direction of insertion for Joist/Header:	$F_{3,J/H,Rk} = n_{45,J/H} \cdot F_{v,45,J/H,Rk} + n_{\alpha,J/H} \cdot F_{v,\alpha,J/H,Rk}$
with	
Load bearing capacity per joint and fastener:	$F_{v,\alpha,J/H,Rk} = 2.3 \cdot \sqrt{M_{y,Rk} \cdot f_{h,J/H,k} \cdot d} + \Delta F_{v,Rk}$ $mit\ \Delta F_{v,Rk} = min\begin{Bmatrix} \frac{F_{ax,\alpha,J/H,Rk}}{4}; \\ 2.3 \cdot \sqrt{M_{y,Rk} \cdot f_{h,J/H,k} \cdot d} \end{Bmatrix}$ $F_{v,45,J/H,Rk} = 2.3 \cdot \sqrt{M_{y,Rk} \cdot f_{h,J/H,k} \cdot d}$
Characteristic withdrawal resistance for a single screw in softwood:	$F_{ax,\propto,J/H,Rk} = 0.52 \cdot d^{0.5} \cdot l_{ef,J/H}^{0.9} \cdot \rho_k^{0.8} \cdot k_{ax}$ or according to ETA for screws
Characteristic withdrawal resistance for a single screw in hardwood:	according to ETA for the screws e.g. ETA-11/0190
Characteristic withdrawal resistance for a single screw in Träger BauBuche according to ETA-14/0354:	$F_{ax,\alpha,J,Rk} = 11.7 \cdot d \cdot l_{ef,J}$ $F_{ax,\alpha,H,Rk} = 23.3 \cdot d \cdot l_{ef,H}$ or according to ETA for screws
Dimension coefficient	$k_{ax} = 0.3 + 0.7 \cdot \frac{\alpha}{45}$ for $0° \leq \alpha \leq 45°$ $k_{ax} = 1.0$ for for $45° \leq \alpha \leq 90°$
Coefficient:	$k_\alpha = 0.7$ for Joist $k_\alpha = 1.0$ for Header
Characteristic yield moment of the screw:	$M_{y,Rk}$ according to Annex 1
Number of screws in Joist/Header:	$n_{45,J/H}$ and $n_{\alpha,J/H}$ according to Annex 2 series 150: $n_{45,J/H,max} = 28$ and $n_{\alpha,J/H,max} = 8$
Effective length of threaded part in the timber member:	$l_{ef,J/H} = l_{Scr,J/H} - 18\ mm$ $80\ mm \leq l_{scr} \leq 240\ mm$
Characteristic value of embedding strength in softwood:	$f_{h,J,k} = 0.033 \cdot \rho_k \cdot d^{-0.3}$ for Joist $f_{h,H,k} = 0.082 \cdot \rho_k \cdot d^{-0.3}$ for Header
Characteristic value of embedding strength in hardwood:	$f_{h,J/H,k} = \frac{0.082 \cdot \rho_k \cdot (1 - 0.01 \cdot d)}{2.5 \cdot \cos^2 \alpha + \sin^2 \alpha}$
Characteristic value of embedding strength in Träger BauBuche:	$f_{h,J/H,k}$ according to Annex 2 of ETA-14/0354

Angle between screw axis and direction of grain:	$\alpha = 0°$ for Joist (end grain) $\alpha = 90°$ for Header (side grain)
For calculation of design values	k_{mod} according to EN 1995-1-1 and $\gamma_m = 1.3$

(d) $F_{45,Rk}$ – force acting perpendicular to direction of insertion:

$$F_{45,Rk} = min \begin{cases} F_{45,J,Rk} \\ F_{45,H,Rk} \\ F_{45,KCC,Rk} \end{cases}$$

Characteristic load bearing against direction of insertion for Joist/Header:	$F_{45,J/H,Rk} = n_{45,J/H} \cdot F_{v,J/H,Rk}$
with	
Load bearing capacity per joint and fastener:	$F_{v,J/H,Rk} = 2.3 \cdot \sqrt{M_{y,Rk} \cdot f_{h,J/H,k} \cdot d} + \Delta F_{v,Rk}$ $mit\ \Delta F_{v,Rk} = min \begin{Bmatrix} \frac{F_{ax,\alpha,J/H,Rk}}{4}; \\ 2.3 \cdot \sqrt{M_{y,Rk} \cdot f_{h,J/H,k} \cdot d} \end{Bmatrix}$
Characteristic withdrawal resistance for a single screw in softwood:	$F_{ax,J/H,Rk} = 0.52 \cdot d^{0.5} \cdot l_{ef,J/H}^{0.9} \cdot \rho_k^{0.8} \cdot k_{ax}$ or according to ETA for screws
Characteristic withdrawal resistance for a single screw in hardwood:	according to ETA for screws in hardwood e.g. ETA-11/0190
Characteristic withdrawal resistance for a single screw in Träger BauBuche according to ETA-14/0354:	$F_{ax,J,Rk} = 11.7 \cdot d \cdot l_{ef,J}$ $F_{ax,H,Rk} = 23.3 \cdot d \cdot l_{ef,H}$ or according to ETA for screws
Dimension coefficient	$k_{ax} = 0.3 + 0.7 \cdot \frac{\alpha}{45}$ for $0° \leq \alpha \leq 45°$ $k_{ax} = 1.0$ for for $45° \leq \alpha \leq 90°$
Coefficient:	$k_\alpha = 0.7$ for Joist $k_\alpha = 1.0$ for Header
Characteristic yield moment of the screw:	$M_{y,Rk}$ according to Annex 1 or according to ETA for screws
Number of screws in Joist/Header:	$n_{45,J/H}$ according to Annex 2 series 150: $n_{45,J/H,max} = 28$
Effective length of threaded part in the timber member:	$l_{ef,J/H} = l_{Scr,J/H} - 14\ mm$ $80\ mm \leq l_{scr} \leq 240\ mm$

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Characteristic value of embedding strength in softwood:	$f_{h,J,k} = 0.033 \cdot \rho_k \cdot d^{-0.3}$ for Joist $f_{h,H,k} = 0.082 \cdot \rho_k \cdot d^{-0.3}$ for Header
Characteristic value of embedding strength in hardwood:	$f_{h,J/H,k} = \frac{0.082 \cdot \rho_k \cdot (1 - 0.01 \cdot d)}{2.5 \cdot \cos^2 \alpha + \sin^2 \alpha}$
Characteristic value of embedding strength in Träger BauBuche:	$f_{h,J/H,k}$ according to Annex 2 of ETA-14/0354
Angle between screw axis and direction of grain:	$\alpha = 0°$ for Joist (end grain) $\alpha = 90°$ for Header (side grain)
For calculation of design values	k_{mod} according to EN 1995-1-1 and $\gamma_m = 1.3$

(e) $M_{2,Rk}$ and $K_{2\varphi}$– moment capacity and spring stiffness:

$$M_{2,Rk} = min \begin{cases} M_{2,J,Rk} \\ M_{2,H,Rk} \end{cases}$$

$$K_{2,\varphi,ser} = \frac{1}{\frac{1}{K_{2\varphi,H}} + \frac{1}{K_{2\varphi,J}}}$$ 1)

Moment capacity of the Joist/Header:	$M_{2,J,Rk} = \sum F_{ax}^i \cdot e_{i,J} + \frac{s_{c,0,k} \cdot x_J^2}{3} + \sum F_{t,re}^i \cdot e_{t,i,J} + F_{c,re} \cdot e_{c,J}$ $M_{2,H,Rk} = \sum F_{ax}^i \cdot e_{i,H} + \frac{s_{c,90,k} \cdot x_H^2}{3} + \sum F_{t,re}^i \cdot e_{t,i,H} + F_{c,re} \cdot e_{c,H}$ with $e_{i,J/H}$ as the individual distances of the tensile screws in the Joist/Header connection from the center of rotation of the joint $e_{t,i,J/H}$ and $e_{c,J/H}$ as the individual distances of the reinforcement elements to increase the moment capacity from the center of rotation of the joist/header $F_{t,re}^i$ as the individual characteristic load-bearing capacities of the reinforcement elements in the bending tension zone $F_{c,re}$ as the characteristic load-bearing capacity of the reinforcement elements in the bending compression zone
Rotational spring stiffness of the Joist/Header:	$K_{2\varphi,J} = \sum K_{ser,s}^i \cdot e_{i,J}^2 + \sum K_{ser,t} \cdot e_{t,i,J}^2$ $K_{2\varphi,H} = \sum K_{ser,s}^i \cdot e_{i,H}^2 + \frac{s_{c,90,k} \cdot x_H^3}{w \cdot 3} + \sum K_{ser,t}^i \cdot e_{t,i,H}^2 + K_{ser,c} \cdot e_{c,H}^2$ $e_{i,J/H}$ as the individual distances of the tensile screws in the Joist/Header from the center of rotation $K_{ser,t}$ as spring stiffness of the individual reinforcement elements in the bending tension zone $K_{ser,c}$ as spring stiffness of the individual reinforcement elements in the bending compression zone
with	

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Tensile force of a Joist/Header moment screw:	$F_{ax}^{i} = \frac{F_{ax,J/H,Rk}^{i} \cdot e_{i,J/H}}{e_{max,J/H}}$ For softwood glulam: $F_{ax,J,Rk} = 0.156 \cdot \sqrt{d} \cdot l_{ef,J}^{0.9} \cdot \rho_{k,J}^{0.8}$ $F_{ax,90,H,Rk} = 0.52 \cdot \sqrt{d} \cdot l_{ef,H}^{0.9} \cdot \rho_{k,H}^{0.8}$ For Träger BauBuche according to ETA-14/0354: $F_{ax,J,Rk} = 11.7 \cdot d \cdot l_{ef,J}$ $F_{ax,H,Rk} = 23.3 \cdot d \cdot l_{ef,H}$ $e_{max,J/H}$ as the distance of the outermost tensile screw in the Joist/Header from the center of rotation of the joint
Maximum value of contribution of compression:	$s_{c,90,k} = \left(k_a \cdot \left(1 - e^{-k_b \cdot w}\right) \cdot b + l_{dis}\right) \cdot f_{c,90,k}$ for Header $s_{c,0,k} = b \cdot f_{c,0,k}$ for Joist with $k_a = 1.7$ and $k_b = 0.6$ for solid wood and glulam of softwood or hardwood $k_a = 1.6$ and $k_b = 0.15$ for Träger Baubuche according to ETA-14/0354 and LVL according to EN 14374 w as the iterative determined compressive deformation at the edge of the contact area b as the width of the contact area $l_{dis} = min\{8 \cdot w; 40\ mm\}$ for softwood glulam $f_{c,0,k}$ as the char. compression strength of the Joist parallel to the grain $f_{c,90,k}$ as the char. compression strength of the Header perpendicular to the grain

Distance of the centre of rotation of the joint to the end of the contact area (to be determined iteratively):	$x_{J/H} = p_{J/H} + \sqrt{p_{J/H}^2 + q_{J/H}}$ with $p_J = \frac{a_{max,J}}{2} + \frac{n_J \cdot k_{l,J} \cdot F_{ax,max} + m \cdot w_{max,J} \cdot K_{u,t} - F_{c,re}}{s_{c,0,k}}$ $q_J = \frac{2 \cdot k_l \cdot F_{ax,max}^i \cdot \sum_{i=1}^n a_{i,J} - 2 \cdot w_{max,J} \cdot K_{u,t} \cdot C + 2 \cdot F_{c,re} \cdot a_{max,J}}{s_{c,0,k}}$ $p_H = \frac{a_{max,H}}{2} + \frac{n_H \cdot k_{l,H} \cdot F_{ax,max} + m \cdot w_{max,H} \cdot K_{u,t} - F_{c,re}}{s_{c,90,k}}$ $q_H = \frac{2 \cdot k_{l,H} \cdot F_{ax,max}^i \cdot \sum_{i=1}^n a_{i,H} - 2 \cdot w_{max,H} \cdot K_{u,t} \cdot C + 2 \cdot F_{c,re} \cdot a_{max,H}}{s_{c,90,k}}$ $C = m \cdot \left((m-1) \cdot \frac{a_{2,re}}{2} + L + a_{4,re}\right)$ $a_{max,J/H}$ as the maximum distance of the tensile screws in the Joist/Header connection from the upper end of the contact area $n_{J/H}$ as the number of tensile screws in Joist/Header $k_{l,J/H} = \frac{\sum F_{ax}^i \cdot \frac{l_{ef,1}}{l_{ef,i}}}{\sum F_{ax}^i}$ m as the number of reinforcement elements arranged on top of each other in the bending tension zone $a_{2,re}$ als größte Verschiebung einer Momentenschraube im MEGANT-Verbinder $a_{2,re}$ as the distance of the reinforcement elements in the bending tension zone $a_{4,re}$ as the distance from the top/bottom reinforcement element in the bending tension zone from the edge of the MEGANT connector $K_{u,t} = \frac{2}{3} K_{ser,t}$ as spring stiffness of the individual reinforcement elements in the bending tension zone in ultimate limit state
Spring stiffness of the screws:	$K_{ser,s}^i = \frac{F_{ax,J/H,Rk}^i}{0.5}$ N/mm

[1)] $K_{2,\varphi}$ for the ultimate limit state shall be calculated as:

$$K_{2,\varphi} = \frac{2 \cdot K_{2,\varphi,ser}}{3 \cdot (1 + 2 \cdot \psi_2 \cdot k_{def})}$$

Where

ψ_2 ...... combination factor according to EN 1990 for the quasi-permanent value of the action causing the largest stress in relation to the strength

k_{def} ... deformation factor according to EN 1995-1-1

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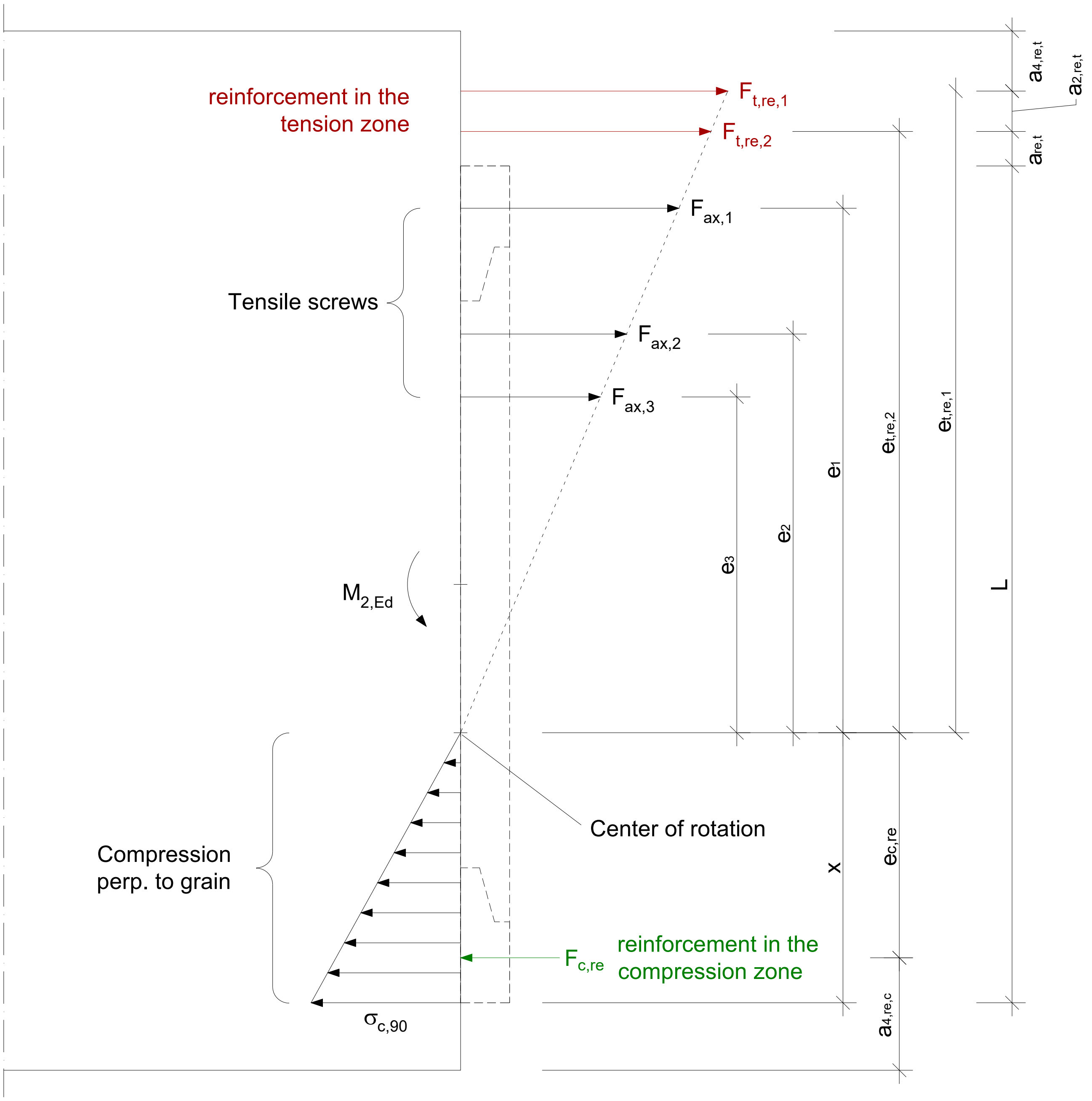
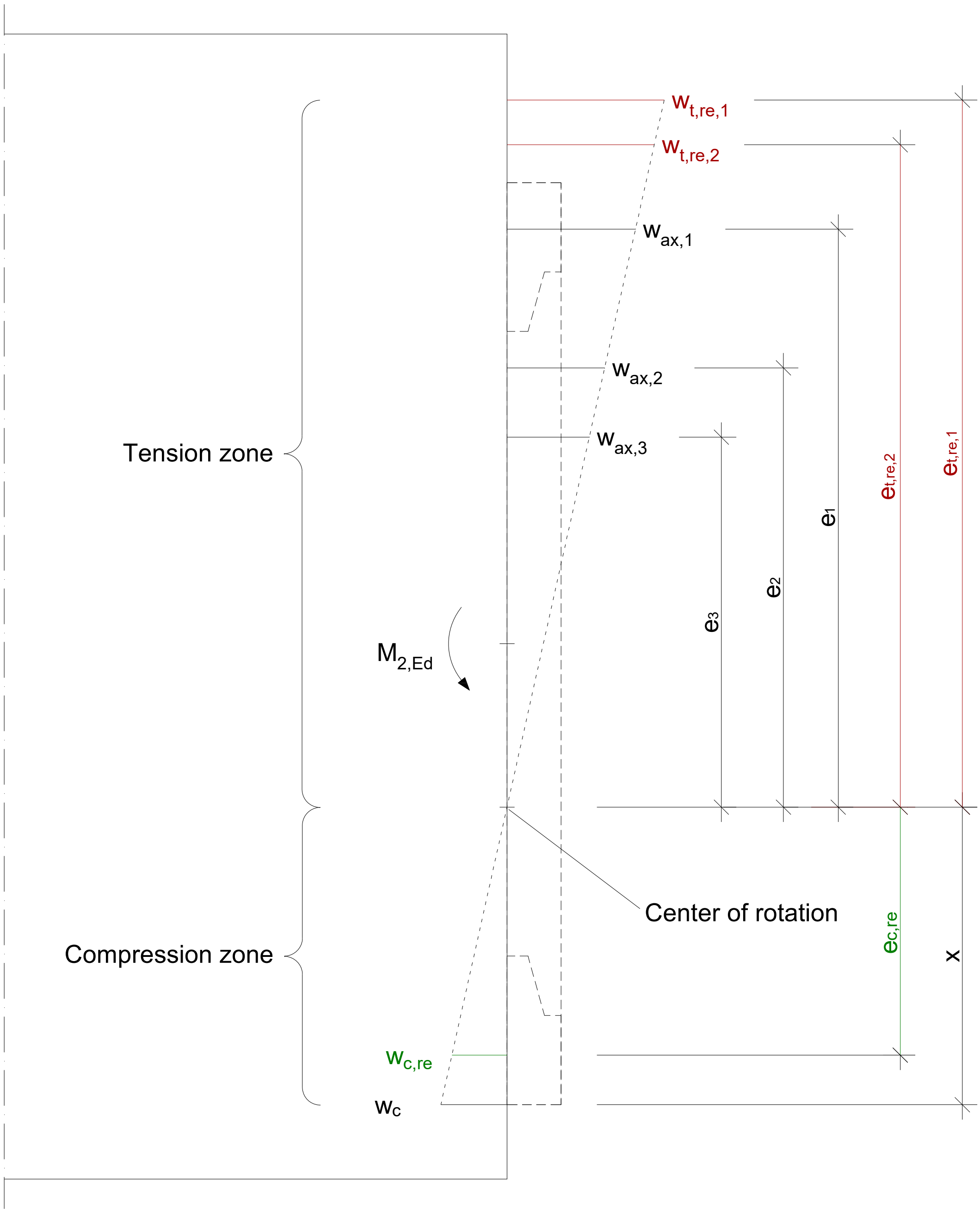
Static system for the determination of the compression zone height x



MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 22.04.2025

Displacements due to bending moment M_2



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(f) Combined loading:

For combined loading, the following needs to be valid

$$\left(\frac{F_{1,Ed}}{F_{1,Rd}} + \frac{M_{2,Ed} - (F_{2,Ed} - F_{1,Ed}) \cdot e_{2,lim}}{M_{2,Rd}}\right)^2 + \left(\frac{F_{2,Ed}}{F_{2,Rd}}\right)^2 + \left(\frac{F_{3,Ed}}{F_{3,Rd}}\right)^2 + \left(\frac{F_{45,Ed}}{F_{45,Rd}}\right)^2 + \left(\frac{M_{tor,Ed}}{M_{tor,Rd}}\right) \leq 1$$

Hereby, the expression $(F_{2,Ed} - F_{1,Ed}) \cdot e_{2,lim}$ is maximum $M_{2,Ed}$:

$$M_{2,Ed} - (F_{2,Ed} - F_{1,Ed}) \cdot e_{2,lim} \geq 0$$

2.) Tension reinforcement

(a) Tension perpendicular to the grain in main- and secondary beam loaded in direction of insertion F_2

(i) No further calculation is needed if:

$\frac{a_J}{H_J} > 0.7$ and $\frac{a_H}{H_H} > 0.7$

with	
Distance of screw row to the loaded edged of the wooden member:	$a_{J/H}$ according to Annex 7
Height of secondary and main beam:	$H_{J/H}$ according to Annex 7

(ii) Tension perpendicular to the grain for timber members with $0.2 \leq \frac{a_{J/H}}{H_{J/H}} \leq 0.7$:

The following expressions shall be satisfied for timber members **without** reinforcement:	
For joist and header:	$\left(\frac{F_{90,d}}{F_{90,J/H,Rd}}\right) \leq 1.0$
with	
	$F_{90,J/H,Rd} = k_{J/H} \cdot k_{s,J/H} \cdot k_{r,J/H} \cdot \left[6.5 + 18 \cdot \left(\frac{a_{J/H}}{H_{J/H}}\right)^2\right] \cdot \left(t_{ef} \cdot H_{J/H}\right)^{0.8} \cdot f_{t,90,d}$
Factor	$k_J = 0.5$ in joist and $k_H = 1.0$ in header
Factor	$k_{s,J/H} = max\begin{cases} 1 \\ 0.7 + \frac{1.4 \cdot a_{r,J/H}}{H_{J/H}} \end{cases}$
	MEGANT series 60: $a_{r,J/H} = 40\ mm$ MEGANT series 100: $a_{r,J/H} = 80\ mm$ MEGANT series 150: $a_{r,J/H} = 130\ mm$
Factor	$k_{r,J/H} = \frac{n_{J/H}}{\sum_{i=1}^{n_{J/H}} \left(\frac{h_{1,J/H}}{h_{i,J/H}}\right)^2}$
Distance of screw row to the unloaded edged of the wooden member:	h_i according to Annex 7
Effective depth	$t_{ef} = min\begin{cases} B_{J/H} \\ \frac{l_{ef,J/H}}{\sqrt{2}} \end{cases}$ see Annex 7

The following expressions shall be used to **reinforce** timber members:	
For joist and header:	$\left(\frac{F_{t,90,J/H,d}}{n \cdot F_{ax,Rd}}\right) \leq 1$
with	
	$F_{t,90,J/H,d} = \left[1 - 3 \cdot \left(\frac{a_{J/H}}{H_{J/H}}\right)^2 + 2 \cdot \left(\frac{a_{J/H}}{H_{J/H}}\right)^3\right] \cdot F_{90,d}$
Number of fully threaded self-tapping screws for reinforcement	n
Design withdrawal resistance:	$F_{ax,Rd}$ according to EN 1995-1-1 or ETA

(b) Tension perpendicular to the grain in main- and secondary beam loaded perpendicular to direction of insertion F_{45}

(iii) No further calculation is needed if:

$\frac{a_J}{B_J} > 0.7$ and $\frac{a_H}{B_H} > 0.7$

with	
Distance of screw row to the loaded edged of the wooden member:	$a_{J/H}$ according to Annex 7
Width of main and secondary beam:	$B_{J/H}$ according to Annex 7

(iv) Tension perpendicular to the grain for timber members with $0.2 \leq \frac{a_{J/H}}{B_{J/H}} \leq 0.7$:

The following expressions shall be satisfied for timber members **without** reinforcement:	
For joist and header:	$\left(\frac{F_{90,d}}{F_{90,J/H,Rd}}\right) \leq 1.0$
with	
	$F_{90,J/H,Rd} = k_{J/H} \cdot k_{s,J/H} \cdot k_{r,J/H} \cdot \left[6.5 + 18 \cdot \left(\frac{a_{J/H}}{B_{J/H}}\right)^2\right] \cdot \left(t_{ef} \cdot B_{J/H}\right)^{0.8} \cdot f_{t,90,d}$
Factor	$k_J = 0.5$ in joist and $k_H = 1.0$ in header

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Factor	$k_{s,J/H} = max \begin{cases} 1 \\ 0.7 + \frac{1.4 \cdot a_{r,J/H}}{B_{J/H}} \end{cases}$
	MEGANT height $h = 310\ mm$: $a_{r,J/H} = 171\ mm$ MEGANT height $h = 430\ mm$: $a_{r,J/H} = 285\ mm$ MEGANT height $h = 550\ mm$: $a_{r,J/H} = 399\ mm$
Factor	$k_{r,J/H} = \frac{n_{J/H}}{\sum_{i=1}^{n_{J/H}} \left(\frac{b_{1,J/H}}{b_{i,J/H}}\right)^2}$
Distance of screw row to the unloaded edged of the wooden member:	b_i according to Annex 7
Effective depth	$t_{ef} = 48\ mm$

The following expressions shall be used to **reinforce** timber members:	
For joist and header:	$\left(\frac{F_{t,90,J/H,d}}{n \cdot F_{ax,Rd}}\right) \le 1.0$
with	
	$F_{t,90,J/H,d} = \left[1 - 3 \cdot \left(\frac{a_{J/H}}{B_{J/H}}\right)^2 + 2 \cdot \left(\frac{a_{J/H}}{B_{J/H}}\right)^3\right] \cdot F_{90,d}$
Number of fully threaded self-tapping screws for reinforcement	n
Design withdrawal resistance:	$F_{ax,Rd}$ according to EN 1995-1-1 or ETA

3.) MEGANT - timber to steel connections:

Main beam from steel and secondary beam as timber construction for load direction F_2:

$$F_{2,Rd} = min\begin{cases} F_{2,J,Rd} \\ F_{2,steel,Rd} \end{cases}$$

Structural analysis of timber connection:

$$F_{2,J,Rd} = min\begin{cases} F_{2,KCC,Rk}/\gamma_{M1} \\ F_{2,Rk} \cdot k_{mod}/\gamma_{M,timber} \end{cases}$$

with
$\gamma_{M1} = 1.1$ and $\gamma_{M,timber} = 1.3$

Structural analysis of steel connection:

$$F_{2,Steel,Rd} = min\begin{cases} n \cdot F_{v,Rd} \\ n \cdot F_{b,Megant,Rd} \\ n \cdot F_{b,Steelplate,Rd} \end{cases}$$

$F_{v,Rd} = \frac{n \cdot \alpha_v \cdot f_{ub,k} \cdot A_s}{\gamma_{M2}}$ according to EN 1993-1-8/3.6.1

$F_{b,Megant,Rd} = \frac{k_1 \cdot \alpha_b \cdot f_u \cdot d_1 \cdot t}{\gamma_{M2}}$ according to EN 1999

$F_{b,Steelplate,Rd} = \frac{n \cdot k_1 \cdot \alpha_b \cdot f_u \cdot d_1 \cdot t}{\gamma_{M2}}$ according to EN 1993-1-8/3.6.1

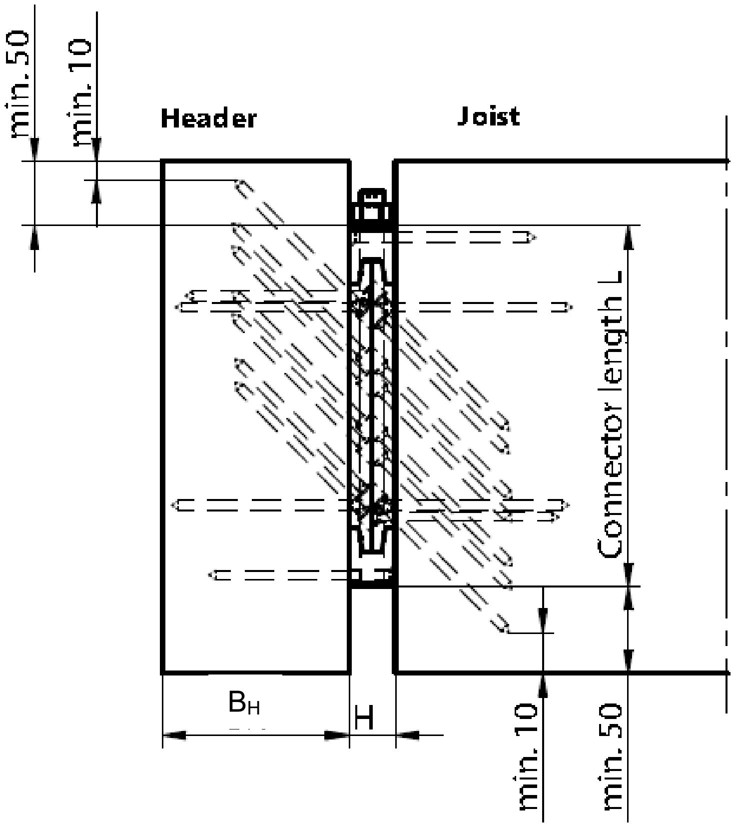
with
$\gamma_{M2} = 1.25$

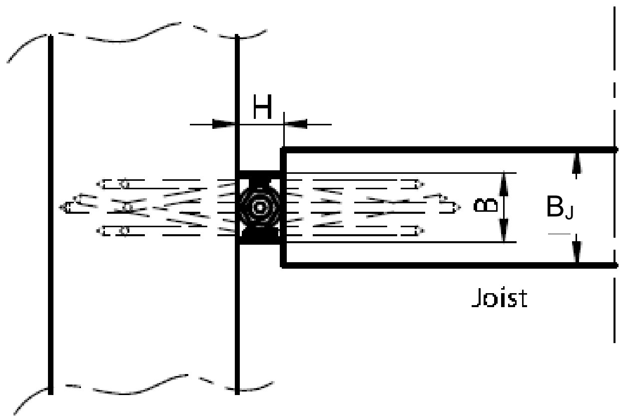
Additional loading directions have to be calculated similar, following the rules of EC3 and EC9.

4.) MEGANT - timber to concrete connections:

The connector MEGANT may be installed to members made of concrete with suitable fasteners. Design of connections with connectors in wood to concrete connections shall follow the respective Eurocode.

MEGANT (AW 6082) header / joist connection





dimensions in mm

MEGANT®	Annex 6
Dimensions and minimum spacings	of European Technical Assessment ETA-15/0667 of 22.04.2025

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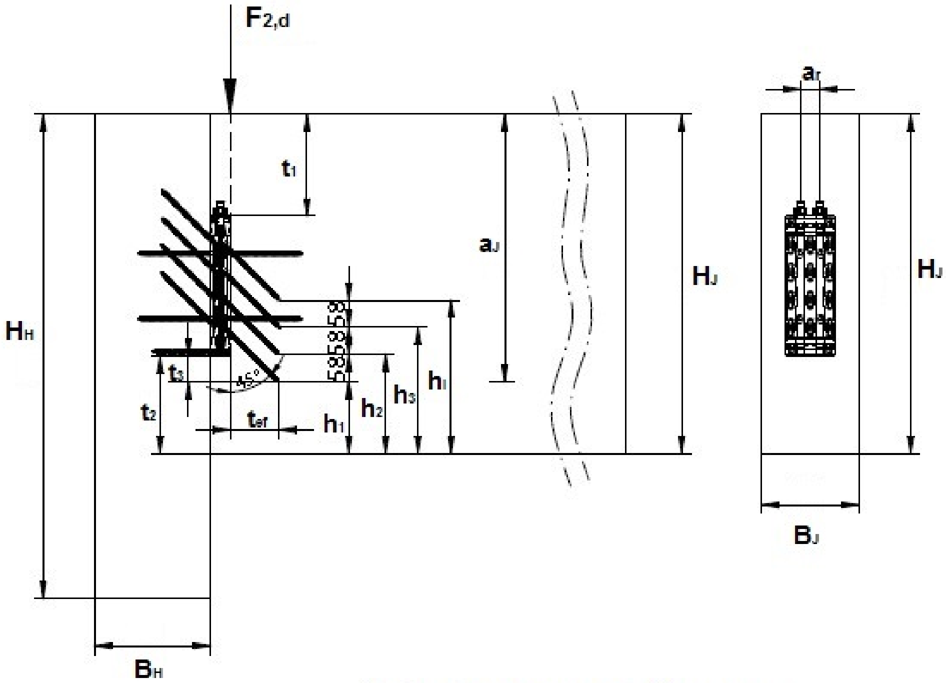
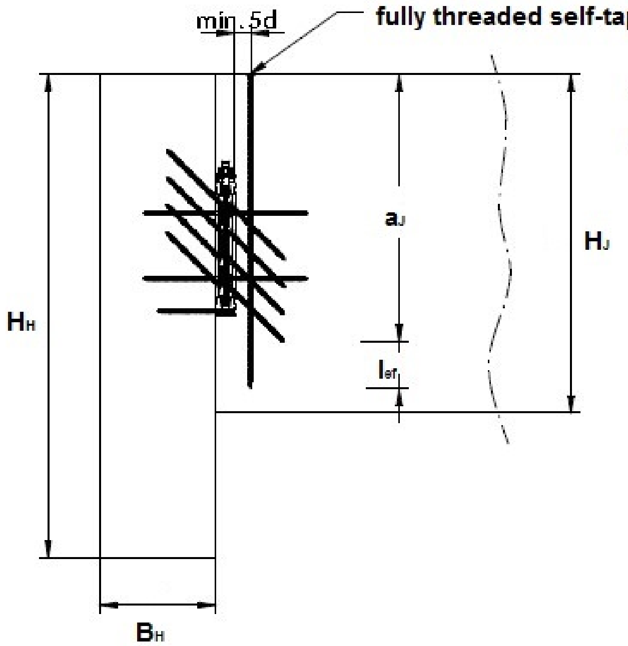
Tension reinforcement in joist - F_2





$a_J = H_J - t_2 - t_3$

$h_{J,i} = h_1 + n*58$

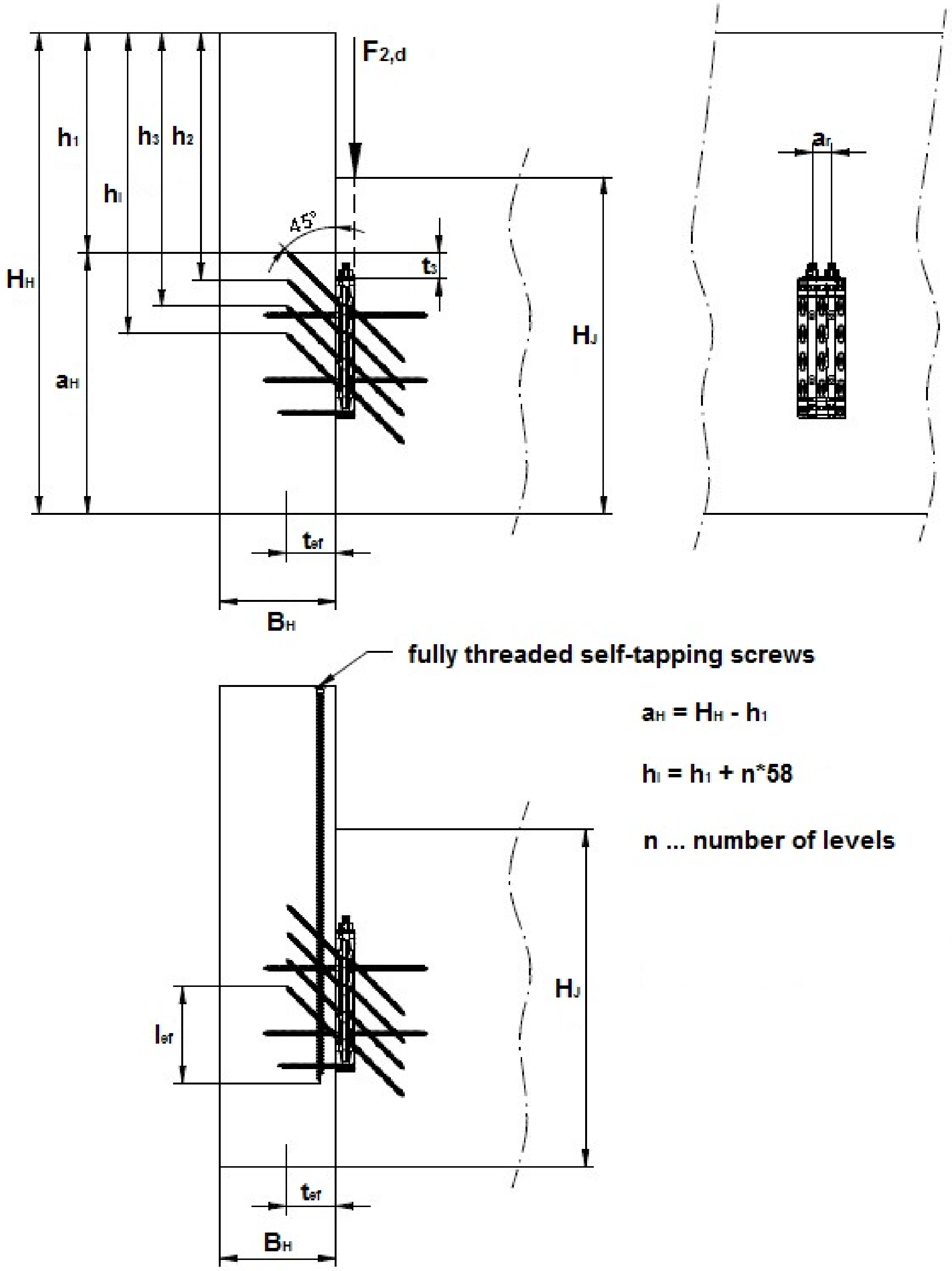
n ... number of levels

dimensions in mm

MEGANT®	Annex 7
Tension reinforcement	of European Technical Assessment ETA-15/0667 of 22.04.2025

OIB Member of EOTA

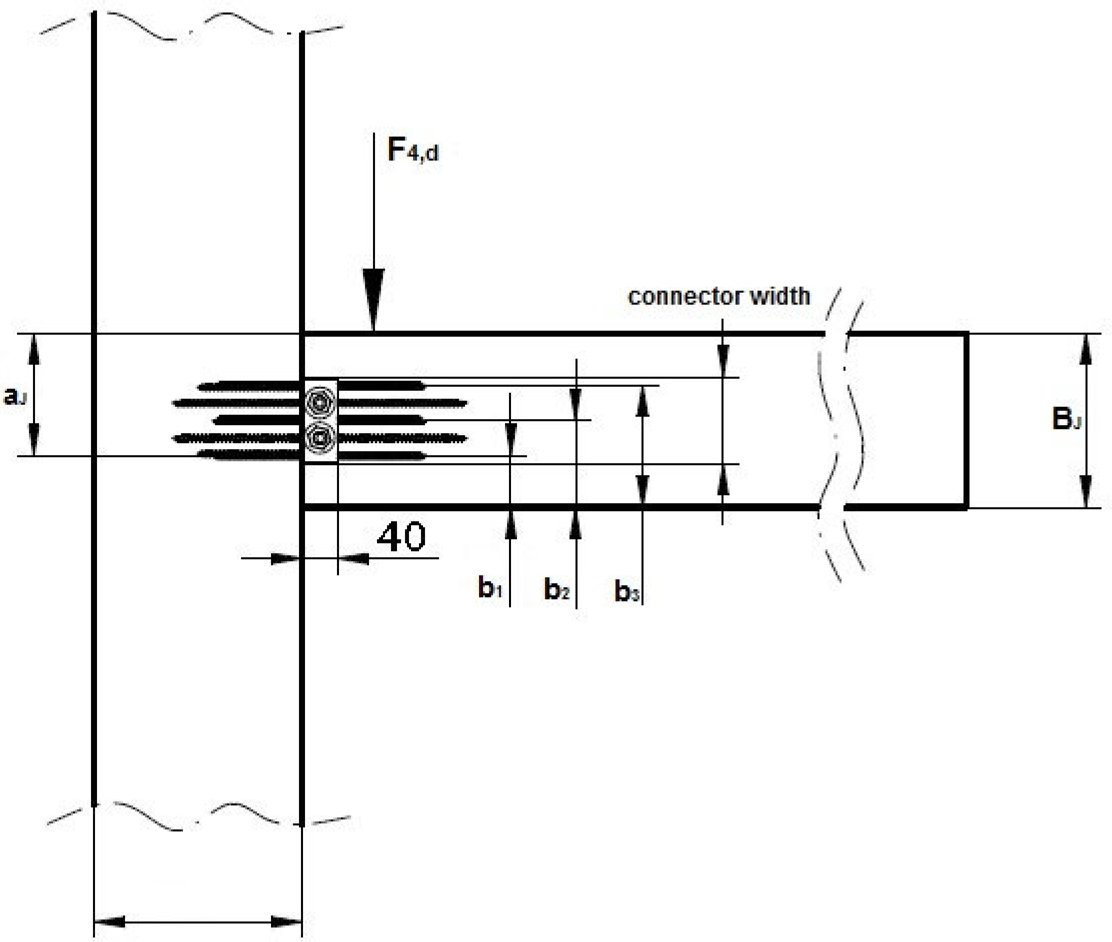
Tension reinforcement in header - F_2



dimensions in mm

MEGANT®	Annex 7
Tension reinforcement	of European Technical Assessment ETA-15/0667 of 22.04.2025

Tension reinforcement – F_4



dimensions in mm

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Tension reinforcement	of European Technical Assessment ETA-15/0667 of 22.04.2025

European Assessment Document EAD 130186-00-0603 “Three-dimensional nailing plates”

European Technical Assessment ETA-14/0354 of 21.07.2024 for “Träger BauBuche GL75, Beam BauBuche GL75, Poutre BauBuche GL75, Trave BauBuche GL75, Viga BauBuche GL75, Belka BauBuche GL75, Draagbalk BauBuche GL75” of Pollmeier Furnierwerkstoffe GmbH, Pferdsdorfer Weg 6, 99831 Creuzburg, Germany

European Technical Assessment ETA-11/0190 of 22.07.2018 for “Würth self-tapping screws” of Adolf Würth GmbH & Co. KG, Reinhold-Würth-Straße 12-17, 74653 Künzelsau, Germany

EN 338 (04.2016), Structural timber – Strength classes

EN 755-2 (03.2016), Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles – Part 2: Mechanical properties

EN 1993-1-8 (05.2005) +AC (12.2005) +AC (07.2009), Design of steel structures – Part 1-8: Design of joints

EN 1995-1-1 (11.2004) +AC (06.2006) +A1 (06.2008) +A2 (05.2014), Eurocode 5 – Design of timber structures – Part 1-1: General – Common rules and rules for buildings

EN 1995-1-2 (11.2004) +AC (06.2006) +AC (03.2009), Eurocode 5 – Design of timber structures – Part 1-2: General – Structural fire design

EN 1999-1-1 (05.2007) +A1 (07.2009) +A2 (12.2013), Design of aluminium structures – Part 1-1: General structural rules

EN 14080 (06.2013), Timber structures – Glued laminated timber and glued solid timber – Requirements

EN 14081-1:2005+A1 (02.2011), Timber structures – Strength graded structural timber with rectangular cross section – Part 1: General requirements

EN 14374 (11.2004), Timber structures – Structural laminated veneer lumber – Requirements

EN ISO 4032 (12.2012), Hexagon regular nuts (style 1) – Product grades A and B

ISO 7090 (06.2000), Plain washers, chamfered – Normal series – Product grade A

MEGANT®	Annex 8
Reference documents	of European Technical Assessment ETA-15/0667 of 22.04.2025