Austrian Institute of Construction Engineering
Schenkenstrasse 4 | T +43 1 533 65 50
1010 Vienna | Austria | F +43 1 533 64 23
www.oib.or.at | mail@oib.or.at

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

Member of EOTA
www.eota.eu

European Technical Assessment

ETA-15/0667 of 20.11.2015

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	63 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	Guideline for European Technical Approval ETAG 015 “Three-dimensional nailing plates”, Edition November 2012, used as European Assessment Document

Remarks

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may be made with the written consent of Austrian Institute of Construction Engineering. Any partial reproduction has to be identified as such.

SPECIFIC PARTS

1 Technical description of the product

1.1 General

This European Technical Assessment (ETA) applies to the connector MEGANT to be used in load-bearing timber to timber or timber to steel or concrete connections. The connector 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 the connector MEGANT is 40 or 50 mm.

The production series MEGANT includes 37 different types of connectors for wood to wood 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

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 - 6005 or EN AW - 6082 according to EN 755-2[1].

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. 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 - 6005 or 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.

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 (property

[1] Reference documents are listed in Annex 8.

class 8), the washers are produced according to ISO 7090. They are made of carbon steel or stainless steel.

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

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,
- 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

The connector 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[2].

It is the responsibility of the ETA holder to ensure that all necessary information on design and installation is submitted to those responsible for design and execution of the works constructed with the connector MEGANT.

Design

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

[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.

The following conditions shall be observed:

- Design of connections with the connector 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.
- The connector MEGANT is installed correctly.
- It shall be checked in accordance with EN 1995-1-1 that splitting will not occur.

Design of connections with connectors 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 in accordance with Eurocode 2, 3, 5 or 9 and Annex 5.

Packaging, transport and storage

The connector MEGANT shall be protected during transport and storage against any damage and detrimental moisture effects.

Installation of connectors in wood to wood connections

The manufacturer shall prepare installation instructions in which the product-specific characteristics and the most important measures to be taken into consideration for installation are described. The installation instructions shall be available at every construction site and shall be deposited at Österreichisches Institut für Bautechnik.

Installation shall be carried out by appropriately qualified personnel under the supervision of the person responsible for technical matters on site.

The connector MEGANT shall be screwed as specified in Annex 2. In hardwood connections the screws shall be driven in predrilled holes with diameter 6 mm.

The structural members which are connected with the connector 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;
- The timber members shall have plane surfaces against the connector;
- There is virtually no gap between the timber members;
- Minimum spacing, end and edge distances are in accordance with EN 1995-1-1 or European Technical Assessment.

Installation of the connectors in wood to steel or concrete connections

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

The following conditions shall be observed:

- The connector shall be close in contact with the steel or concrete over the whole face.
- The fastener shall have a diameter not less than the hole diameter minus 2 mm.

Use, maintenance and repair

The assessment of the product is based on the assumption that maintenance is not required during the assumed intended working life.

In case of a severe damage of a connection with connector MEGANT, actions regarding the mechanical resistance and stability of the works shall be initiated. Repair is in general done by replacement.

2.3 Assumed working life

The provisions made in the European Technical Assessment (ETA) are based on an assumed intended working life of the construction product 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[3].

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 and performances of the product

№	Essential characteristic	Product performance
Basic Requirement 1: Mechanical resistance and stability [1)]		
1	Characteristic load bearing capacity	3.1.1
2	Stiffness	3.1.2
–	Ductility in cyclic testing	No performance assessed.
Basic Requirement 2: Safety in case of fire		
3	Reaction to fire	3.1.3
4	Resistance to fire	No performance assessed.
Basic Requirement 3: Hygiene, health and the environment		
5	Content, emission and/or release of dangerous substances	3.1.4
Basic Requirement 4: Safety and accessibility in use		
6	Same as BR 1	
Basic Requirement 5: Protection against noise		
–	Not relevant. No characteristic assessed.	
Basic Requirement 6: Energy economy and heat retention		
–	Not relevant. No characteristic assessed.	
Basic Requirement 7: Sustainable use of natural resources		
–	No characteristic assessed.	

[3] 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.

General aspects		
7	Resistance to corrosion and deterioration	3.1.5
8	Dimensional stability	3.1.6
[1)] These characteristics also relate to BR 4.		

3.1.1 Characteristic load bearing capacity

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, F_3 and F_{45}, as defined in Annex 4, are given in Annex 5.

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 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 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.

3.1.4 Content, emission and/or release of dangerous substances

The release of dangerous substances is determined according to Guideline for European Technical Approval ETAG 015 “Three-dimensional nailing plates”, Edition November 2012, used as European Assessment Document. No dangerous substances is the performance of the connector MEGANT in this respect. A manufacturer’s declaration to this effect has been submitted.

NOTE In addition to the specific clauses relating to dangerous substances contained in the 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.

3.1.5 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.

In accordance with ETAG 015 and EN 1995-1-1 the connector plates and clamping jaws are made of aluminium EN AW - 6005 or EN AW - 6082 according to EN 755-2. Threaded rods, hexagonal nuts and washers are made of carbon steel and galvanised or of stainless steel.

3.1.6 Dimensional stability

The effects of dimensional changes on the structural timber members being jointed due to varying moisture content was considered by the determination of the characteristic load bearing capacity and stiffness of the joints. Moisture content during service shall not change to such an extent that adverse deformation will occur. The conditions of Clause 2.2 shall be observed.

3.2 Assessment methods

3.2.1 General

The assessment of the connector MEGANT for the intended use in relation to the requirements for mechanical resistance and stability, for safety in case of fire, for hygiene, health and the environment and for safety and accessibility in use in the sense of the Basic Requirements 1, 2, 3 and 4 of Regulation (EU) № 305/2011 has been made in accordance with *Guideline for European Technical Approval ETAG № 015 "Three-dimensional nailing plates" used as European Assessment Document.*

3.2.2 Identification

The European Technical Assessment for the connector MEGANT is issued on the basis of agreed data, deposited with Österreichisches Institut für Bautechnik, which identifies the product that has been assessed. Changes to materials, to the composition or to characteristics of the product, or to the production process, which could result in this deposited data being incorrect, should be immediately notified to Österreichisches Institut für Bautechnik before the changes are introduced. Österreichisches Institut für Bautechnik will decide whether or not such changes affect the European Technical Assessment, and, if so, whether further assessment or alterations to the European Technical Assessment are considered 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 the MEGANT connector is System 2+. As laid down in the Commission Delegated Regulation (EU) № 568/2014 of 18 February 2014, Annex, 1.3, under System 2+ the manufacturer shall draw up the declaration of performance and determine the product-type on the basis of

(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[4].

[4] 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.

(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 AVCP for 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

At the manufacturing plant the manufacturer has implemented and continuously maintains a factory production control system. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. The factory production control system ensures that the performance of 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 prescribed test plan. The incoming raw materials shall be subject to controls and tests by the manufacturer before acceptance. Check of incoming materials shall include control of inspection documents (comparison with nominal values) presented by the manufacturer of the raw materials by verifying the dimensions and determining the material properties.

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 prescribed test 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 kept at least for ten years time after the construction product has been placed on the market and shall be presented to the notified factory production control certification body involved in continuous surveillance. On request they 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 ascertain that, in accordance with the prescribed test plan, the factory, in particular personnel and equipment, and the factory production control, are suitable to ensure a continuously and orderly manufacturing of the connector MEGANT with the specifications given in the specific parts as well as in the Annexes of the European Technical Assessment.

5.2.2 Continuing surveillance, assessment and evaluation of factory production control

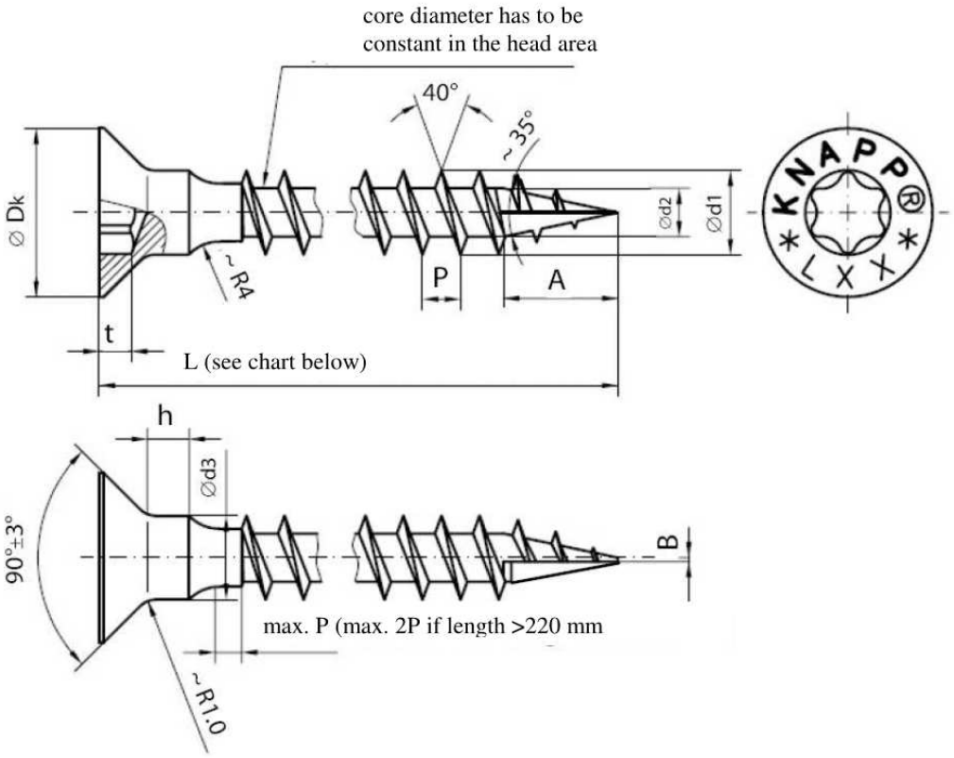
The notified factory production control certification body shall visit the factory at least once a year for routine inspection. It shall be verified that the system of factory production control and the specified manufacturing process are maintained, taking account of the prescribed test plan. On demand the results of continuing surveillance shall be made available by the notified factory production control certification body to Österreichisches Institut für Bautechnik. When the provisions of the European Technical Assessment and the prescribed test plan are no longer fulfilled, the certificate of conformity of the factory production control shall be withdrawn by the notified factory production control certification body.

Issued in Vienna on 20.11.2015
by Österreichisches Institut für Bautechnik

The original document is signed by:

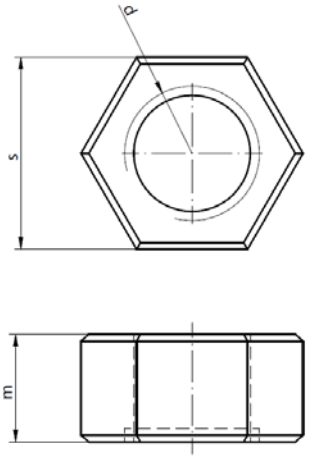
Rainer Mikulits

Managing Director

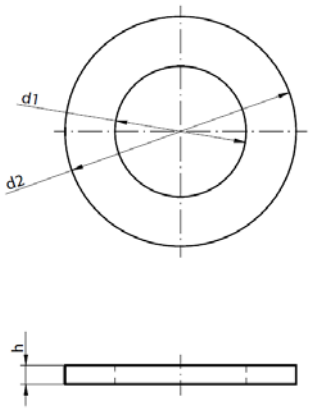


Self-tapping screw 8 x L mm	
E-Modulus	210 000 N/mm²
Min. char. tensile strength $f_{tens,k}$	20 kN
Min. char. yield moment $M_{y,k}$	20 Nm
Min. char. torsional strength $f_{tor,k}$	23 Nm
Head diameter D_k	15 mm
Outer thread diameter d_1	8 mm
Inner thread diameter d_2	5.1 mm
Length L	80 - 240 mm

MEGANT®	Annex 1
Fastener specification – self-tapping screw	of European Technical Assessment ETA-15/0667 of 20.11.2015

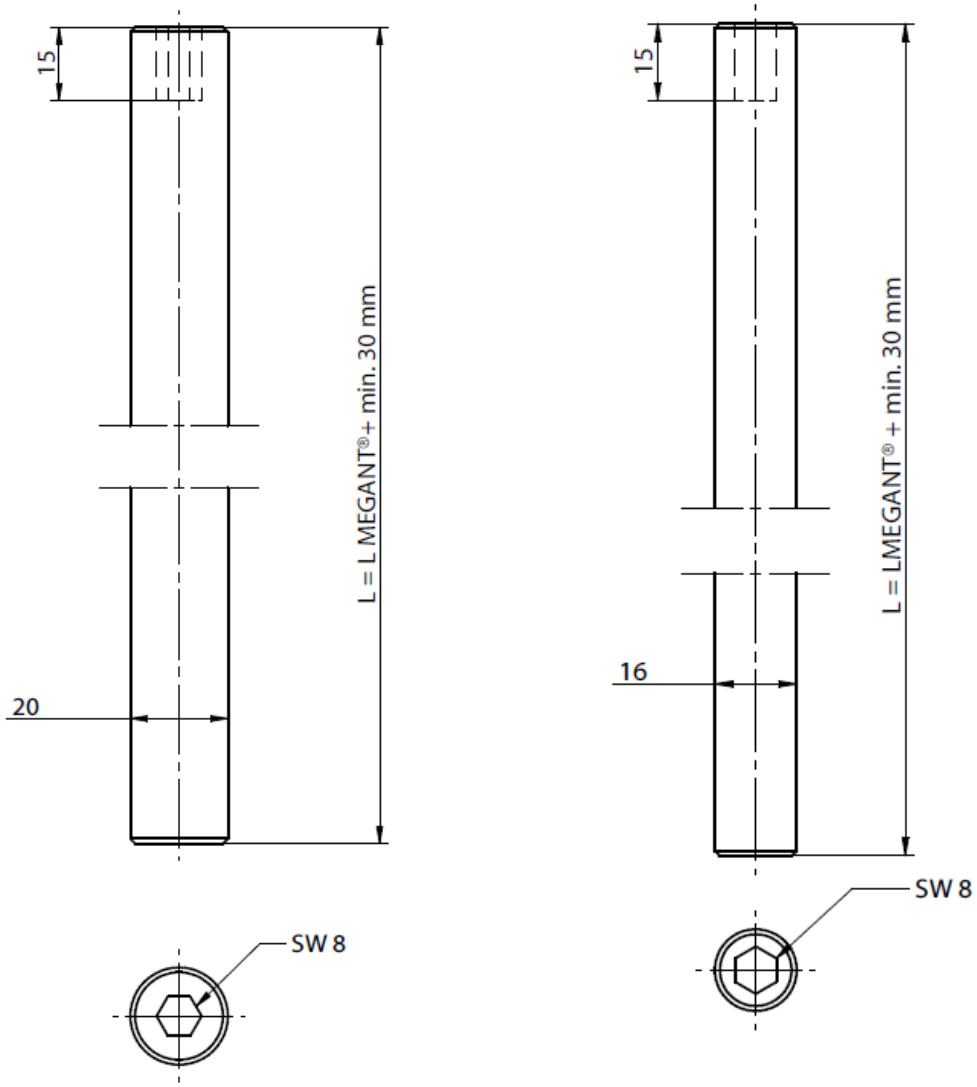


Hexagonal nut	Diameter d	Width across flat s	Thickness m
-	mm	mm	mm
M8	8	13	6.5
M10	10	17	8
M16	16	24	13
M20	20	30	16



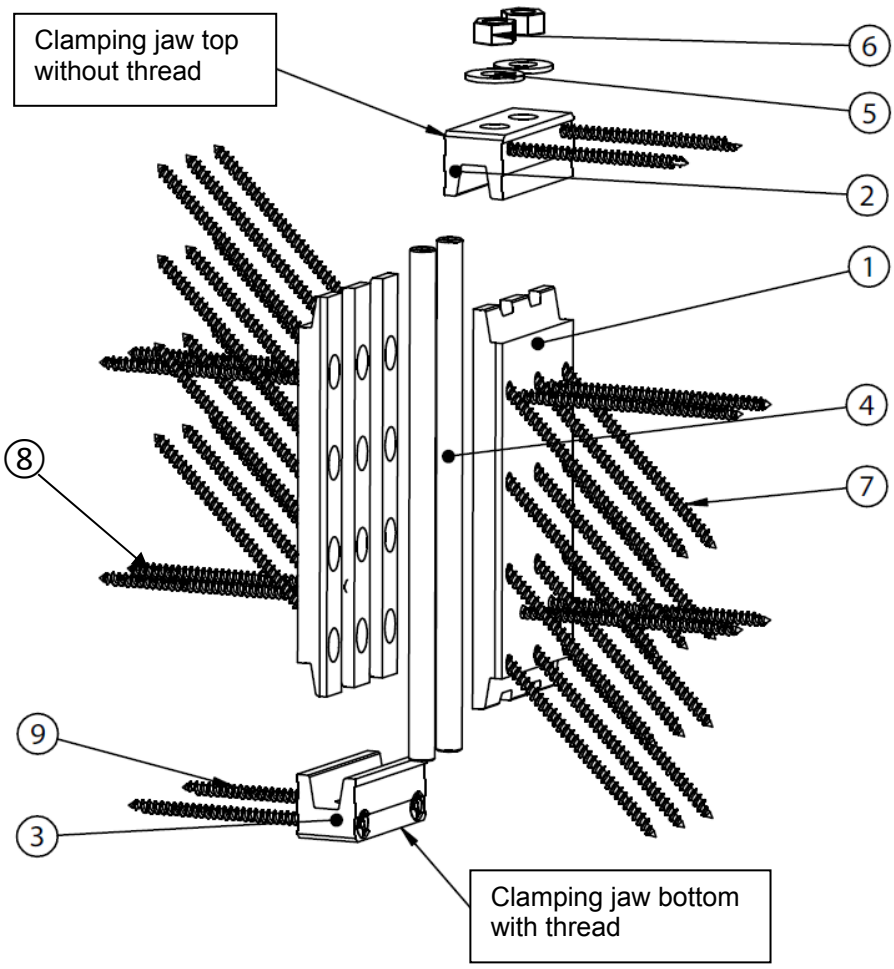
Washer	Inner diameter d_1	Outer diameter d_2	Thickness m
-	mm	mm	mm
M8	8.4	16	1.6
M10	10.5	20	2
M16	17	30	3
M20	21	37	3

MEGANT®	Annex 1
Fastener specification – hexagonal nut and washer	of European Technical Assessment ETA-15/0667 of 20.11.2015



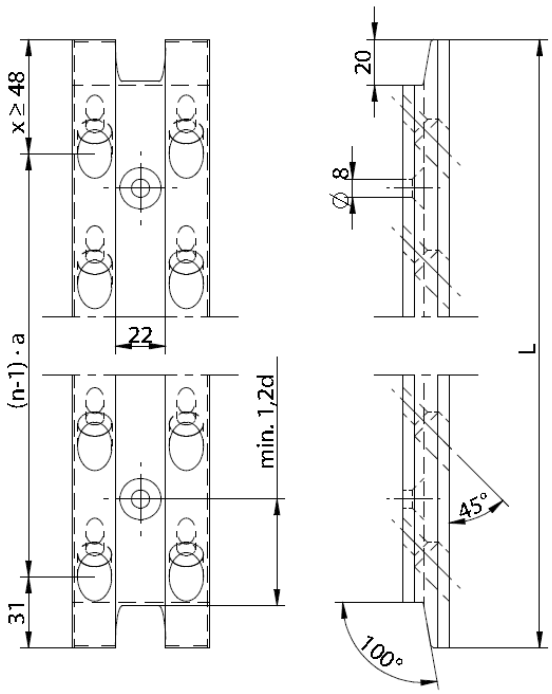
dimensions in mm

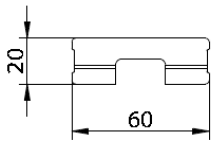
MEGANT®	Annex 1
Fastener specification – threaded rod M16 and M20	of European Technical Assessment ETA-15/0667 of 20.11.2015



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 of European Technical Assessment ETA-15/0667 of 20.11.2015
Product details definitions: assembling of the connector	





$$L = 31 + (n-1) \cdot a + x$$

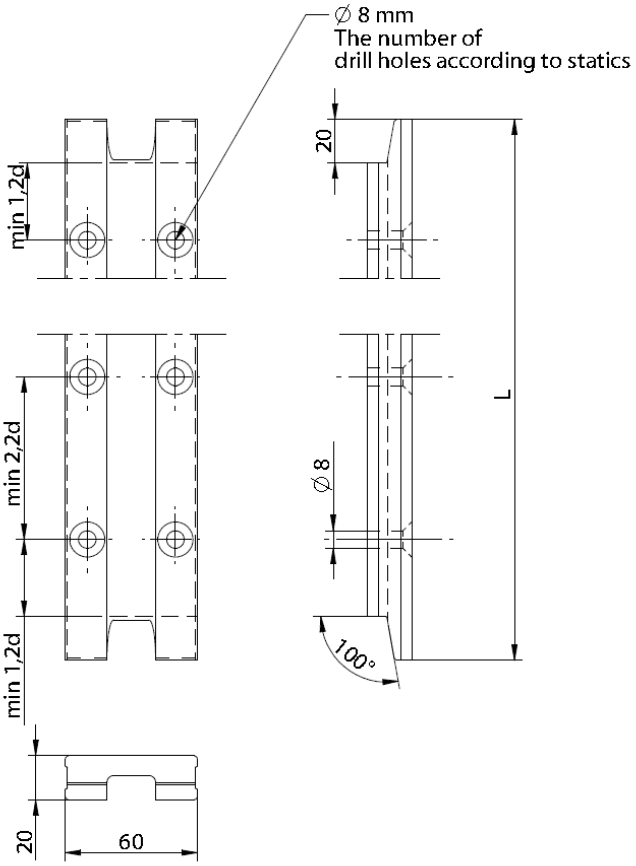
$$a = 5d \cdot \sqrt{2} \ldots \text{for KNAPP screws}$$

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

MEGANT® Dimension L/B/H	Number of screws in connector plate (joist and header J/H)		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
290x60x40	2	8	2	1x M20x320
405x60x40	2	12	2	1x M20x435-465
520x60x40	2	16	2	1x M20x550-580

dimensions in mm

MEGANT® 60	Annex 2
Connector plate for wood Material: EN AW - 6005	of European Technical Assessment ETA-15/0667 of 20.11.2015

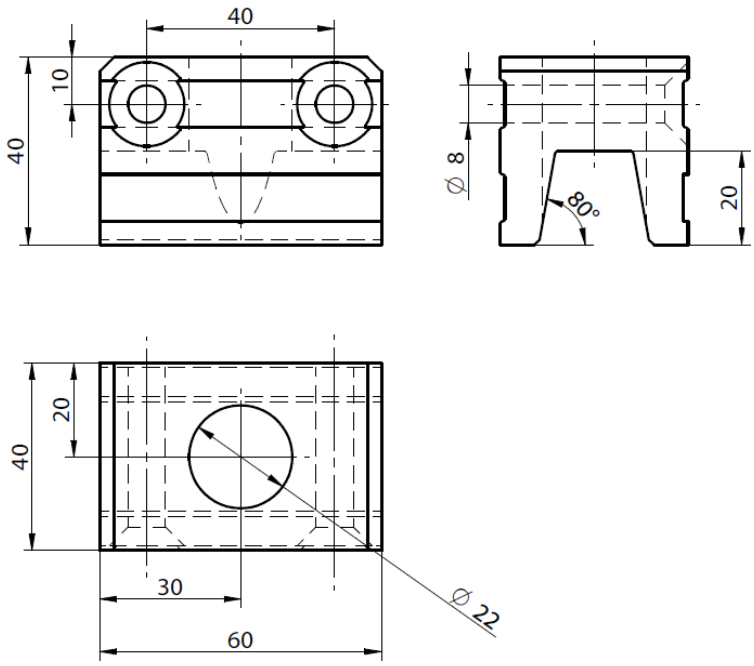


L according to the length of the connector to be mounted on the joist
Min. 2 x 3 and max. 2 x 6 countersunk holes with Ø 8 mm

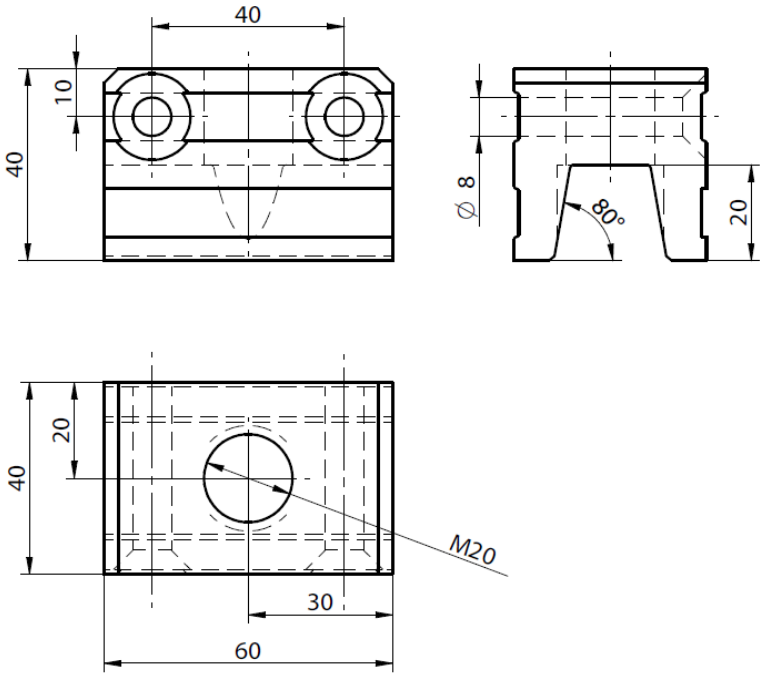
dimensions in mm

MEGANT® 60	Annex 2
Connector plate for steel Material: EN AW - 6005	of European Technical Assessment ETA-15/0667 of 20.11.2015

Clamping jaw top

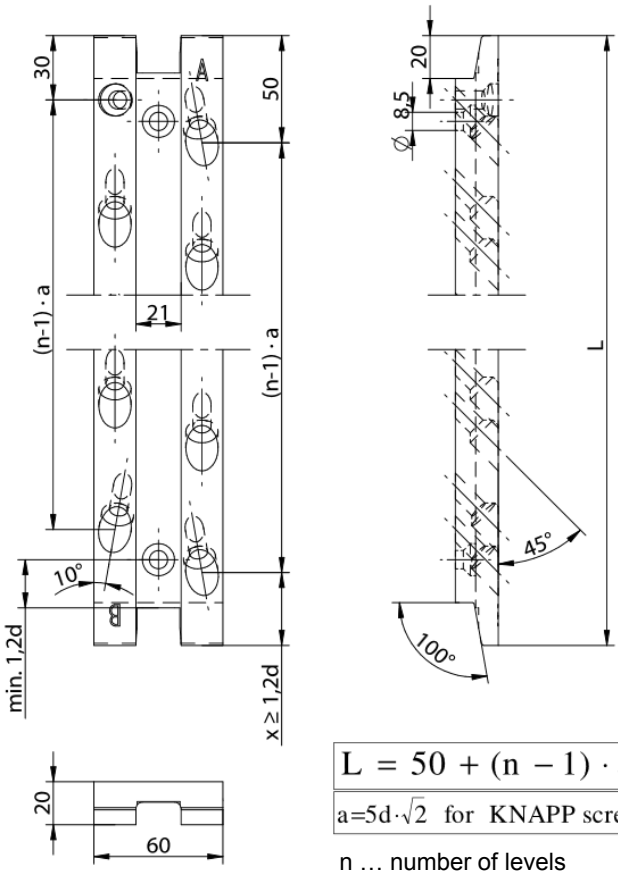


Clamping jaw bottom



dimensions in mm

MEGANT® 60	Annex 2
Clamping jaws Material: EN AW - 6005	of European Technical Assessment ETA-15/0667 of 20.11.2015



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

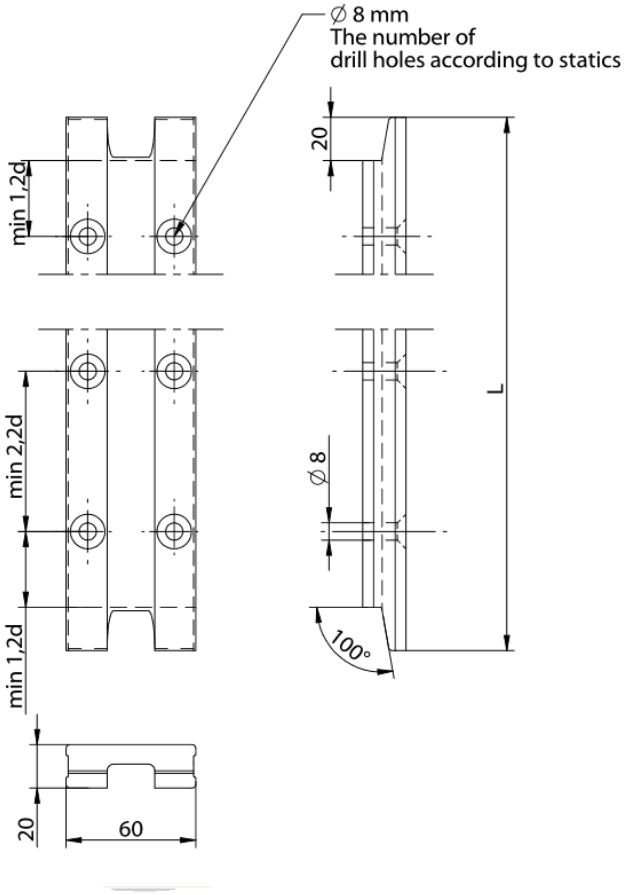
$$a = 5d \cdot \sqrt{2} \quad \text{for KNAPP screws}$$

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

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
430x60x40	3	11	2	1x M20x460
550x60x40	3	15	2	1x M20x580

dimensions in mm

MEGANT® 60	Annex 2
Connector plate for wood Material: EN AW - 6082	of European Technical Assessment ETA-15/0667 of 20.11.2015

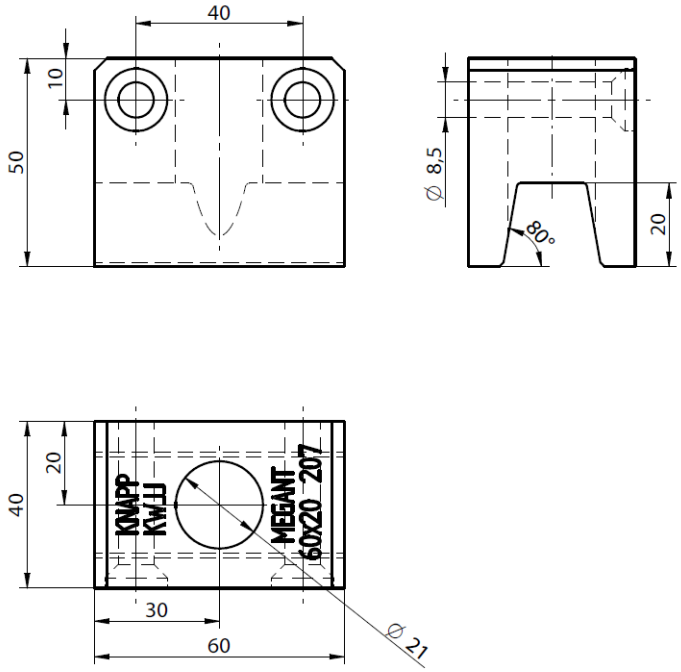


L according to the length of the connector to be mounted on the joist
Min. 2 x 3 and max. 2 x 6 countersunk holes with Ø 8 mm

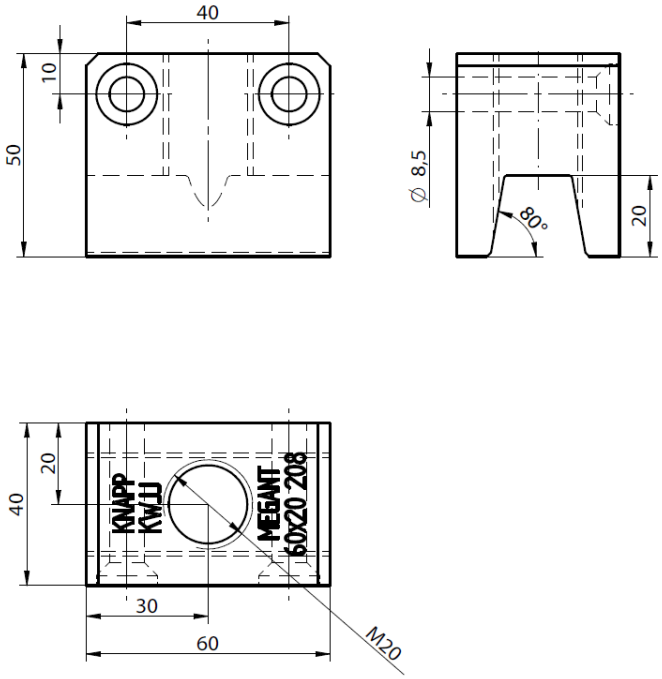
dimensions in mm

MEGANT® 60	Annex 2
Connector plate for steel Material: EN AW - 6082	of European Technical Assessment ETA-15/0667 of 20.11.2015

Clamping jaw top

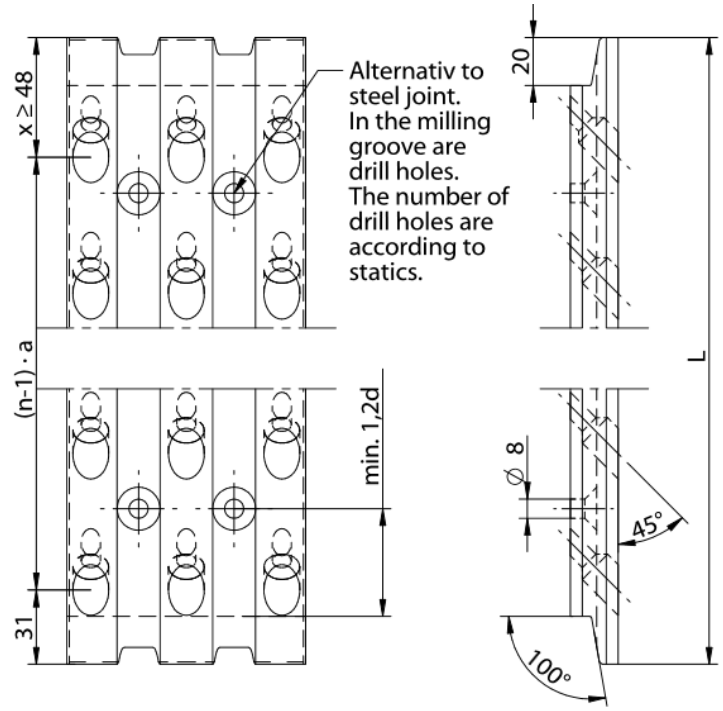


Clamping jaw bottom



dimensions in mm

MEGANT® 60	Annex 2
Clamping jaws Material: EN AW - 6082	of European Technical Assessment ETA-15/0667 of 20.11.2015



$$L = 31 + (n-1) \cdot a + x$$

$$a = 5\,d \cdot \sqrt{2} \ldots . \text{for KNAPP screws}$$

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

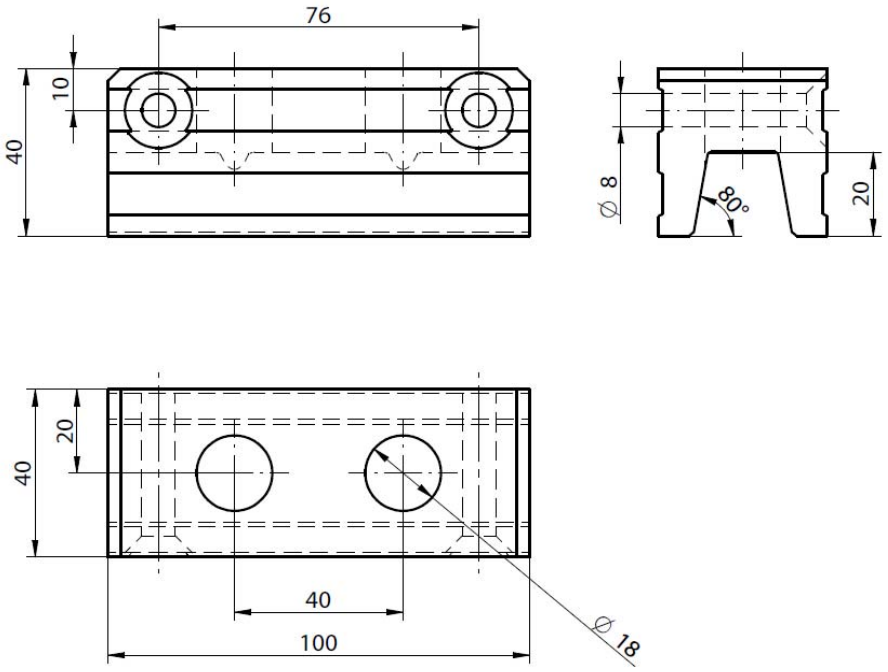
The connector plate for use in steel connections is provided with min. 2 x 4 and max. 2 x 8 countersunk holes with Ø 8 mm instead of the holes for the n_{90} screws in the area of the threaded rods.

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
290x100x40	4	12	2	2x M16x320
405x100x40	4	18	2	2x M16x435
520x100x40	4	24	2	2x M16x550

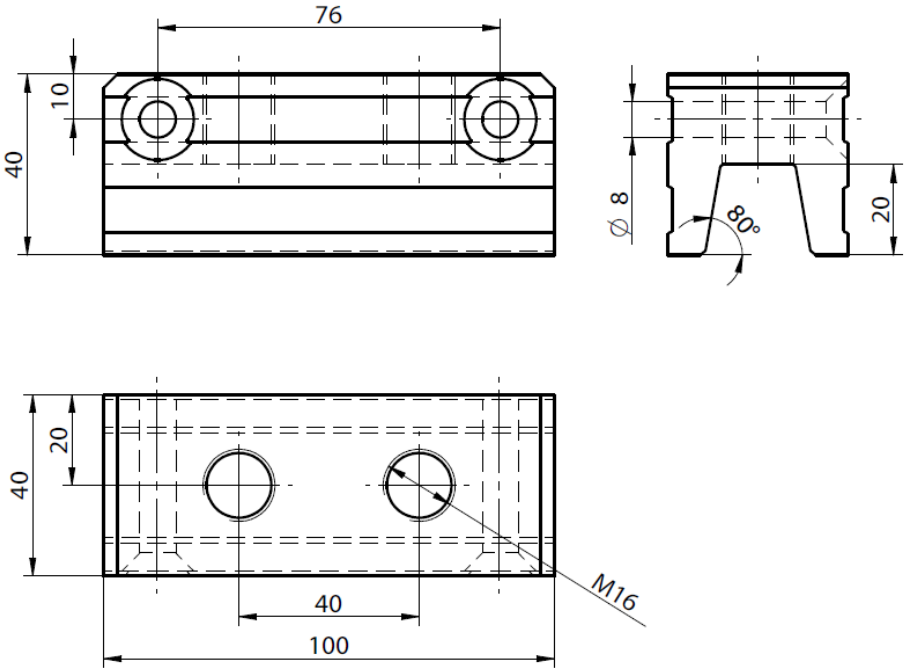
dimensions in mm

MEGANT® 100	Annex 2
Connector plate for wood/steel Material: EN AW - 6005	of European Technical Assessment ETA-15/0667 of 20.11.2015

Clamping jaw top

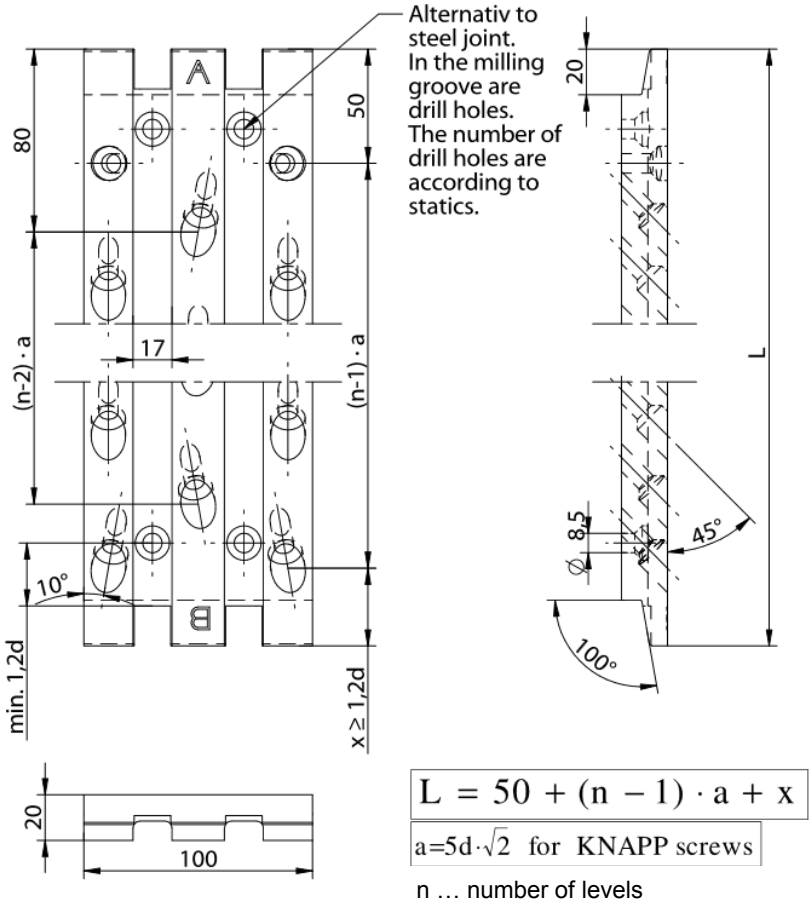


Clamping jaw bottom



dimensions in mm

MEGANT® 100	Annex 2
Clamping jaws Material: EN AW - 6005	of European Technical Assessment ETA-15/0667 of 20.11.2015



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

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

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

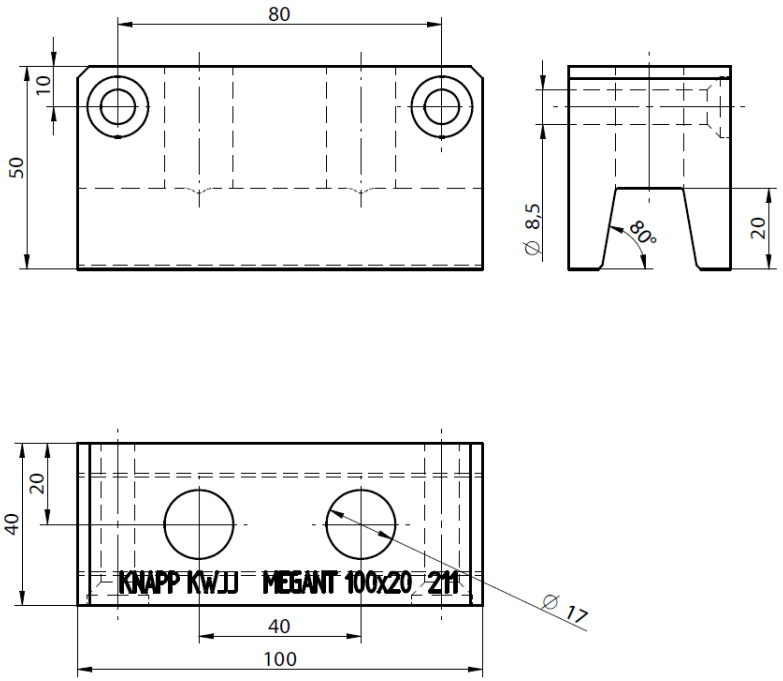
The connector plate for use in steel connections is provided with min. 2 x 4 and max. 2 x 8 countersunk holes with Ø 8 mm instead of the holes for the n_{90} screws in the area of the threaded rods.

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
430x100x40	6	15	2	2x M16x460
550x100x40	6	21	2	2x M16x580

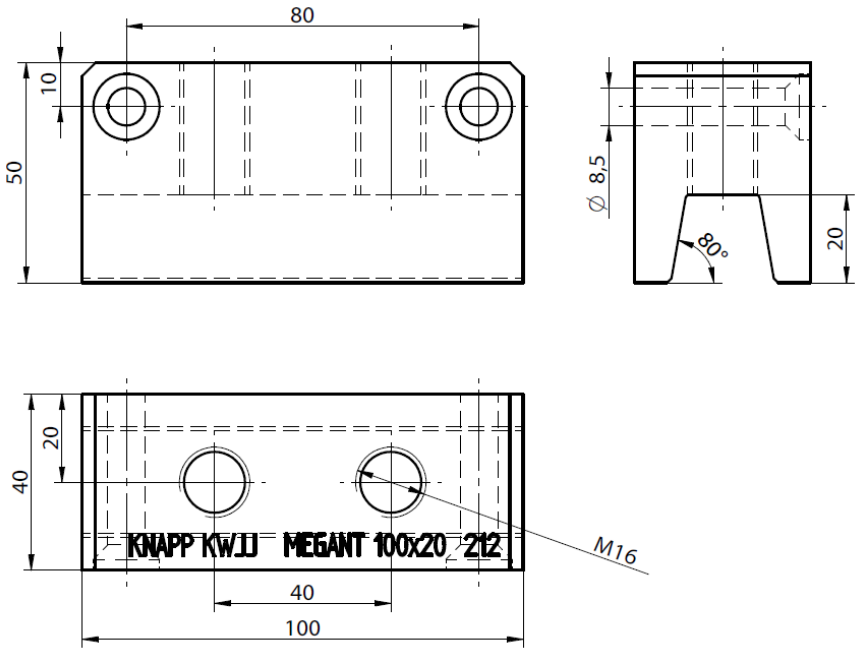
dimensions in mm

MEGANT® 100	Annex 2
Connector plate for wood Material: EN AW - 6082	of European Technical Assessment ETA-15/0667 of 20.11.2015

Clamping jaw top

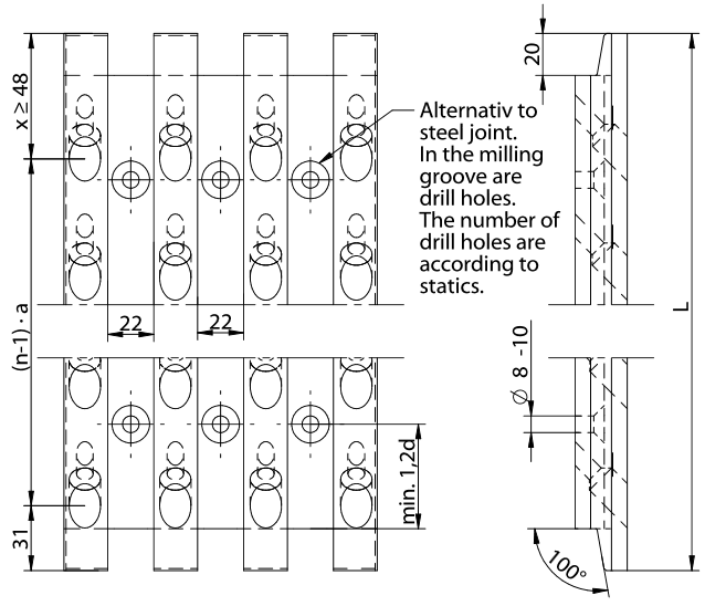


Clamping jaw bottom



dimensions in mm

MEGANT® 100	Annex 2
Clamping jaws Material: EN AW - 6082	of European Technical Assessment ETA-15/0667 of 20.11.2015



$$L = 31 + (n-1) \cdot a + x$$

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

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

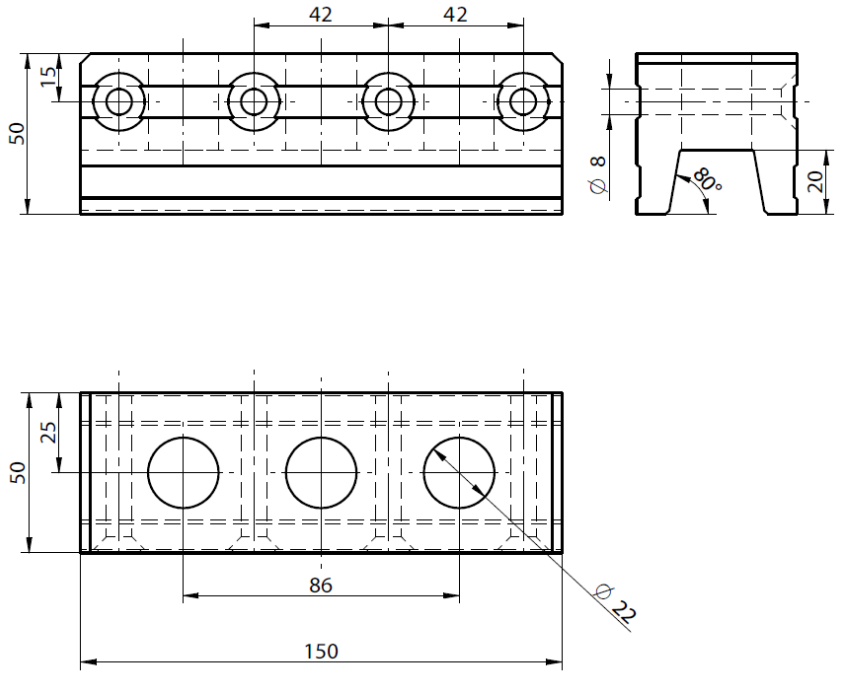
The connector plate for use in steel connections is provided with min. 3 x 2 and max. 3 x 5 countersunk holes with Ø 10 mm instead of the holes for the n_{90} screws in the area of the threaded rods.

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
280x150x50	6	12	4	1-2 x M20x320
430x150x50	6	24	4	2-3 x M20x460
550x150x50	6	32	4	2-3 x M20x580
600x150x50	6	36	4	3x M20x640
660x150x50	6	40	4	3x M20x700
720x150x50	6	44	4	3x M20x760
780x150x50	6	48	4	3x M20x820
830-1060x150x50	9	52	4	3x M20x890-1120
1120x150x50	9	52	4	3x M20x1180

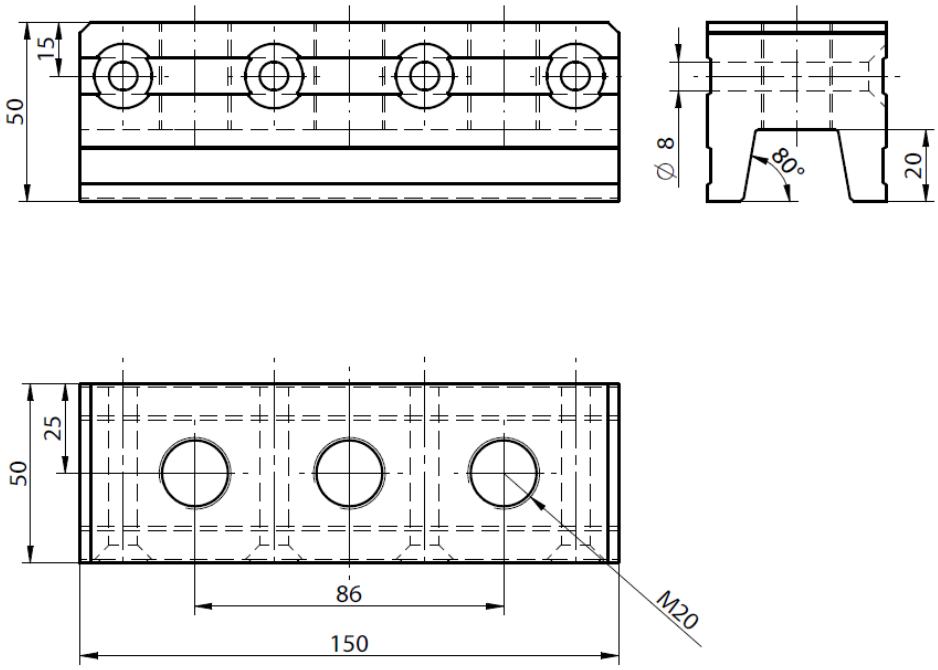
dimensions in mm

MEGANT® 150	Annex 2
Connector plate for wood Material: EN AW - 6005	of European Technical Assessment ETA-15/0667 of 20.11.2015

Clamping jaw top

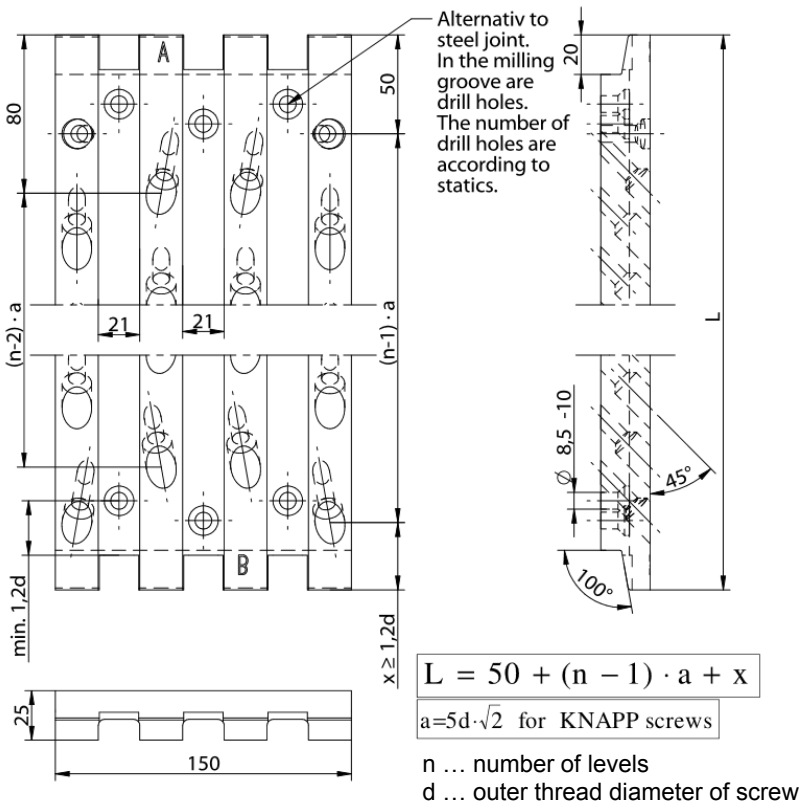


Clamping jaw bottom



dimensions in mm

MEGANT® 150	Annex 2
Clamping jaws Material: EN AW - 6005	of European Technical Assessment ETA-15/0667 of 20.11.2015



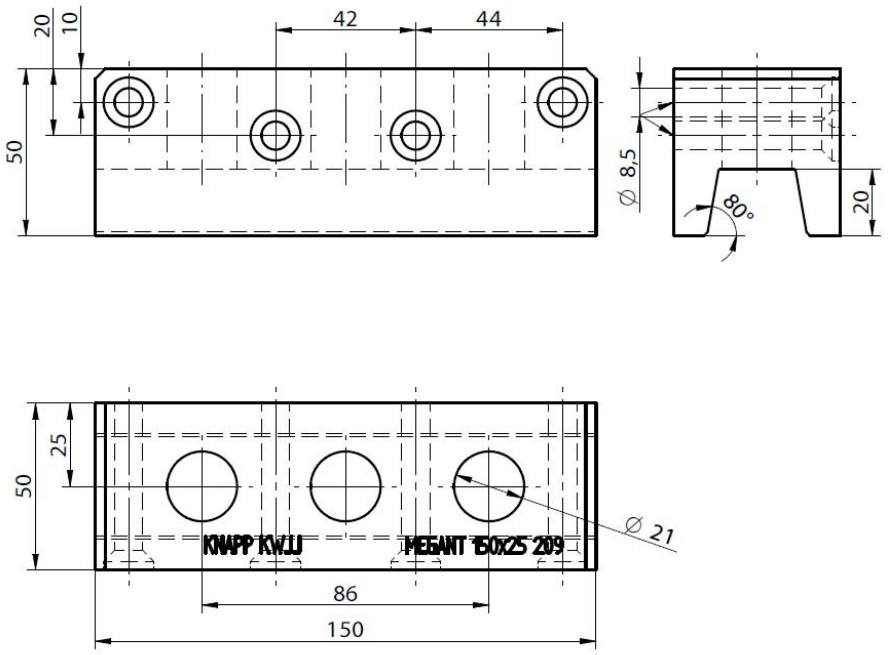
The connector plate for use in steel connections is provided with min. 3 x 2 and max. 3 x 6 countersunk holes with Ø 10 mm instead of the holes for the n_{90} screws in the area of the threaded rods.

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
310x150x50	8	12	4	1-2 x M20x340
430x150x50	8	20	4	2-3 x M20x460
550x150x50	8	28	4	3x M20x580
610x150x50	8	32	4	3x M20x640
670x150x50	8	36	4	3x M20x700
730x150x50	8	40	4	3x M20x760
790x150x50	8	44	4	3x M20x820
850-1030x150x50	11	48	4	3x M20x910-1090
1090x150x50	11	52	4	3x M20x1150

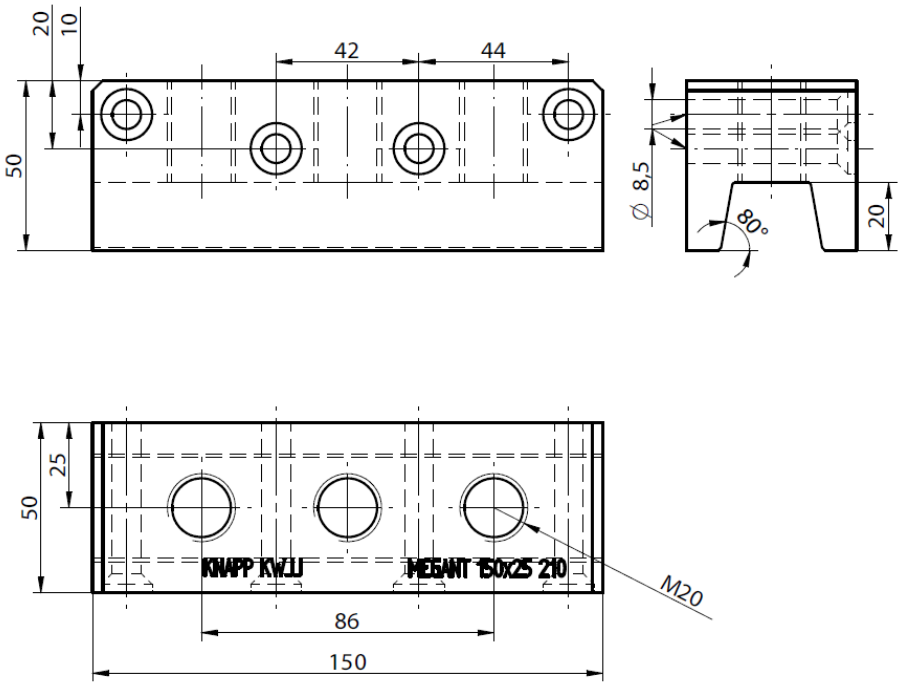
dimensions in mm

MEGANT® 150	Annex 2
Connector plate for wood Material: EN AW - 6082	of European Technical Assessment ETA-15/0667 of 20.11.2015

Clamping jaw top



Clamping jaw bottom



dimensions in mm

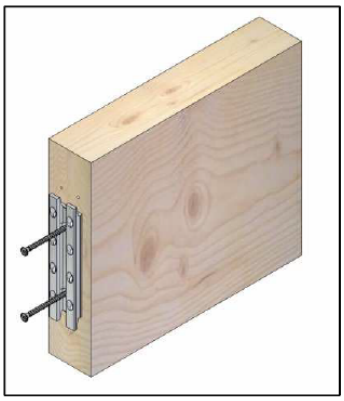
MEGANT® 150	Annex 2
Product details definitions: clamping jaw	of European Technical Assessment ETA-15/0667 of 20.11.2015

Header 1: positioning screws

Header 2: 45° screws

Header 3: bottom clamoping jaw

Header 4: finished

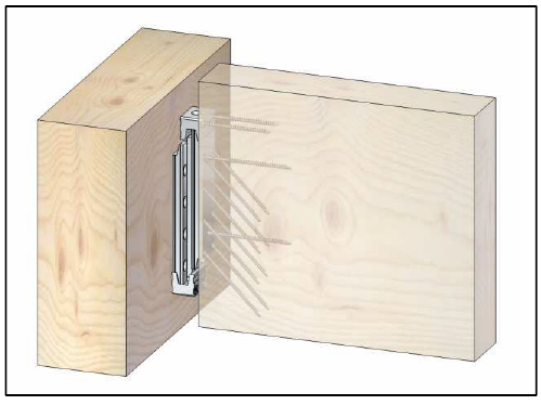


Joist 1: positioning screws

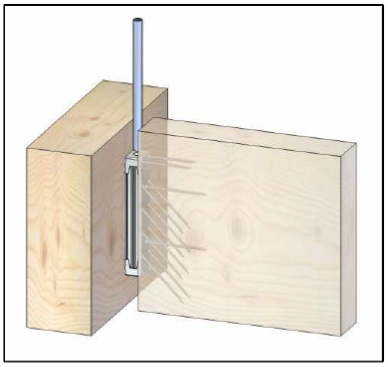
Joist 2: 45° screws

Joist 3: finished with top clamping jaw

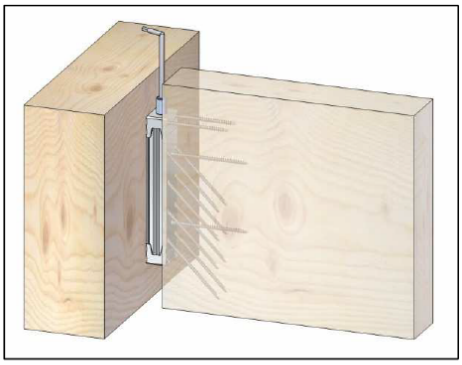
MEGANT®	Annex 3
The typical installation of the connectors Assembling from the top	of European Technical Assessment ETA-15/0667 of 20.11.2015



Header with joist 1: hang in joist

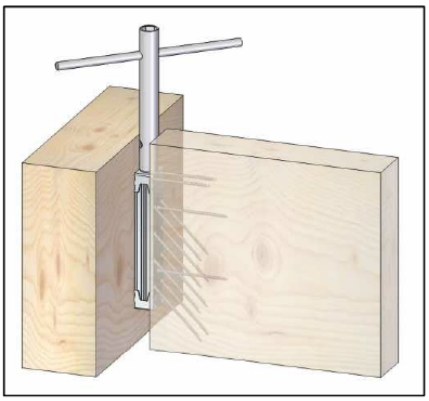


Header with joist 2: threaded rod



Header with joist 3: screw in threaded rod

Header with joist 4: washer and hex nut

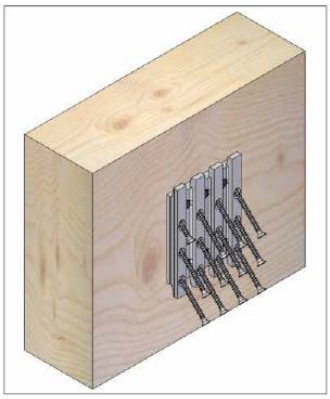


Header with joist 5: tighten hex nut

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 20.11.2015

Header 1: positioning screws



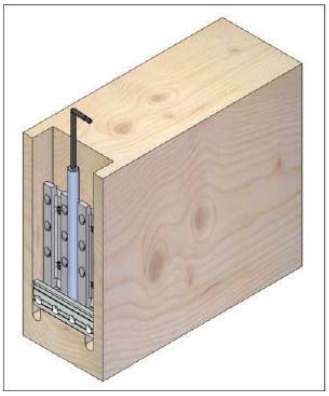
Header 2: 45° screws

Header 3: finished

Joist 1: bottom clamoping jaw in milling groove

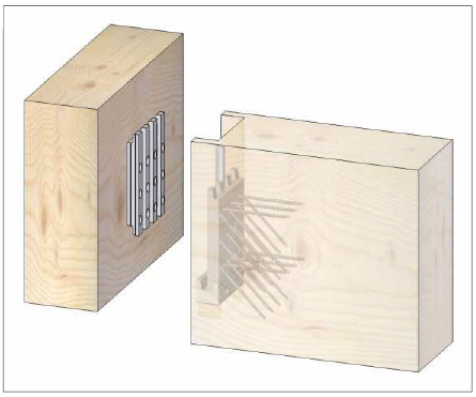
Joist 2: positioning screws

Joist 3: 45° screws

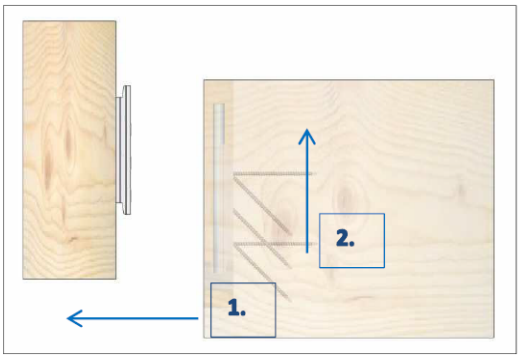


Joist 4: screw in threaded rod

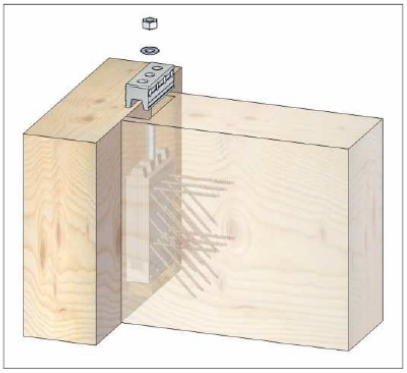
MEGANT®	Annex 3
The typical installation of the connectors Assembling from the bottom	of European Technical Assessment ETA-15/0667 of 20.11.2015



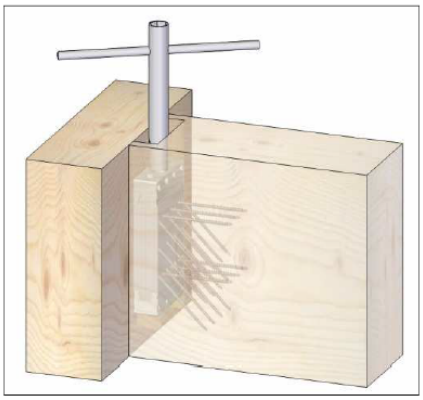
Header with joist 1: hang in joist



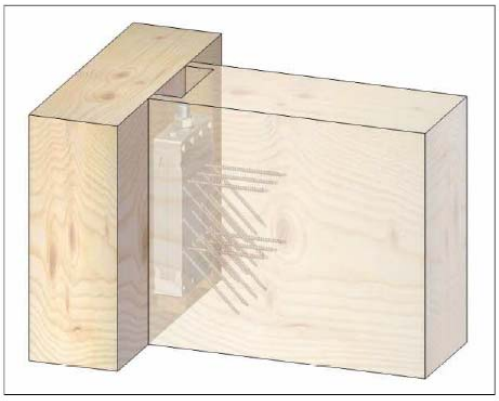
Header with joist 2: hang in joist from below



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

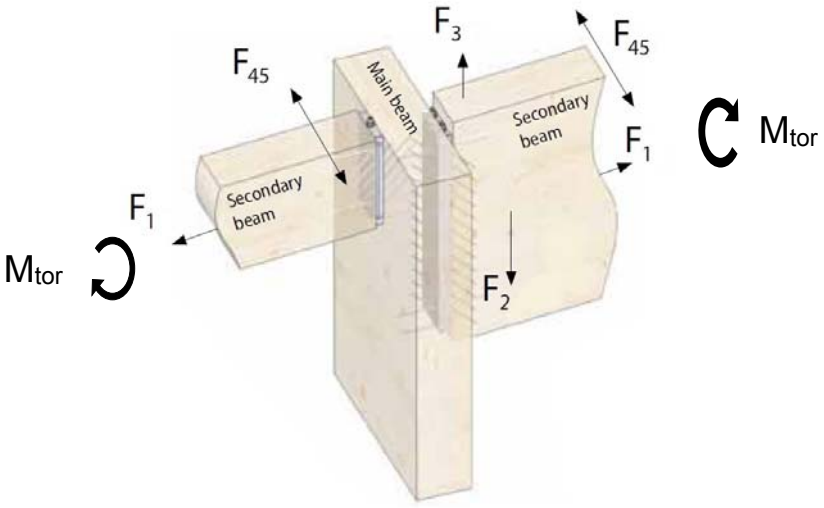


Header with joist 4: tighten hex nut



Header with joist 5: connection finished

MEGANT®	Annex 3
The typical installation of the connectors Assembling from the bottom	of European Technical Assessment ETA-15/0667 of 20.11.2015



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,

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.

MEGANT®	Annex 4
Definition of forces and their directions	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 60 – Material: EN AW - 6005									
Dimensions L/B/H	Softwood material	Characteristic load bearing capacity in softwood with screws 8 x 160 mm							
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm
290x60x40	C24	36.6	31.4	111.4 [1)] 97.6 · f_{R2} [2)]	100.7	27.5	36.9	36.6	2.5
	GL24h		33.6		107.5	31.0		38.2	2.7
405x60x40	C24		31.4		151.0	36.6	40.6	54.9	5.4
	GL24h		33.6		161.2	40.5		57.2	5.8
520x60x40	C24		31.4		201.3	45.8	44.3	73.2	9.6
	GL24h		33.6		215.0	50.1		76.3	10.2
MEGANT series 60 – Material: EN AW - 6082									
Dimensions L/B/H	Softwood material	Characteristic load bearing capacity in softwood with screws 8 x 160 mm							
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm
310x60x40	C24	36.6	35.4	150.4 [1)] 130.1 · f_{R2} [2)]	88.1	29.8	36.9	32.0	2.5
	GL24h		37.8		94.1	31.0		33.4	2.7
430x60x40	C24		35.4		138.4	38.9	40.6	50.4	5.5
	GL24h		37.8		147.8	40.5		52.5	5.8
550x60x40	C24		35.4		188.7	48.1	44.3	68.7	9.6
	GL24h		37.8		201.6	50.1		71.5	10.2

$F_{1,KCC,RK}$ / $F_{1,Rk}$	Characteristic load bearing capacity (steel failure/wood failure) in direction of secondary beam
$F_{2,KCC,RK}$ / $F_{2,Rk}$	Characteristic load bearing capacity (steel 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 (steel failure/wood failure) perpendicular to direction of insertion
M_{tor}	Characteristic rotation moment

[1)] $F_{2,KCC,Rk}$ for torsional fixed header
[2)] $F_{2,KCC,Rk} \cdot f_{R2}$ for not torsional fixed header

MEGANT®	Annex 5
Characteristic load-bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 100 – Material: EN AW - 6005									
Dimensions L/B/H	Softwood material	Characteristic load bearing capacity in softwood with screws 8 x 160 mm							
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm
290x100x40	C24	55.3	50.1	187.3 [1)] 155.0 · f_{R2} [2)]	151.0	45.8	62.4	54.9	4.1
	GL24h		54.5		161.2	47.7		57.2	4.4
405x100x40	C24		50.1		226.5	59.5	68.6	82.4	8.6
	GL24h		54.5		241.9	62.0		85.9	9.2
520x100x40	C24		50.1		301.9	73.2	74.9	109.9	14.8
	GL24h		54.5		322.5	76.3		114.5	15.8
MEGANT series 100 – Material: EN AW - 6082									
Dimensions L/B/H	Softwood material	Characteristic load bearing capacity in softwood with screws 8 x 160 mm							
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm
310x100x40	C24	55.3	55.1	224.2 [1)] 206.6 · f_{R2} [2)]	113.2	48.1	62.4	41.2	4.2
	GL24h		58.8		120.9	50.1		42.9	4.4
430x100x40	C24		55.1		188.7	61.8	68.6	68.7	8.6
	GL24h		58.8		201.6	64.4		71.5	9.2
550x100x40	C24		55.1		261.2	75.5	74.9	96.1	14.9
	GL24h		58.8		261.2	78.7		100.2	15.9

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	$B_H \le 140$ $140 \le B_H \le 320$	$e \le 90$ $90 \le e \le 180$	$f_{R2} = 1,0$ $f_{R2} = (270-e)/180$
series 100	$B_H \le 140$ $140 \le B_H \le 360$	$e \le 90$ $90 \le e \le 200$	$f_{R2} = 1,0$ $f_{R2} = (310-e)/220$
series 150	$B_H \le 200$ $200 \le B_H \le 450$	$e \le 125$ $125 \le e \le 250$	$f_{R2} = 1,0$ $f_{R2} = (375-e)/250$

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

MEGANT®	Annex 5
Characteristic load-bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 150 – Material: EN AW - 6005									
Dimensions L/B/H	Softwood material	Characteristic load bearing capacity in softwood with screws 8 x 160 mm							
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm
280x150x50	C24	74.3	70.7	325.9 [1)] 299.6 · f_{R2} [2)]	146.4	54.9	68.0	54.9	3.9
	GL24h		75.6		156.4	57.2		57.2	4.2
430x150x50	C24		70.7		292.9	82.4	74.8	109.9	12.5
	GL24h		75.6		312.8	85.9		114.5	13.3
550x150x50	C24		70.7		390.5	100.7	81.6	146.5	20.9
	GL24h		75.6		417.0	104.9		152.6	22.3
600x150x50	C24		70.7		439.3	100.7		146.5	20.9
	GL24h		75.6		469.2	104.9		152.6	22.3
660x150x50	C24		70.7		488.1	100.7		146.5	20.9
	GL24h		75.6		521.3	104.9		152.6	22.3
720x150x50	C24		70.7		536.9	100.7		146.5	20.9
	GL24h		75.6		573.4	104.9		152.6	22.3
780x150x50	C24		70.7		585.7	100.7		146.5	20.9
	GL24h		75.6		625.6	104.9		152.6	22.3
830x150x50 – 1120x150x50	C24		70.7		634.6	100.7		146.5	20.9
	GL24h		75.6		677.7	104.9		152.6	22.3

MEGANT®	Annex 5
Characteristic load-bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 150 – Material: EN AW - 6082									
Dimensions L/B/H	Softwood material	Characteristic load bearing capacity in softwood with screws 8 x 160 mm							
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm
310x150x50	C24	74.3	74.6	375.0 [1)] 366.5 · f_{R2} [2)]	146.4	64.1	68.0	54.9	3.9
	GL24h		79.7		156.4	66.8		57.2	4.2
430x150x50	C24		74.6		244.1	82.4	74.8	91.6	12.5
	GL24h		79.7		260.7	85.9		95.4	13.3
550x150x50	C24		74.6		341.7	100.7	81.6	128.2	20.9
	GL24h		79.7		364.9	104.9		133.6	22.3
610x150x50	C24		74.6		390.5	100.7		128.2	20.9
	GL24h		79.7		417.0	104.9		133.6	22.3
670x150x50	C24		74.6		439.3	100.7		128.2	20.9
	GL24h		79.7		469.2	104.9		133.6	22.3
730x150x50	C24		74.6		488.1	100.7		128.2	20.9
	GL24h		79.7		521.3	104.9		133.6	22.3
790x150x50	C24		74.6		536.9	100.7		128.2	20.9
	GL24h		79.7		573.4	104.9		133.6	22.3
850x150x50 – 1030x150x50	C24		74.6		585.7	100.7		128.2	20.9
	GL24h		79.7		625.6	104.9		133.6	22.3
1090x150x50	C24		74.6		634.6	100.7		128.2	20.9
	GL24h		79.7		677.7	104.9		133.6	22.3

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 60, 100, and 150 – Material: EN AW - 6005					
Megant series: dimension L	Softwood material	Slip modulus in softwood with screws 8 x 160 mm			
		$K_{1,ser}$	$K_{2,ser}$ [3)]	$K_{2,ser}$ [4)]	$K_{4,ser}$
mm	-	kN/mm	kN/mm	kN/mm	kN/mm
series 60: 290, 405, 520	C24	6.7	34.2	48.3	6.2
	GL24h	7.2	36.5	51.6	6.6
series 100: 290, 405, 520	C24	12.4	54.1	94.2	8.4
	GL24h	13.2	57.8	100.6	9.0
series 150: 280, 430, 550-1120	C24	19.7	73.1	63.5	12.3
	GL24h	21.0	78.1	67.8	13.1
MEGANT series 60, 100, and 150 – Material: EN AW - 6082					
Megant series: dimension L	Softwood material	Slip modulus in softwood with screws 8 x 160 mm			
		$K_{1,ser}$	$K_{2,ser}$ [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	37.3	30.6	6.2
	GL24h	7.2	39.8	32.7	6.6
series 100: 310, 430, 550	C24	12.4	53.6	45.5	8.4
	GL24h	13.2	57.2	48.6	9.0
series 150: 310, 430, 550-1090	C24	19.7	82.6	68.2	12.3
	GL24h	21.0	88.2	72.8	13.1

K_{ser} is given for a characteristic density of 380 kg/m³. For deviating densities K_{ser} may be adapted by the factor k_{dens}

$$k_{dens} = (\rho_k / 380)^{0.8}$$

Where

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

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

[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 20.11.2015

MEGANT series 60 – Material: EN AW - 6005					
Dimensions L/B/H	Softwood material	Torsion modulus in softwood with screws 8 x 160 mm			
		$M_{2,\varphi,Rk}$	$K_{2,\varphi,ser}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kNm	kNm/rad	kNm	kNm/rad
290x60x40	C24	2.1	211	2.5	200
	GL24h	2.3	225	2.7	227
405x60x40	C24	3.1	449	5.4	639
	GL24h	3.3	480	5.8	723
520x60x40	C24	4.1	777	9.6	1 569
	GL24h	4.4	829	10.2	1 775
MEGANT series 60 – Material: EN AW - 6082					
Dimensions L/B/H	Softwood material	Torsion modulus in softwood with screws 8 x 160 mm			
		$M_{2,\varphi,Rk}$	$K_{2,\varphi,ser}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kNm	kNm/rad	kNm	kNm/rad
310x60x40	C24	2.1	211	2.5	200
	GL24h	2.3	225	2.7	227
430x60x40	C24	3.2	461	5.5	639
	GL24h	3.4	493	5.8	723
550x60x40	C24	4.2	809	9.6	1 569
	GL24h	4.5	864	10.2	1 775

$M_{2,\varphi,Rk}$, $K_{2,\varphi,ser}$, $M_{tor,Rk}$ and $K_{tor,ser}$ are given for a characteristic density of 380 kg/m^3. For deviating densities $M_{2,\varphi,Rk}$, $K_{2,\varphi,ser}$, $M_{tor,Rk}$ and $K_{tor,ser}$ may be adapted by the factor k_{dens}

$$k_{dens} = (\rho_k / 380)^{0.8}$$

Where

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

ρ_k ..... Characteristic density of timber in kg/m^3

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 100 – Material: EN AW - 6005					
Dimensions L/B/H	Softwood material	Torsion modulus in softwood with screws 8 x 160 mm			
		$M_{2,\varphi,Rk}$	$K_{2,\varphi,ser}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kNm	kNm/rad	kNm	kNm/rad
290x100x40	C24	3.2	386	4.1	346
	GL24h	3.5	413	4.4	391
405x100x40	C24	4.7	823	8.6	1 066
	GL24h	5.1	879	9.2	1 206
520x100x40	C24	6.2	1 424	14.8	2 443
	GL24h	6.6	1 521	15.8	2 764
MEGANT series 100 – Material: EN AW - 6082					
Dimensions L/B/H	Softwood material	Torsion modulus in softwood with screws 8 x 160 mm			
		$M_{2,\varphi,Rk}$	$K_{2,\varphi,ser}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kNm	kNm/rad	kNm	kNm/rad
310x100x40	C24	3.3	387	4.2	346
	GL24h	3.5	413	4.4	391
430x100x40	C24	4.8	846	8.6	1 066
	GL24h	5.1	904	9.2	1 206
550x100x40	C24	6.4	1 484	14.9	2 443
	GL24h	6.8	1 585	15.9	2 764

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 150 – Material: EN AW - 6005					
Dimensions L/B/H	Softwood material	Torsion modulus in softwood with screws 8 x 160 mm			
		$M_{2,\varphi,Rk}$	$K_{2,\varphi,ser}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kNm	kNm/rad	kNm	kNm/rad
280x150x50	C24	3.8	476	3.9	304
	GL24h	4.1	508	4.2	344
430x150x50	C24	6.4	1 346	12.5	1 594
	GL24h	6.9	1 437	13.3	1 803
550x150x50	C24	8.5	2 361	20.9	3 488
	GL24h	9.1	2 521	22.3	3 946
600x150x50	C24	9.4	2 867	20.9	3 488
	GL24h	10.0	3 062	22.3	3 946
660x150x50	C24	10.4	3 539	20.9	3 488
	GL24h	11.1	3 780	22.3	3 946
720x150x50	C24	11.5	4 283	20.9	3 488
	GL24h	12.3	4 574	22.3	3 946
780x150x50	C24	12.5	5 097	20.9	3 488
	GL24h	13.4	5 443	22.3	3 946
830x150x50	C24	13.4	5 829	20.9	3 488
	GL24h	14.3	6 225	22.3	3 946
890x150x50	C24	14.4	6 773	20.9	3 488
	GL24h	15.4	7 233	22.3	3 946
950x150x50	C24	15.5	7 787	20.9	3 488
	GL24h	16.5	8 317	22.3	3 946
1000x150x50	C24	16.3	8 687	20.9	3 488
	GL24h	17.5	9 278	22.3	3 946
1060x150x50	C24	17.4	9 831	20.9	3 488
	GL24h	18.6	10 500	22.3	3 946
1120x150x50	C24	18.4	11 047	20.9	3 488
	GL24h	19.7	11 798	22.3	3 946

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 150 – Material: EN AW - 6082					
Dimensions L/B/H	Softwood material	Torsion modulus in softwood with screws 8 x 160 mm			
		$M_{2,\varphi,Rk}$	$K_{2,\varphi,ser}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kNm	kNm/rad	kNm	kNm/rad
310x150x50	C24	4.3	614	3.9	304
	GL24h	4.6	656	4.2	344
430x150x50	C24	6.5	1 346	12.5	1 594
	GL24h	6.9	1 437	13.3	1 803
550x150x50	C24	8.5	2 360	20.9	3 488
	GL24h	9.1	2 521	22.3	3 946
610x150x50	C24	9.6	2 974	20.9	3 488
	GL24h	10.2	3 176	22.3	3 946
670x150x50	C24	10.6	3 658	20.9	3 488
	GL24h	11.3	3 907	22.3	3 946
730x150x50	C24	11.7	4 413	20.9	3 488
	GL24h	12.5	4 713	22.3	3 946
790x150x50	C24	12.7	5 239	20.9	3 488
	GL24h	13.6	5 595	22.3	3 946
850x150x50	C24	13.8	6 136	20.9	3 488
	GL24h	14.7	6 553	22.3	3 946
910x150x50	C24	14.8	7 103	20.9	3 488
	GL24h	15.8	7 586	22.3	3 946
970x150x50	C24	15.8	8 141	20.9	3 488
	GL24h	16.9	8 695	22.3	3 946
1030x150x50	C24	16.9	9 250	20.9	3 488
	GL24h	18.0	9 879	22.3	3 946
1090x150x50	C24	17.9	10 430	20.9	3 488
	GL24h	19.1	11 139	22.3	3 946

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 60 – Material: EN AW - 6005									
Dimensions L/B/H	Hardwood material	Characteristic load bearing capacity in hardwood with screws 8 x 120 mm							
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm
290x60x40	D30 / GL_H	36.6	35.7	111.4 [1] / 97.6 · f_{R2} [2]	151.4	43.5	36.9	56.2	3.5
	D50 / GL_H		42.3		179.8	46.6		62.1	3.9
405x60x40	D30 / GL_H		35.7		227.2	58.2	40.6	84.3	7.5
	D50 / GL_H		42.3		269.7	62.1		93.2	8.5
520x60x40	D30 / GL_H		35.7		302.9	72.9	44.3	112.4	13.2
	D50 / GL_H		42.3		359.6	77.6		124.2	14.9

MEGANT series 60 – Material: EN AW - 6082									
Dimensions L/B/H	Hardwood material	Characteristic load bearing capacity in hardwood with screws 8 x 120 mm							
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm
310x60x40	D30 / GL_H	36.6	40.1	150.4 [1] / 130.1 · f_{R2} [2]	132.5	46.8	36.9	49.2	3.5
	D50 / GL_H		47.6		157.3	50.5		54.4	3.9
430x60x40	D30 / GL_H		40.1		208.2	61.5	40.6	77.3	7.5
	D50 / GL_H		47.6		247.2	66.0		85.4	8.5
550x60x40	D30 / GL_H		40.1		283.9	76.3	44.3	105.4	13.2
	D50 / GL_H		47.6		337.1	81.5		116.5	14.9

$F_{1,KCC,RK}$ / $F_{1,Rk}$	Characteristic load bearing capacity (steel failure/wood failure) in direction of secondary beam
$F_{2,KCC,RK}$ / $F_{2,Rk}$	Characteristic load bearing capacity (steel 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 (steel failure/wood failure) perpendicular to direction of insertion
M_{tor}	Characteristic rotation moment

[1] $F_{2,KCC,Rk}$ for torsional fixed header
[2] $F_{2,KCC,Rk} \cdot f_{R2}$ for not torsional fixed header

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 100 – Material: EN AW - 6005									
Dimensions L/B/H	Hardwood material	Characteristic load bearing capacity in hardwood with screws 8 x 120 mm							
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm
290x100x40	D30 / GL_H	55.3	57.9	187.3 [1)] 155.0 · f_{R2} [2)]	227.2	72.2	62.4	84.3	5.7
	D50 / GL_H		68.8		269.7	77.6		93.2	6.4
405x100x40	D30 / GL_H		57.9		340.7	94.3	68.6	126.4	11.9
	D50 / GL_H		68.8		404.5	100.9		139.8	13.3
520x100x40	D30 / GL_H		57.9		454.3	116.4	74.9	168.6	20.5
	D50 / GL_H		68.8		539.3	124.2		186.3	23.0

MEGANT series 100 – Material: EN AW - 6082									
Dimensions L/B/H	Hardwood material	Characteristic load bearing capacity in hardwood with screws 8 x 120 mm							
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm
310x100x40	D30 / GL_H	55.3	62.5	224.2 [1)] 206.6 · f_{R2} [2)]	170.4	75.3	62.4	63.2	5.7
	D50 / GL_H		74.2		202.3	81.5		69.9	6.4
430x100x40	D30 / GL_H		62.5		283.9	97.3	68.6	105.4	11.9
	D50 / GL_H		74.2		337.1	104.8		116.5	13.3
550x100x40	D30 / GL_H		62.5		397.5	119.4	74.9	147.5	20.5
	D50 / GL_H		74.2		471.9	128.1		163.0	23.0

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 150 – Material: EN AW - 6005									
Dimensions L/B/H	Hardwood material	Characteristic load bearing capacity in hardwood with screws 8 x 120 mm							
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm
280x150x50	D30 / GL_H	74.3	80.3	325.9 [1] 299.6 · f_{R2} [2]	216.8	86.3	68.0	84.3	5.4
	D50 / GL_H		95.3		257.4	93.2		93.2	6.1
430x150x50	D30 / GL_H		80.3		433.6	130.4	74.8	168.6	17.1
	D50 / GL_H		95.3		514.8	139.8		186.2	19.3
550x150x50	D30 / GL_H		80.3		578.2	159.9	81.6	224.7	28.7
	D50 / GL_H		95.3		686.4	170.8		248.4	32.3
600x150x50	D30 / GL_H		80.3		650.5	159.9		224.7	28.7
	D50 / GL_H		95.3		772.2	170.8		248.4	32.3
660x150x50–1120x15x50	D30 / GL_H		80.3		722.7	159.9		224.7	28.7
	D50 / GL_H		95.3		858.0	170.8		248.4	32.3

MEGANT series 150 – Material: EN AW - 6082									
Dimensions L/B/H	Hardwood material	Characteristic load bearing capacity in hardwood with screws 8 x 120 mm							
		$F_{1,KCC,Rk}$	$F_{1,Rk}$	$F_{2,KCC,Rk}$	$F_{2,Rk}$	$F_{3,Rk}$	$F_{4KCC,Rk}$	$F_{4,Rk}$	$M_{tor,Rk}$
mm	-	kN	kN	kN	kN	kN	kN	kN	kNm
310x150x50	D30 / GL_H	74.3	84.7	375.0 [1] 366.5 · f_{R2} [2]	216.8	100.3	68.0	84.3	5.4
	D50 / GL_H		100.5		257.4	108.7		93.2	6.1
430x150x50	D30 / GL_H		84.7		361.4	129.8	74.8	140.5	17.1
	D50 / GL_H		100.5		429.0	139.8		155.3	19.3
550x150x50	D30 / GL_H		84.7		505.9	159.2	81.6	196.7	28.7
	D50 / GL_H		100.5		600.6	170.8		217.4	32.3
610x150x50	D30 / GL_H		84.7		578.2	159.2		196.7	28.7
	D50 / GL_H		100.5		686.4	170.8		217.4	32.3
670x150x50 - 1090x150x50	D30 / GL_H		84.7		650.5	159.2		196.7	28.7
	D50 / GL_H		100.5		772.2	170.8		217.4	32.3

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 60, 100, and 150 – Material: EN AW - 6005					
Megant series: dimension L	Hardwood material	Slip modulus in hardwood with screws 8 x 120 mm			
		$K_{1,ser}$	$K_{2,ser}$ [3)]	$K_{2,ser}$ [4)]	$K_{4,ser}$
mm	-	kN/mm	kN/mm	kN/mm	kN/mm
series 60: 290, 405, 520	D30 / GL_H	9.4	47.6	67.3	8.6
	D50 / GL_H	10.2	51.9	73.4	9.4
series 100: 290, 405, 520	D30 / GL_H	17.2	75.4	131.3	11.7
	D50 / GL_H	18.8	82.2	143.0	12.8
series 150: 280, 430, 550-1120	D30 / GL_H	27.4	101.9	88.5	17.1
	D50 / GL_H	29.9	111.0	96.4	18.6
MEGANT series 60, 100, and 150 – Material: EN AW - 6082					
Megant series: dimension L	Hardwood material	Slip modulus in hardwood with screws 8 x 120 mm			
		$K_{1,ser}$	$K_{2,ser}$ [3)]	$K_{2,ser}$ [4)]	$K_{4,ser}$
mm	-	kN/mm	kN/mm	kN/mm	kN/mm
series 60: 310, 430, 550	D30 / GL_H	9.4	51.9	42.7	8.6
	D50 / GL_H	10.2	56.6	46.5	9.4
series 100: 310, 430, 550	D30 / GL_H	17.2	74.6	63.4	11.7
	D50 / GL_H	18.8	81.3	69.1	12.8
series 150: 310, 430, 550-1090	D30 / GL_H	27.4	115.1	95.0	17.1
	D50 / GL_H	29.9	125.4	103.5	18.6

[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 20.11.2015

MEGANT series 60 – Material: EN AW - 6005					
Dimensions L/B/H	Hardwood material	Torsion modulus in hardwood with screws 8 x 120 mm			
		$M_{2,\varphi,Rk}$	$K_{2,\varphi,ser}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kNm	kNm/rad	kNm	kNm/rad
290x60x40	D30 / GL_H	3.0	294	3.5	374
	D50 / GL_H	3.3	320	3.9	439
405x60x40	D30 / GL_H	4.4	626	7.5	1 190
	D50 / GL_H	4.8	682	8.5	1 398
520x60x40	D30 / GL_H	5.8	1 082	13.2	2 924
	D50 / GL_H	6.3	1 179	14.9	3 434
MEGANT series 60 – Material: EN AW - 6082					
Dimensions L/B/H	Hardwood material	Torsion modulus in hardwood with screws 8 x 120 mm			
		$M_{2,\varphi,Rk}$	$K_{2,\varphi,ser}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kNm	kNm/rad	kNm	kNm/rad
310x60x40	D30 / GL_H	3.0	294	3.5	374
	D50 / GL_H	3.3	320	3.9	439
430x60x40	D30 / GL_H	4.4	643	7.5	1 190
	D50 / GL_H	4.8	701	8.5	1 398
550x60x40	D30 / GL_H	5.9	1 128	13.2	2 924
	D50 / GL_H	6.4	1 229	14.9	3 434

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 100 – Material: EN AW - 6005					
Dimensions L/B/H	Hardwood material	Torsion modulus in hardwood with screws 8 x 120 mm			
		$M_{2,\varphi,Rk}$	$K_{2,\varphi,ser}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kNm	kNm/rad	kNm	kNm/rad
290x100x40	D30 / GL_H	4.5	538	5.7	644
	D50 / GL_H	4.9	587	6.4	757
405x100x40	D30 / GL_H	6.6	1 147	11.9	1 986
	D50 / GL_H	7.2	1 250	13.3	2 333
520x100x40	D30 / GL_H	8.7	1 984	20.5	4 553
	D50 / GL_H	9.4	2 162	23.0	5 348
MEGANT series 100 – Material: EN AW - 6082					
Dimensions L/B/H	Hardwood material	Torsion modulus in hardwood with screws 8 x 120 mm			
		$M_{2,\varphi,Rk}$	$K_{2,\varphi,ser}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kNm	kNm/rad	kNm	kNm/rad
310x100x40	D30 / GL_H	4.5	538	5.7	644
	D50 / GL_H	4.9	587	6.4	757
430x100x40	D30 / GL_H	6.7	1 179	11.9	1 986
	D50 / GL_H	7.3	1 285	13.3	2 333
550x100x40	D30 / GL_H	8.8	2 068	20.5	4 553
	D50 / GL_H	9.6	2 253	23.0	5 348

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 150 – Material: EN AW - 6005					
Dimensions L/B/H	Hardwood material	Torsion modulus in hardwood with screws 8 x 120 mm			
		$M_{2,\varphi,Rk}$	$K_{2,\varphi,ser}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kNm	kNm/rad	kNm	kNm/rad
280x150x50	D30 / GL_H	5.3	663	5.4	567
	D50 / GL_H	5.8	723	6.1	666
430x150x50	D30 / GL_H	9.0	1 876	17.1	2 970
	D50 / GL_H	9.8	2 044	19.3	3 489
550x150x50	D30 / GL_H	11.9	3 290	28.7	6 500
	D50 / GL_H	12.9	3 585	32.3	7 634
600x150x50	D30 / GL_H	13.1	3 995	28.7	6 500
	D50 / GL_H	14.3	4 353	32.3	7 634
660x150x50	D30 / GL_H	14.5	4 933	28.7	6 500
	D50 / GL_H	15.9	5 375	32.3	7 634
720x150x50	D30 / GL_H	16.0	5 969	28.7	6 500
	D50 / GL_H	17.4	6 503	32.3	7 634
780x150x50	D30 / GL_H	17.5	7 103	28.7	6 500
	D50 / GL_H	19.0	7 739	32.3	7 634
830x150x50	D30 / GL_H	18.7	8 124	28.7	6 500
	D50 / GL_H	20.3	8 852	32.3	7 634
890x150x50	D30 / GL_H	20.1	9 439	28.7	6 500
	D50 / GL_H	21.9	10 285	32.3	7 634
950x150x50	D30 / GL_H	21.6	10 853	28.7	6 500
	D50 / GL_H	23.5	11 826	32.3	7 634
1000x150x50	D30 / GL_H	22.8	12 107	28.7	6 500
	D50 / GL_H	24.8	13 192	32.3	7 634
1060x150x50	D30 / GL_H	24.2	13 702	28.7	6 500
	D50 / GL_H	26.4	14 929	32.3	7 634
1120x150x50	D30 / GL_H	25.7	15 396	28.7	6 500
	D50 / GL_H	28.0	16 775	32.3	7 634

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

MEGANT series 150 – Material: EN AW - 6082					
Dimensions L/B/H	Hardwood material	Torsion modulus in hardwood with screws 8 x 120 mm			
		$M_{2,\varphi,Rk}$	$K_{2,\varphi,ser}$	$M_{tor,Rk}$	$K_{tor,ser}$
mm	-	kNm	kNm/rad	kNm	kNm/rad
310x150x50	D30 / GL_H	6.1	856	5.4	567
	D50 / GL_H	6.6	933	6.1	666
430x150x50	D30 / GL_H	9.0	1 876	17.1	2 970
	D50 / GL_H	9.8	2 044	19.3	3 489
550x150x50	D30 / GL_H	11.9	3 290	28.7	6 500
	D50 / GL_H	12.9	3 585	32.3	7 634
610x150x50	D30 / GL_H	13.3	4 145	28.7	6 500
	D50 / GL_H	14.5	4 516	32.3	7 634
670x150x50	D30 / GL_H	14.8	5 099	28.7	6 500
	D50 / GL_H	16.1	5 555	32.3	7 634
730x150x50	D30 / GL_H	16.2	6 151	28.7	6 500
	D50 / GL_H	17.7	6 702	32.3	7 634
790x150x50	D30 / GL_H	17.7	7 302	28.7	6 500
	D50 / GL_H	19.3	7 956	32.3	7 634
850x150x50	D30 / GL_H	19.2	8 551	28.7	6 500
	D50 / GL_H	20.9	9 317	32.3	7 634
910x150x50	D30 / GL_H	20.6	9 900	28.7	6 500
	D50 / GL_H	22.5	10 787	32.3	7 634
970x150x50	D30 / GL_H	22.1	11 347	28.7	6 500
	D50 / GL_H	24.0	12 363	32.3	7 634
1030x150x50	D30 / GL_H	23.5	12 892	28.7	6 500
	D50 / GL_H	25.6	14 047	32.3	7 634
1090x150x50	D30 / GL_H	25.0	14 536	28.7	6 500
	D50 / GL_H	27.2	15 839	32.3	7 634

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

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:

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

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

Characteristic withdrawal resistance in softwood:	$F_{1,J/H,Rk} = \frac{n_{ef,J/H} \cdot f_{ax,J/H,k} \cdot d \cdot l_{ef,J/H} \cdot k_{ax}}{1.2 \cdot \cos^2\alpha + \sin^2\alpha}$	
Characteristic withdrawal resistance in hardwood ($\rho_k \le 590 kg/m^3$):	$F_{1,J/H,Rk} = n_{ef,J/H} \cdot 2 \cdot 10^{-3} \cdot l_{ef,J/H} \cdot d^{0.66} \cdot \rho_k^{1.6} \cdot k_\alpha$	
with		
Characteristic withdrawal strength perpendicular to direction of grain:	$f_{ax,J/H,k} = 0.52 \cdot d^{-0.5} \cdot l_{ef,J/H}^{-0.1} \cdot \rho_k^{0.8}$	
Number of screws acting in direction of force:	EN AW – 6005: series 60: $n_{ef,J/H}$ = 2.67 series 100: $n_{ef,J/H}$ = 4.33 series 150: $n_{ef,J/H}$ = 6.00	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 l_{Scr} = min. 80 mm to max. 240 mm	
Angle between screw axis and direction of grain:	α = 0° for Joist α = 90° for Header	
Dimension coefficient	k_{ax} =1.0 for screw diameter 8 mm	
Coefficient	k_α = 0.7 for Joist k_α = 1.0 for Header	
For calculation of design values	k_{mod} according to EN 1995-1-1 and γ_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 according to Annex 1
For calculation of design values	γ_{M2} = 1.25 (EN 1993-1-1)

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

(iii) Maximum load bearing capacity of KNAPP-Clip Connector:

Maximum load bearing capacity:	$F_{1,KCC,Rk}$ according to Annex 5
For calculation of design values	γ_{M2} = 1.25 (EN 1999-1-1)

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

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

(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:	$F_{2,J/H,Rk} = \frac{1.35 \cdot n_{ef,45,J/H} \cdot F_{ax,45,J/H,Rk}}{\sqrt{2}}$
with	
Characteristic withdrawal strength for a single screw in softwood:	$F_{ax,45,J/H,Rk} = \frac{0.52 \cdot d^{-0.5} \cdot l_{ef,J/H}^{0.9} \cdot \rho_k^{0.8}}{1.2 \cdot \cos^2\alpha + \sin^2\alpha}$
Characteristic withdrawal strength for a single screw in hardwood ($\rho_k \le 590 kg/m^3$):	$F_{ax,45,J/H,Rk} = 2 \cdot 10^{-3} \cdot l_{ef,J/H} \cdot d^{0.66} \cdot \rho_k^{1.6}$
Number of 45° screws in Joist/Header:	$n_{ef,45,J/H}$ according to Annex 2
Effective length of threaded part in the timber member:	$l_{ef,J/H} = l_{Scr,J/H}$ - 10 mm for Megant series 60 and 100 $l_{ef,J/H} = l_{Scr,J/H}$ - 20 mm for Megant series 150 l_{Scr} = min. 80 mm to max. 240 mm
Angle between screw axis and direction of grain:	α = 45°
For calculation of design values	k_{mod} according to EN 1995-1-1 and γ_M = 1.3

(ii) Maximum load bearing capacity of KNAPP-Clip Connector:

Maximum load bearing capacity:	$F_{2,KCC,Rk}$ according to Annex 5
For calculation of design values	γ_{M1} = 1.1 (EN 1999-1-1)

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

Tensile strength of threaded rods:	$F_{t,Rk} = n \cdot k_2 \cdot f_{ub} \cdot A_s$
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 mm² for rod diameter 16 mm A_s = 245 mm² for rod diameter 20 mm
Factor	k_2 =0.9
For calculation of design values	γ_{M2} = 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	$R_{p0.2,k} = f_O$ = 200 N/mm² for EN AW – 6005 $R_{p0.2,k} = f_O$ = 240 N/mm² 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:	β_M = 0.4
For calculation of design values	γ_{M1} = 1.1 (EN 1999-1-1)

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

(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:	$F_{3,J,Rk} = n_{45,J/H} \cdot F_{v,45,J/H,Rk} + n_{\alpha,J/H} \cdot F_{v,\alpha,J/H,Rk}$
with	
Load bearing capacity per joint and fastener:	$F_{v,\alpha,J/H,Rk} = 2.3 \cdot \sqrt{M_{y,Rk} \cdot f_{h,J/H,k} \cdot d} + \frac{F_{ax,\alpha,J/H,Rk}}{4}$ $F_{v,45,J/H,Rk} = 2.3 \cdot \sqrt{M_{y,Rk} \cdot f_{h,J/H,k} \cdot d}$
Characteristic withdrawal strength for a single screw:	$F_{ax,\alpha,J/H,Rk}$ according to (b)(i)
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
Characteristic value of embedding strength in timber member:	$f_{h,J,k} = 0.033 \cdot \rho_k \cdot d^{-0.3}$ for Joist $f_{h,H,k} = 0.082 \cdot \rho_k \cdot d^{-0.3}$ for Header
Angle between screw axis and direction of grain:	α = 0° for Joist (end grain) α = 90° for Header (side grain)
For calculation of design values	k_{mod} according to EN 1995-1-1 and γ_M = 1.3

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

$F_{45,Rk}$ may be multiplied by k_{mod} and f_{size}

Size factor for connector height:	f_{size} = 1.0 for h = 310 mm f_{size} = 1.1 for h = 430 mm f_{size} = 1.2 for h = 550 mm
For calculation of design values	k_{mod} according to EN 1995-1-1 and γ_M = 1.3

(e) Combined loading:

For combined loading, the following needs to be valid

$$\left(\frac{F_{1,d}}{F_{1,Rd}}\right)^2 + \left(\frac{F_{2,d}}{F_{2,Rd}}\right)^2 + \left(\frac{F_{45,d}}{F_{45,Rd}}\right)^2 + \left(\frac{M_{tor,d}}{M_{tor,Rd}}\right) \le 1.0$$

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

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:

$a_J / H_J > 0.7$ and $a_H / H_H > 0.7$

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 $0.2 \le a_{J/H} / H_{J/H} \le 0.7$:

The following expressions shall be satisfied for timber members **without** reinforcement:	
For joist and header:	$\left(\frac{F_{90,d}}{F_{90,J/H,Rd}}\right) \le 1.0$
with	
	$F_{90,H/J,Rd} = k_{J/H} \cdot k_{s,J/H} \cdot k_{r,J/H} \cdot \left[6.5 + 18 \cdot \left(\frac{a_{J/H}}{H_{J/H}}\right)^2\right] \cdot (t_{ef} \cdot H_{J/H})^{0.8} \cdot f_{t,90,d}$
Factor	k_J = 0.5 in joist and k_H = 1.0 in header
Factor	$k_{s,J/H} = \max\left\{1;\ 0.7 + \frac{1.4 \cdot a_{r,J/H}}{H_{J/H}}\right\}$
	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	$t_{ef} = \min\left\{B_{J/H};\ \frac{l_{ef,J/H}}{\sqrt{2}}\right\}$ see Annex 7

The following expressions shall be used to **reinforce** timber members:	
For joist and header:	$\left(\frac{F_{t,90,J/H,d}}{n \cdot F_{ax,Rd}}\right) \le 1.0$
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
Characteristic withdrawal strength:	$F_{ax,Rd}$ 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}

(i) No further calculation is needed if:

$a_J / B_J > 0.7$ and $a_H / B_H > 0.7$

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

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

The following expressions shall be satisfied for timber members **without** reinforcement:	
For joist and header:	$\left(\frac{F_{90,d}}{F_{90,J/H,Rd}}\right) \le 1.0$
with	
	$F_{90,H/J,Rd} = k_{J/H} \cdot k_{s,J/H} \cdot k_{r,J/H} \cdot \left[6.5 + 18 \cdot \left(\frac{a_{J/H}}{B_{J/H}}\right)^2\right] \cdot (t_{ef} \cdot B_{J/H})^{0.8} \cdot f_{t,90,d}$
Factor	k_J = 0.5 in joist and k_H = 1.0 in header
Factor	$k_{s,J/H} = \max\left\{1; 0.7 + \frac{1.4 \cdot a_{r,J/H}}{B_{J/H}}\right\}$

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

	MEGANT height h=290, 310 mm: $a_{r,J/H}$ = 171 mm MEGANT height h=405, 430 mm: $a_{r,J/H}$ = 285 mm MEGANT height h=520, 550 mm: $a_{r,J/H}$ = 399 mm
Factor	$k_{r,J/H} = \frac{m_{J/H}}{\sum_{i=1}^{n_{J/H}} \left(\frac{b_{1,J/H}}{b_{i,J/H}} \right)^2}$
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:	$\left(\frac{F_{t,90,J/H,d}}{n \cdot F_{ax,Rd}} \right) \leq 1.0$
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
Characteristic withdrawal strength:	$F_{ax,Rd}$ according to EN 1995-1-1 or ETA

MEGANT®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

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:

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

with
γ_{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
γ_{M2} = 1.25

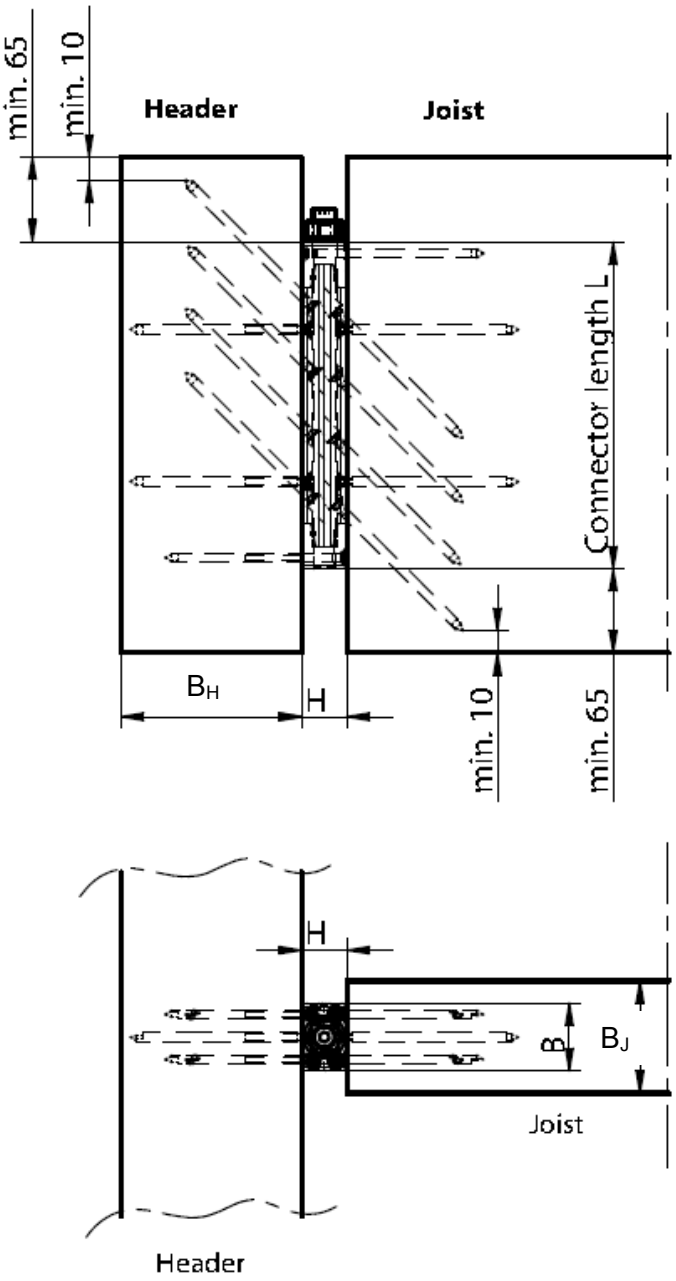
Additional loading directions have to be calculated similar, following the rules of EC3 and EC9.

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®	Annex 5
Characteristic load bearing capacities	of European Technical Assessment ETA-15/0667 of 20.11.2015

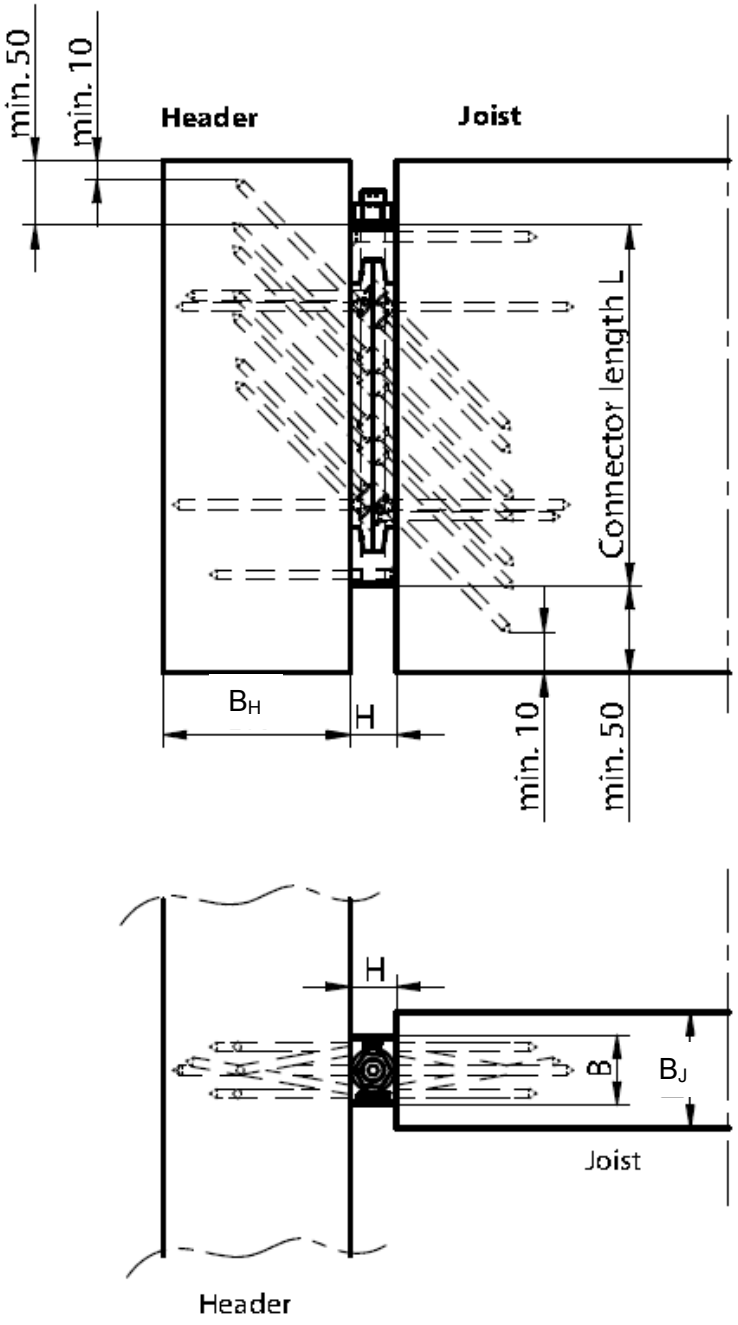
MEGANT (AW 6005) header / joist connection



dimensions in mm

MEGANT®	Annex 6
Dimensions and minimum spacings	of European Technical Assessment ETA-15/0667 of 20.11.2015

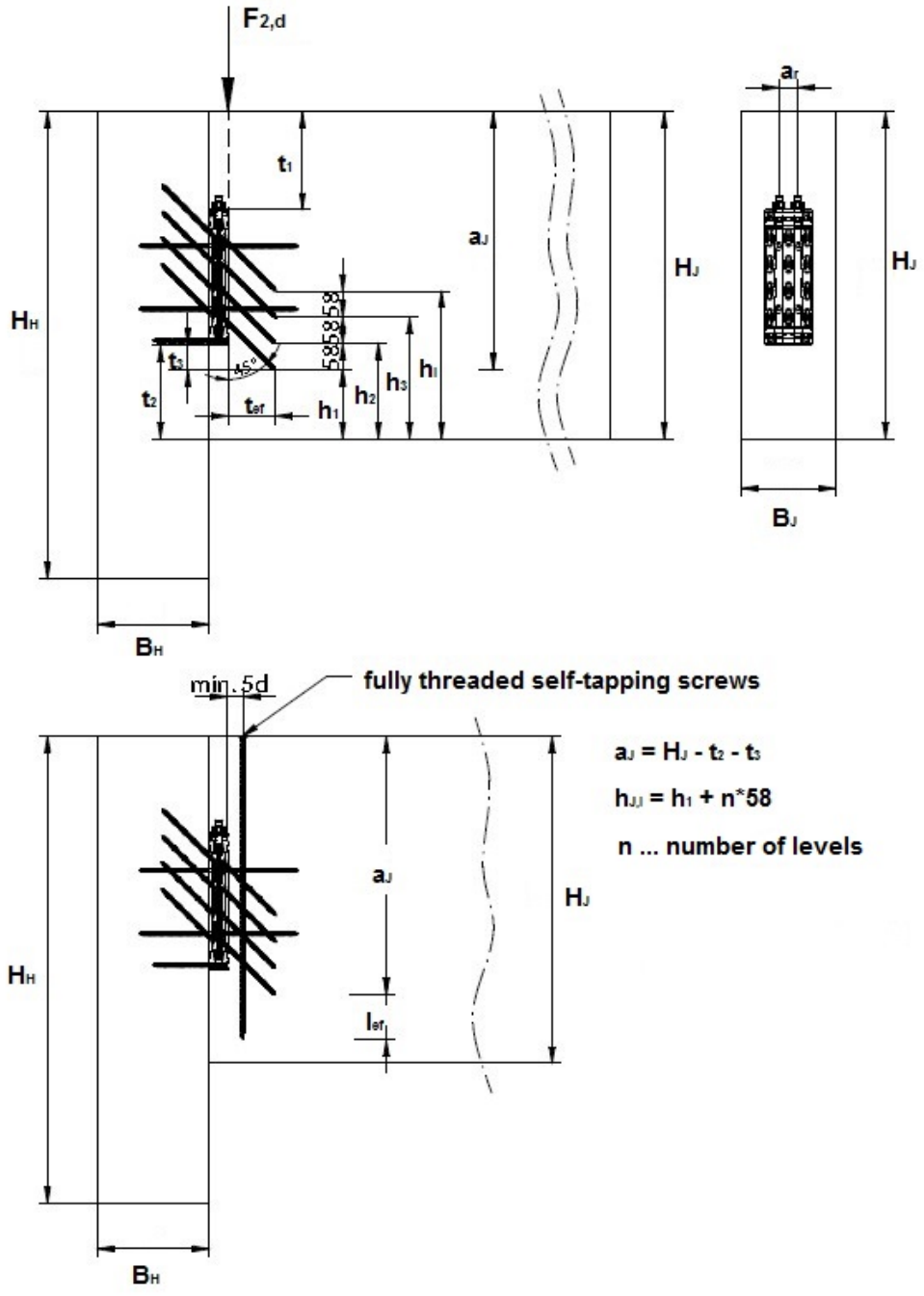
MEGANT (AW 6082) header / joist connection



dimensions in mm

MEGANT®	Annex 6
Dimensions and minimum spacings	of European Technical Assessment ETA-15/0667 of 20.11.2015

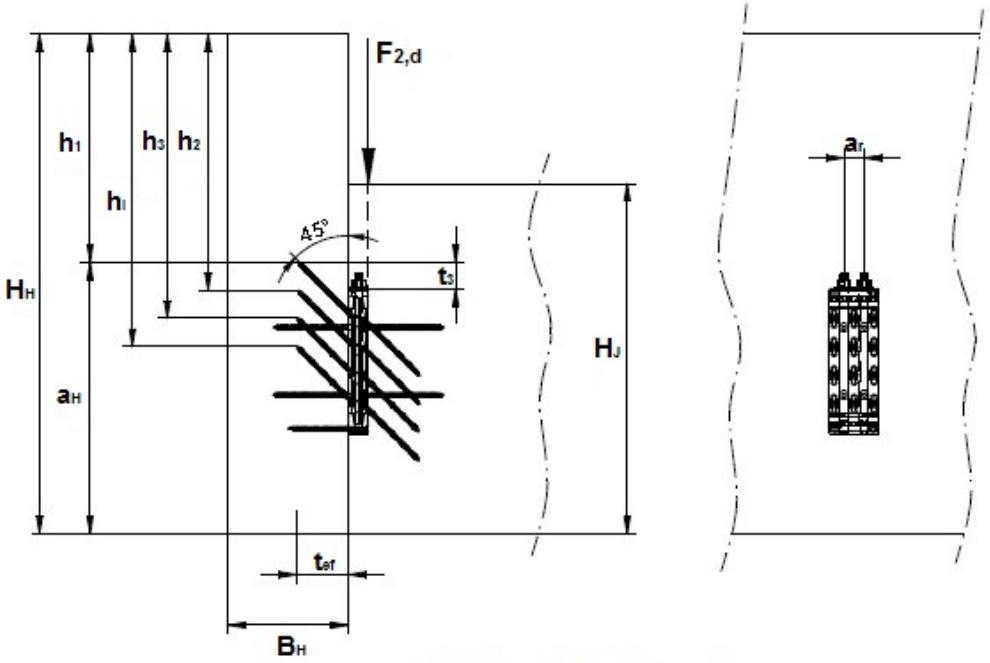
Tension reinforcement in joist - F_2

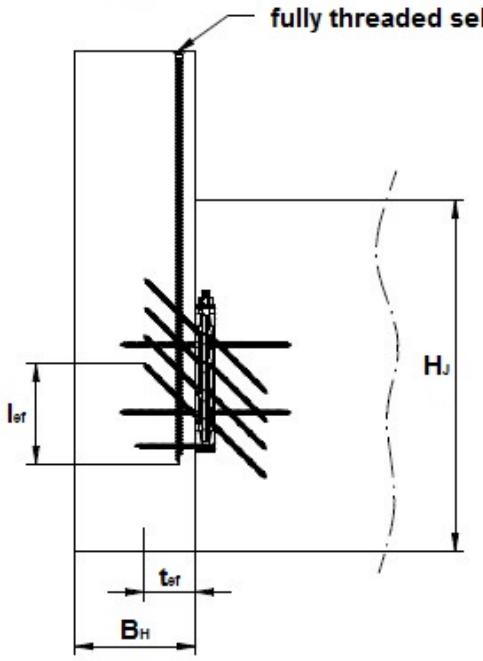


dimensions in mm

MEGANT®	Annex 7
Tension reinforcement	of European Technical Assessment ETA-15/0667 of 20.11.2015

Tension reinforcement in header - F_2

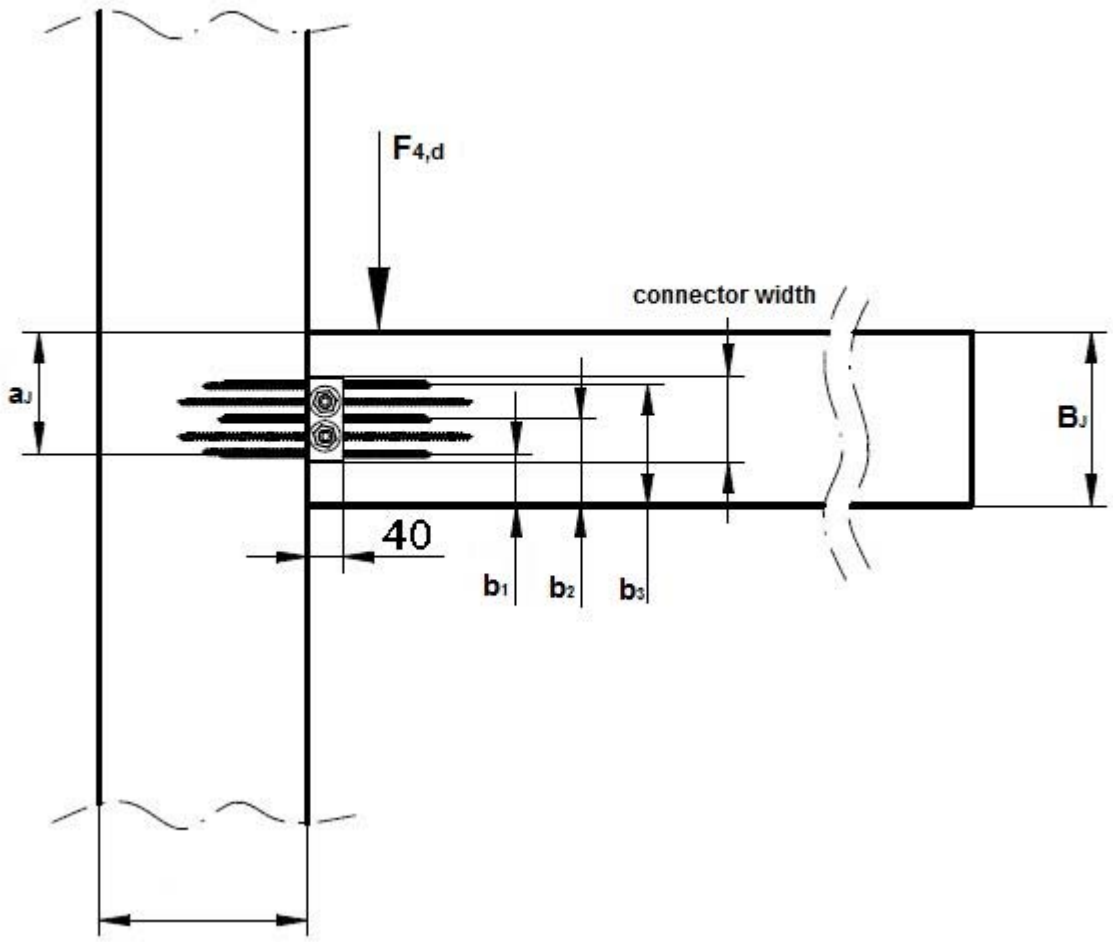




dimensions in mm

MEGANT®	Annex 7
Tension reinforcement	of European Technical Assessment ETA-15/0667 of 20.11.2015

Tension reinforcement – F_4



dimensions in mm

MEGANT®	Annex 7
Tension reinforcement	of European Technical Assessment ETA-15/0667 of 20.11.2015

Guideline for European Technical Approval ETAG 015 “Three-dimensional nailing plates”, Edition November 2012, used as European Assessment Document

EN 338 (10.2009), Structural timber – Strength classes

EN 755-2 (10.2013), Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles – Part 2: Mechanical properties

EN 1993-1-8 (05.2005) +AC (12.2015) +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), 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 (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

Commission Decision 96/603/EC of 4 October 1996 establishing the list of products belonging to Classes A ‘No contribution to fire’ provided for in Decision 94/611/EC implementing Article 20 of Council Directive 89/106/EEC on construction products, Official Journal L 267 from 19.10.1996, page 23, amended by Commission Decision 2000/605/EC of 26 September 2000, Official Journal L 258 from 12.10.2000 and Commission Decision 2003/424/EC of 6 June 2003, Official Journal L 144 from 12.6.2003

MEGANT®	Annex 8
Reference documents	of European Technical Assessment ETA-15/0667 of 20.11.2015