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European Technical Assessment

ETA-23/0821 of 15.04.2026

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	SIHGA HobaFix Max, SIHGA LamellenFix
Product family to which the construction product belongs	Beam hanger for timber-to-timber connections
Manufacturer	SIHGA GmbH Gewerbepark Kleinreith 4 4694 Ohlsdorf AUSTRIA
Manufacturing plant	Manufacturing plant 1
This European Technical Assessment contains	30 pages including 4 Annexes which form an integral part of this assessment.
This European Technical Assessment is issued in accordance with Article 95(4) of Regulation (EU) 2024/3110, on the basis of	European Assessment Document (EAD) 130186-00-0603 “Three-dimensional nailing plates”.
This European Technical Assessment is a corrigendum of	European Technical Assessment ETA-23/0821 of 15.04.2026.

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

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Specific parts

1 Technical description of the product

1.1 General

This European Technical Assessment (ETA) applies to the beam hangers SIHGA HobaFix Max and SIHGA LamellenFix to be used in load-bearing timber to timber connections.

The beam hanger SIHGA HobaFix Max consists of three parts, one base part (main beam) and two parts (main and secondary beam) which are inserted into each other. Installation of the beam hanger into the timber is carried out with special screws. Two locking screws are used to mount the two inserted parts of SIHGA HobaFix Max.

The beam hanger SIHGA LamellenFix consists of two parts which are identical in shape and inserted into each other. Installation of the beam hanger into the timber is carried out with special screws. One fixing screw is used to mount the two parts of SIHGA LamellenFix.

The beam hangers and the components for its manufacturing correspond to the specifications given in the Annexes 1, 2 and 4. The material characteristics, dimensions and tolerances of the beam hangers, not indicated in these Annexes, are given in the technical file[1] of the European Technical Assessment.

1.2 Beam hanger

SIHGA HobaFix Max and SIHGA LamellenFix are made of extruded aluminium EN AW 6060 according to EN 573-3[2]. Aluminium with the same or higher strength may be used.

There are nine sizes of the beam hanger SIHGA HobaFix Max, type HF Max 105, HF Max 145, HF Max 185, HF Max 225, HF Max 265, HF Max 305, HF Max 345, HF Max 385 and HF Max 425.

There are four sizes of the beam hanger SIHGA LamellenFix, type LV 80 small, LV 80, LV 120 and LV 160.

The different types together with their most important dimensions are shown in Annex 2.

1.3 Special screws / Mounting screws

The screws for installation of the beam hanger SIHGA HobaFix Max conform to ETA-11/0425[3]. Number as well as diameter and length of the screws are given in Annex 1. They are made of hardened carbon steel.

The screws for installation of the beam hanger SIHGA LamellenFix conform to ETA-20/0558[4]. Number as well as diameter and length of the screws are given in Annex 1. They are made of stainless steel. The use of equivalent screws is possible in accordance with the calculations in Annex 5.

1.4 Locking screws

The locking screws used to mount the two inserted parts of the beam hanger SIHGA HobaFix Max conform to ETA-11/0425. Number as well as diameter and length of the screws are given in Annex 1. They are made of hardened carbon steel.

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1 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.

2 EN 573:2019 + A1

3 European Technical Assessment ETA-11/0425 of 17.01.2026 for „SIHGA GoFix, SIHGA BohrFix screws and GoFix GS threaded rods“ of SIHGA GmbH, Gewerbepark Kleinreith 4, 4694 Ohlsdorf, Austria.

4 European Technical Assessment ETA-20/0558 of 20.02.2026 for „GoFix MS II, VG-S, VG-Z, DG-T / DG-Z, GoFix SH, Alu-TeFix and TeFix“ of SIHGA GmbH, Gewerbepark Kleinreith 4, 4694 Ohlsdorf, Austria.

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The locking screw used to mount the two inserted parts of the beam hanger SIHGA LamellenFix conform to ETA-11/0283[5] or ETA-11/0425. Number as well as diameter and length of the screws are given in Annex 1. They are made of stainless steel.

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

2.1 Intended use

The beam hangers are intended to be used in load bearing connections of timber structures as end-grain to side-grain or side-grain to side-grain connections, e.g. between beams, in solid timber of softwood of strength class C24 or better according to EN 338[6].

The typical installation of the beam hangers is shown in Annex 2.

The beam hangers shall be subjected to static and quasi static actions only.

SIHGA HobaFix Max is intended to be used in service classes 1 and 2 according to EN 1995-1-1[7]. SIHGA LamellenFix is intended to be used in service classes 1, 2 and 3 according to EN 1995-1-1.

2.2 General assumptions

SIHGA HobaFix Max and SIHGA LamellenFix are 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 SIHGA HobaFix Max and SIHGA LamellenFix. Verification of stability of the works including application of loads on the product is not subject to the European Technical Assessment.

The following conditions shall be observed:

- Design of connections with beam hangers 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 the respective service class according to EN 1995-1-1.
- The beam hangers are installed correctly.
- For the forces F_1 to F_3 according to Annex 3 it shall be checked in accordance with EN 1995-1-1 that splitting will not occur.

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

[5] European Technical Assessment ETA-11/0283 of 06.06.2023 for „S + P screws“ of Schäfer + Peters GmbH, Zeilbaumweg 32, 74613 Öhringen, Germany.
[6] EN 338:2016
[7] EN 1995-1-1:2004 + AC:2006 + A1:2008 + A2:2014

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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 and mounted with locking screws.

The structural members which are connected with the beam hangers shall be

- Restrained against rotation; see Annex 3
- Strength class C24 or better;
- Free from wane under the beam hanger;
- The timber members shall have plane surfaces against the beam hangers;
- Minimum spacing and edge distances are in accordance with EN 1995-1-1.

2.3 Assumed working life

The provisions made in the European Technical Assessment (ETA) are based on an assumed intended working life of SIHGA HobaFix Max and SIHGA LamellenFix 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[8].

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.

[8] 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 can also be shorter than the assumed working life.

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

3.1 Performance of the product

Table 1: Performance of the product in relation to the essential characteristics

Essential characteristic	Method of assessment	Performance
Basic requirement for construction works 1: Mechanical resistance and stability		
Joint strength	EAD 130186-00-0603, Clause 2.2.1	Clause 3.1.1
Joint stiffness	EAD 130186-00-0603, Clause 2.2.1	Clause 3.1.2
Joint ductility	No performance assessed.	
Resistance to seismic actions	No performance assessed.	
Resistance to corrosion and deterioration	EAD 130186-00-0603, Clause 2.2.3	Clause 3.1.3
Basic requirement for construction works 2: Safety in case of fire		
Reaction to fire	EAD 130186-00-0603, Clause 2.2.4	Clause 3.1.4
Resistance to fire	No performance assessed.	

3.1.1 Joint strength

The characteristic load bearing capacities of the beam hangers are determined by calculation assisted by testing (SIHGA HobaFix Max) and testing (SIHGA LamellenFix). The beam hangers are installed with a defined number of screws with respective nominal diameter and mounted with locking screws as specified in Annex 1, 3 and 4. Kinematic boundary conditions are defined in Annex 3.

The values of the characteristic load bearing capacities for the loading directions F_1 to F_4 as defined in Annex 3 are given in Annex 4.

3.1.2 Joint stiffness

The stiffness of the beam hangers was determined by testing. The beam hangers are installed with a defined number of screws with respective nominal diameter and mounted with locking screws as specified in Annex 1 and Annex 2.

The stiffness values are given in Annex 4.

3.1.3 Resistance to corrosion and deterioration

SIHGA HobaFix Max is intended to be used in service classes 1 and 2 according to EN 1995-1-1. SIHGA LamellenFix is intended to be used in service classes 1, 2 and 3 according to EN 1995-1-1. The product and each member of the connection should at least be suitable for the service classes 1 and 2 (and 3), but not for service class 1 only.

The beam hangers are made of extruded aluminium according to EN 573-3. The screws for installation and the locking screws are made of hardened carbon steel and stainless steel, respectively. Screws made of carbon steel are zinc coated.

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3.1.4 Reaction to fire

The beam hangers are made of aluminium and the screws and locking screws are made of 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 SIHGA HobaFix Max and SIHGA LamellenFix 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 SIHGA HobaFix Max and SIHGA LamellenFix 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 (thereafter 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 SIHGA HobaFix Max and SIHGA LamellenFix is System 2+. System 2+ is detailed in Commission Delegated Regulation (EU) № 568/2014[9] 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[10].

(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.

[9] Official Journal of the European Union OJ L 157, 27.5.2014, p. 76

[10] 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.

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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 the product 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.

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 the SIHGA HobaFix Max and SIHGA LamellenFix according to the European Technical Assessment. In particular the following items shall be appropriately considered.

- Personnel and equipment

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

5.2.2 Continuous 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 are 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 is withdrawn by the notified factory production control certification body.

Issued in Vienna on 15.04.2026
by Österreichisches Institut für Bautechnik

The original document is signed by:

Thomas Rockenschaub

Managing Director

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SIHGA HobaFix Max

Beam hanger	Number GoFix HK screws ø6 x 100 mm [1] in main beam	Number GoFix S+ screws ø6,5 x 100 mm [1] in secondary beam	Number GoFix HK mounting screws ø4 x 60 mm [1] in secondary beam	2 GoFix locking screws ø8 mm [1]
HobaFix HF Max 425	21	20	6	X+ / l = 330
HobaFix HF Max 385	19	18	6	X+ / l = 330
HobaFix HF Max 345	17	16	6	X+ / l = 330
HobaFix HF Max 305	15	14	6	X+ / l = 295
HobaFix HF Max 265	13	12	4	X+ / l = 245
HobaFix HF Max 225	11	10	4	X+ / l = 220
HobaFix HF Max 185	9	8	4	X+ / l = 155
HobaFix HF Max 145	7	6	2	X+ / l = 125
HobaFix HF Max 105	5	4	2	X+ / l = 95

SIHGA LamellenFix

Beam hanger	TeFix screws [1] in main and secondary beam	S+P (double countersunk head timber screws with ribs, full thread) locking screw ø8 mm A2 [2]	GoFix S+ locking screw ø8 mm A4 [3]
LamellenFix LV 160	ø 6 x 80 mm	-	A4 / l = 155
LamellenFix LV 120	ø 6 x 80 mm	-	A4 / l = 125
LamellenFix LV 80	ø 6 x 80 mm	A2 / l = 80	-
LamellenFix LV 80 small	ø 6 x 70 mm	A2 / l = 80	-

[1] according to ETA-20/0558 or equivalent screws, calculated according to Annex 5

[2] according to ETA-11/0283

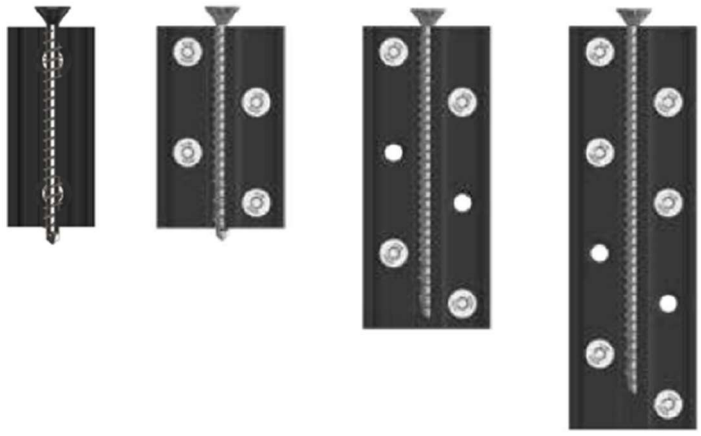
[3] according to ETA-11/0425

SIHGA HobaFix Max and SIHGA LamellenFix	Annex 1 of ETA-23/0821
Fastener specification – screws	

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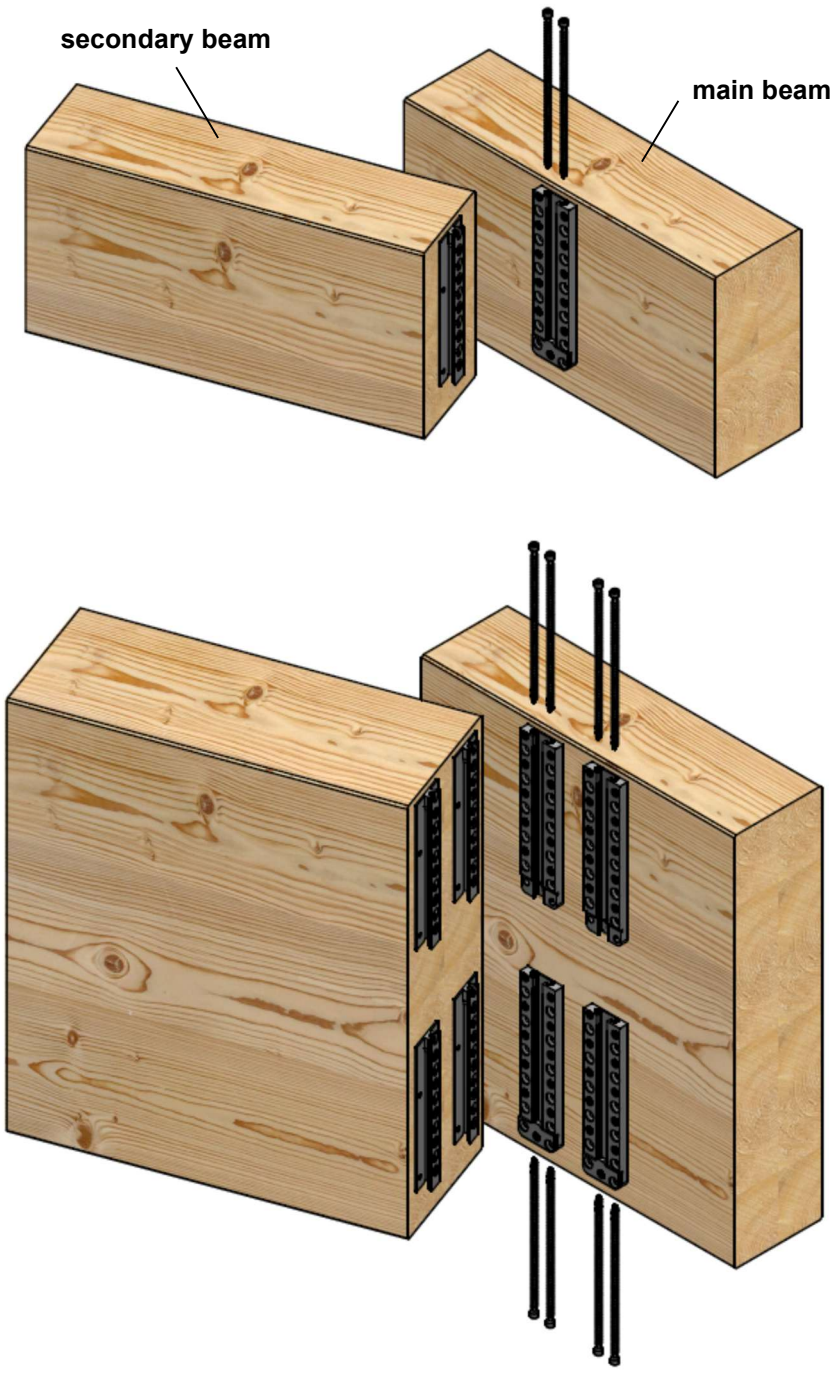
SIHGA LamellenFix

Beam hanger	Number of screws in main and secondary beam n	Effective number of screws n_{ef}
LamellenFix LV 160	6	$n^{0,9} = 5.0$
LamellenFix LV 120	4	$n^{0,9} = 3.5$
LamellenFix LV 80	4	$n^{0,8} = 3.0$
LamellenFix LV 80 small	2	$n^{0,7} = 1.6$



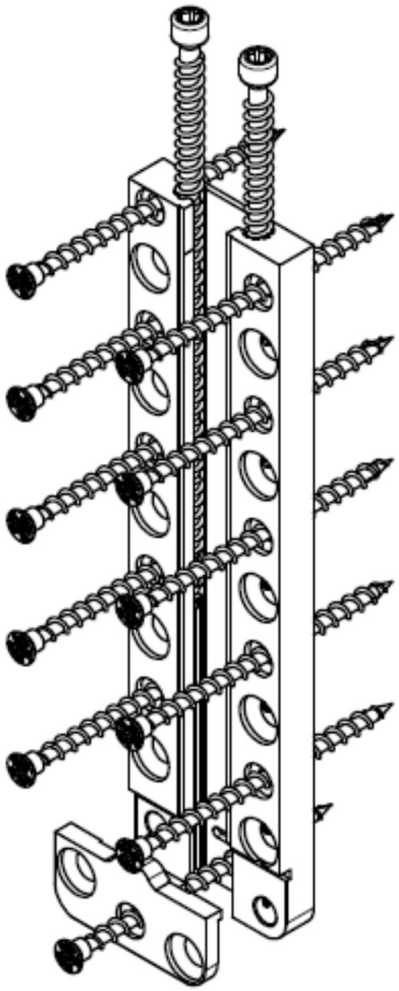
Recommended screw pattern of LV 80 small, LV 80, LV 120 and LV 160 (left to right)

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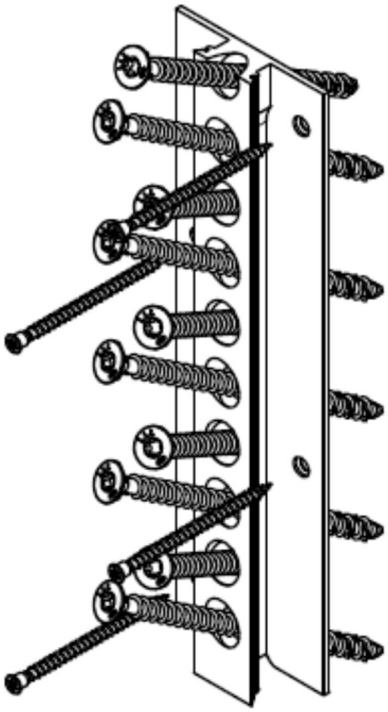


SIHGA HobaFix Max	Annex 2 of ETA-23/0821
Product details: typical installation of the beam hangers HF Max 105 to HF Max 425	

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Screw pattern for main beam

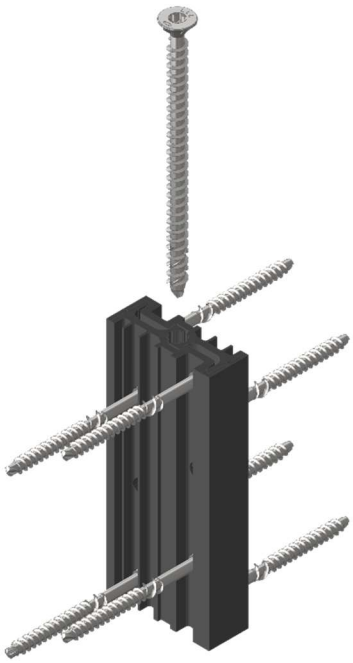


Screw pattern for secondary beam

SIHGA HobaFix Max	Annex 2 of ETA-23/0821
Product details: typical installation of the beam hangers HF Max 105 to HF Max 425	

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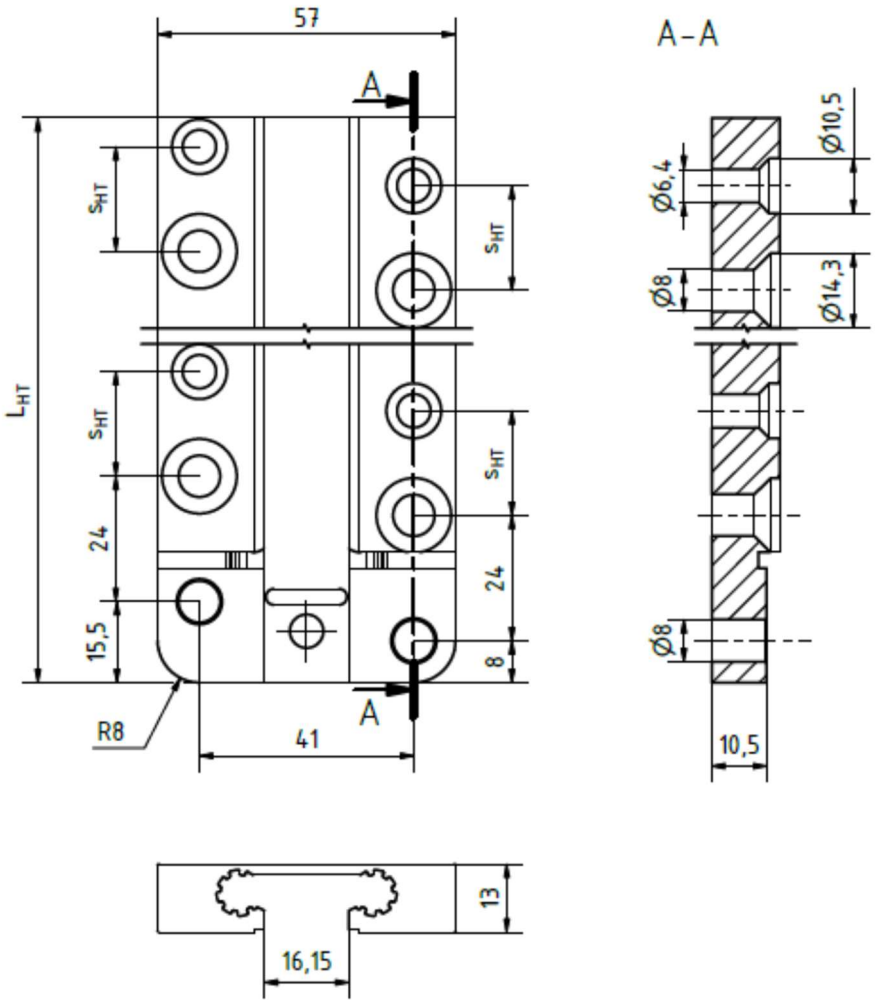




SIHGA LamellenFix	Annex 2 of ETA-23/0821
Product details: typical installation of the beam hangers LV 80 small to LV 160	

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Beam hanger	L_{HT} [mm]	s_{HT} [mm]	Number ø10,5 mm	Number ø14,3 mm
HobaFix HF Max 425	425	20	20	20
HobaFix HF Max 385	385	20	18	18
HobaFix HF Max 345	345	20	16	16
HobaFix HF Max 305	305	20	14	14
HobaFix HF Max 265	265	20	12	12
HobaFix HF Max 225	225	20	10	10
HobaFix HF Max 185	185	20	8	8
HobaFix HF Max 145	145	20	6	6
HobaFix HF Max 105	105	20	4	4

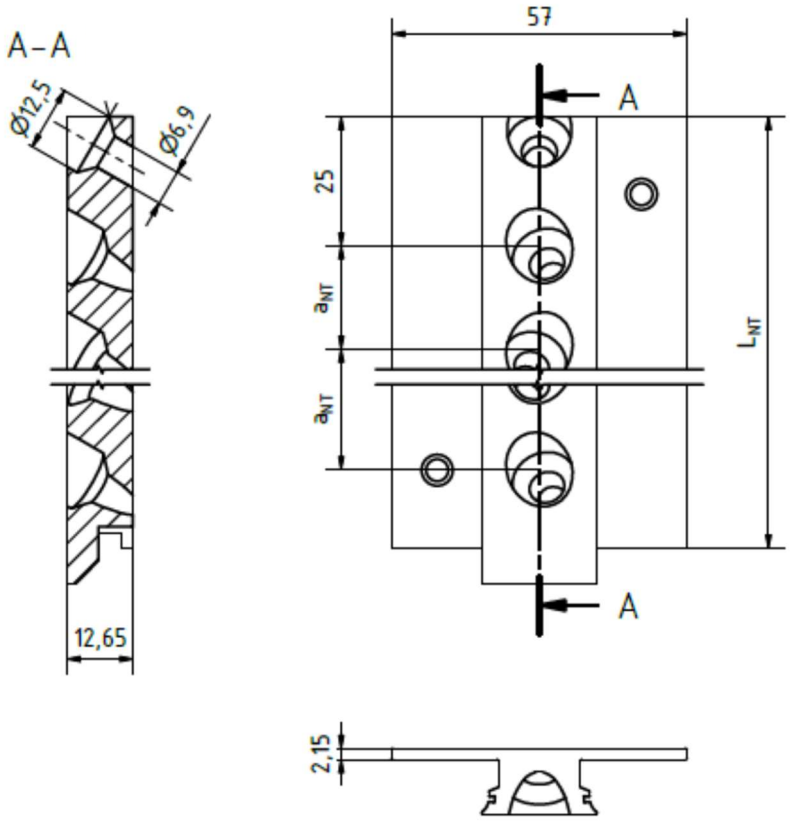


Dimensions in mm

SIHGA HobaFix Max	
Product details: Type HF Max 105 to 425 in main beam Nominal dimensions	Annex 2 of ETA-23/0821

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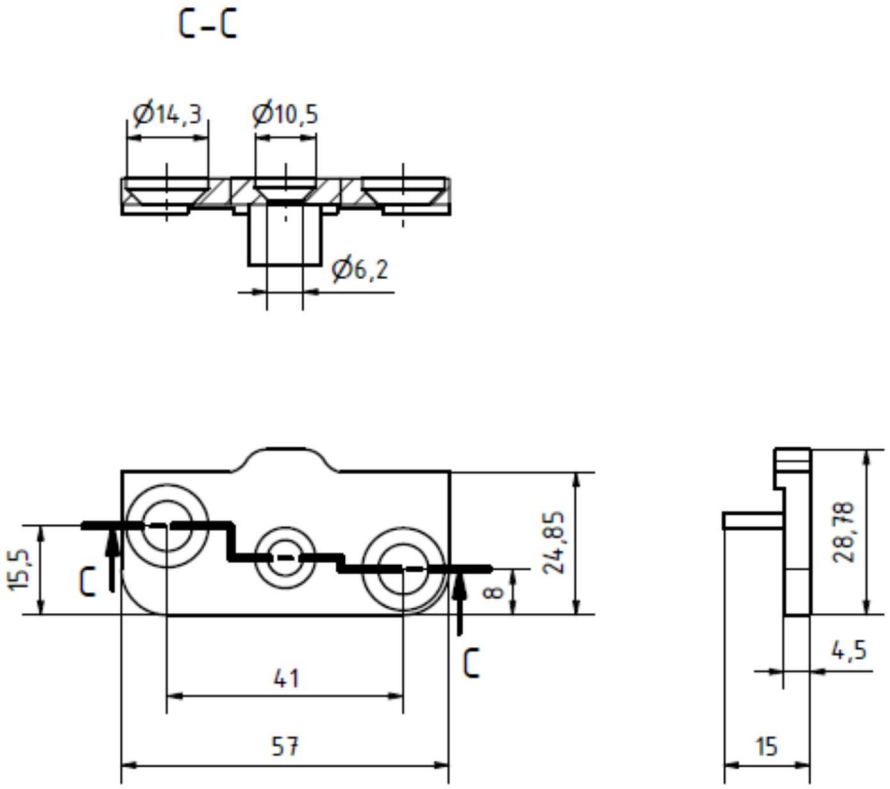
Beam hanger	L_{NT} [mm]	a_{NT} [mm]	Number ø12,5 mm
HobaFix HF Max 425	400,15	20	20
HobaFix HF Max 385	360,15	20	18
HobaFix HF Max 345	320,15	20	16
HobaFix HF Max 305	280,15	20	14
HobaFix HF Max 265	240,15	20	12
HobaFix HF Max 225	200,15	20	10
HobaFix HF Max 185	160,15	20	8
HobaFix HF Max 145	120,15	20	6
HobaFix HF Max 105	80,15	20	4



Dimensions in mm

SIHGA HobaFix Max	
Product details: Type HF Max 105 to 425 in secondary beam Nominal dimensions	Annex 2 of ETA-23/0821

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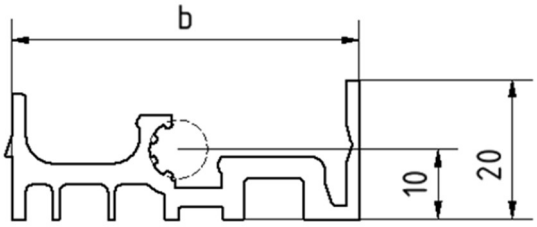


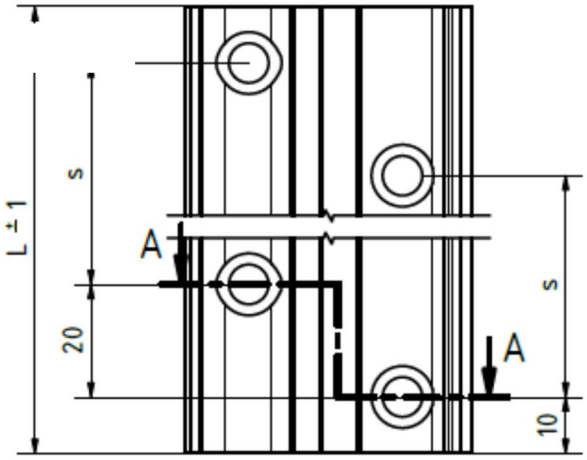
Dimensions in mm

SIHGA HobaFix Max	Annex 2 of ETA-23/0821
Product details: Type HF Max 105 to 425 base part in main beam Nominal dimensions	

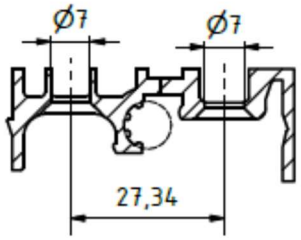
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Beam hanger	L [mm]	s [mm]	b [mm]	Number ø7,0 mm
LamellenFix LV 80	78	40	50	4
LamellenFix LV 120	118	40	50	6
LamellenFix LV 160	158	40	50	8





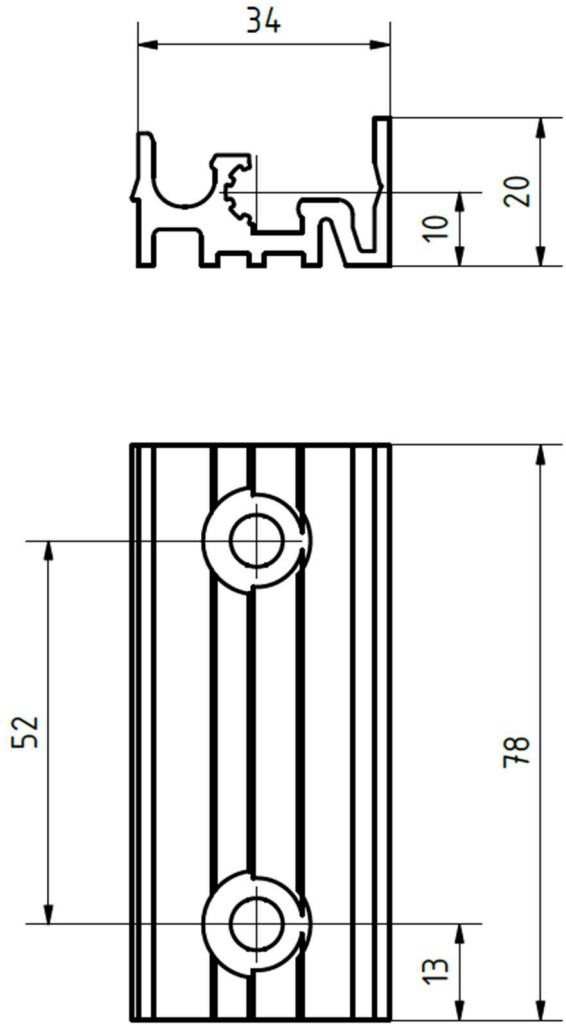
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Dimensions in mm

SIHGA LamellenFix	Annex 2 of ETA-23/0821
Product details: Type LV 80 to LV 160 – Nominal dimensions	

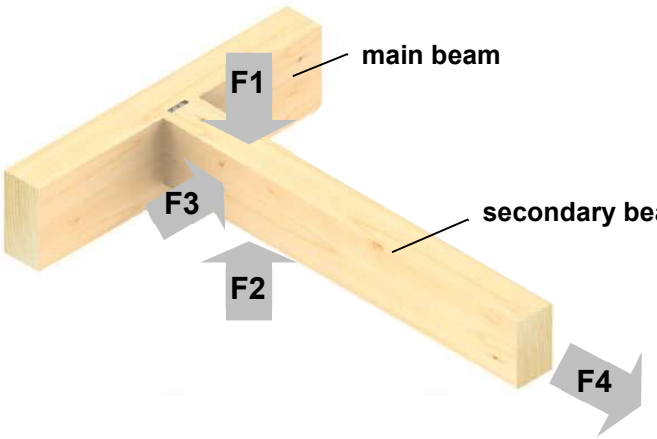
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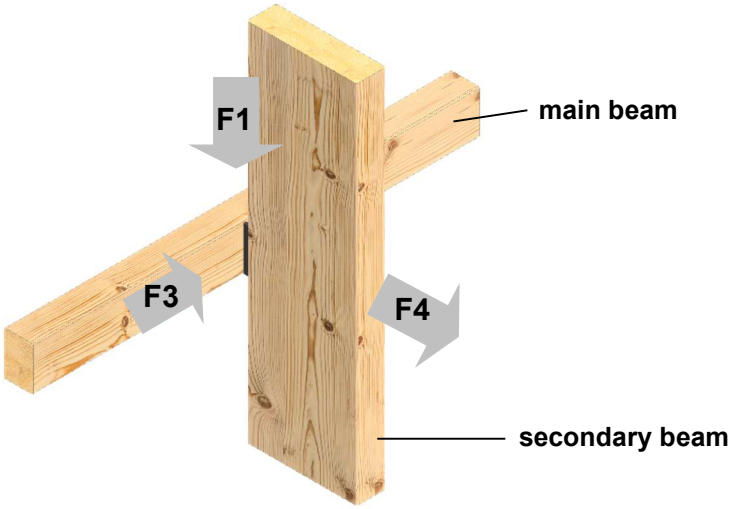


Dimensions in mm

SIHGA LamellenFix	Annex 2 of ETA-23/0821
Product details: Type LV 80 small – Nominal dimensions	

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Wooden structural components

Beam, solid wood, strength class C24 or better according to EN 338.

Forces and their directions

F_1 Force acting in direction of insertion. Connection of main beam and secondary beam. The members shall be prevented from rotation.

F_2 Force acting against direction of insertion. Connection of main beam and secondary beam. The members shall be prevented from rotation.

F_3 Force acting perpendicular to direction of insertion. Connection of main beam and secondary beam or column and secondary beam. The members shall be prevented from rotation.

F_4 Force acting in direction of secondary beam.

SIHGA HobaFix Max and SIHGA LamellenFix	Annex 3 of ETA-23/0821
Definition of forces and their directions	

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Product	Characteristic load bearing capacity for the given minimum dimensions of the secondary beam				
	Min. dimensions of secondary beam	$F_{1,Rk}$ 1)	$F_{2,Rk}$ 1)	$F_{3,Rk}$ 2)	$F_{4,Rk}$ 3)
	mm	N	N	N	N
HobaFix HF Max 425	120 x 460	81 730	39 680	40 020	38 000
HobaFix HF Max 385	120 x 420	74 980	36 090	36 540	34 630
HobaFix HF Max 345	120 x 380	68 150	32 460	33 060	31 250
HobaFix HF Max 305	100 x 340	61 240	28 780	29 830	27 880
HobaFix HF Max 265	100 x 300	52 050	25 050	26 320	24 500
HobaFix HF Max 225	100 x 260	44 930	21 260	22 810	21 130
HobaFix HF Max 185	100 x 220	37 650	17 390	17 710	17 750
HobaFix HF Max 145	100 x 180	27 900	13 430	14 490	14 380
HobaFix HF Max 105	100 x 140	20 180	9 320	11 270	11 000

For calculation of the characteristic strength of the secondary beam regarding transverse tensile load according to EN 1995-1-1, Clause 6.5.2:

1) h_{ef} is the distance from the loaded side of the wooden beam to the farthest screw tip

2) h_{ef} is the distance from the loaded side of the wooden beam to the farthest screw tip for secondary beam width ≥ 100 mm and h_{ef} is the distance from the loaded side of the wooden beam to the centre of gravity of the farthest screw for secondary beam in between 60 mm and 100 mm

3) failure in beam hanger

The characteristic load bearing capacities of the beam hanger connections with HobaFix Max are given for glued laminated timber with a characteristic density of 385 kg/m³. For timber with a lower characteristic density than 385 kg/m³ the characteristic load bearing capacities shall be reduced by the factor k_{dens}

$$k_{dens} = \left(\frac{\rho_k}{385}\right)^{1,2}$$

Where

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

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

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Product	Slip modulus	
	$K_{1,ser}$	$K_{3,ser}$
	N/mm	N/mm
HobaFix HF Max 425	15 500	10 900
HobaFix HF Max 385	14 000	9 400
HobaFix HF Max 345	12 500	8 400
HobaFix HF Max 305	11 000	7 400
HobaFix HF Max 265	9 500	6 400
HobaFix HF Max 225	8 000	5 400
HobaFix HF Max 185	6 500	4 400
HobaFix HF Max 145	5 000	2 900
HobaFix HF Max 105	3 500	2 400

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Calculation of characteristic load bearing capacity for SIHGA HobaFix Max

Calculation shall only be performed in case of smaller dimensions of the secondary beam as given on page 17 or grain direction in the secondary beam deviating from 30° for installation screws and 0° for mounting screws.

Force acting in direction of insertion F_1

$$F_{1,Rk} = min\begin{cases} F_{1,v,Rk} \\ F_{1,t,Rk} \end{cases}$$

$$F_{1,v,Rk} = \mu_H \cdot min\begin{cases} F_{1,v,Rk,HT} \\ F_{1,v,Rk,NT} \end{cases}$$

with

$\mu_H = 1{,}25$ friction coefficient between steel and timber

$$F_{1,v,Rk,HT} = n_{HT}^{0,9} \cdot F_{v,Rk,HT}$$

$$F_{1,v,Rk,NT} = n_{NT}^{0,9} \cdot F_{v,Rk,NT} + n_{MS}^{0,9} \cdot F_{v,Rk,MS}$$

n_{HT} number of screws in the main beam, $\alpha = 90°$
n_{NT} number of screws in the secondary beam (α angle to the grain direction)
n_{MS} number of mounting screws in the secondary beam (α angle to the grain direction)

Calculation of $F_{v,Rk}$ for screws in the main beam (HT) and secondary beam (NT, MS) according to EN 1995-1-1, Equation (8.10), leads to

$$F_{v,Rk} = 2{,}3 \cdot \sqrt{M_{y,Rk} \cdot f_{h,k} \cdot d} + \frac{F_{ax,Rk}}{4}$$

$M_{y,Rk}$ char. yield moment for the respective screws acc. to ETA-11/0425 in Nmm
$f_{h,k}$ embedding strength for the respective screws in pre-drilled holes in softwood acc. to ETA-11/0425 in N/mm²
d diameter of the respective screws in mm
$F_{ax,Rk}$ axial withdrawal capacity for the respective single screw acc. to ETA-11/0425 in N

For multiple arrangement of beam hangers on top of each other the following reduction factor shall be taken into account for the upper beam hanger:

$$k_m = \frac{n-1}{n}$$

In addition, it must be checked if the strength of the secondary beam regarding transverse tensile load according to EN 1995-1-1, Clause 6.5.2, is decisive with

$$F_{1,t,Rk} = \frac{b_{ef} \cdot h_{ef} \cdot k_v \cdot f_{v,k}}{1{,}5}$$

b_{ef} effective width according to EN 1995-1-1, Equation (6.13a)
h_{ef} distance from the loaded side of the wooden beam to the farthest screw tip
k_v reduction factor according to EN 1995-1-1, Equation (6.62)

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Force acting against direction of insertion F_2

$$F_{2,Rk} = min\begin{cases} F_{2,v,Rk,NT} \\ F_{2,t,Rk} \end{cases}$$

$$F_{2,v,Rk,HT} = n_{NT}^{0,9} \cdot F_{v,Rk,NT}$$

n_{NT} number of screws in the secondary beam (α angle to the grain direction)

Calculation of $F_{v,Rk}$ for screws in the secondary beam (NT) according to EN 1995-1-1, Equation (8.10), without consideration of the axial withdrawal capacity $F_{ax,Rk}$

$$F_{v,Rk} = 2{,}3 \cdot \sqrt{M_{y,Rk} \cdot f_{h,k} \cdot d}$$

$M_{y,Rk}$ char. yield moment for the screw acc. to ETA-11/0425 in Nmm
$f_{h,k}$ embedding strength for the screw in pre-drilled holes in softwood acc. to ETA-11/0425 in N/mm²
d diameter of the screw in mm

For multiple arrangement of beam hangers on top of each other the following reduction factor shall be taken into account for the upper beam hanger:

$$k_m = \frac{n-1}{n}$$

In addition, it must be checked if the strength of the secondary beam regarding transverse tensile load according to EN 1995-1-1, Clause 6.5.2, is decisive with

$$F_{2,t,Rk} = \frac{b_{ef} \cdot h_{ef} \cdot k_v \cdot f_{v,k}}{1{,}5}$$

b_{ef} effective width according to EN 1995-1-1, Equation (6.13a)
h_{ef} distance from the loaded side of the wooden beam to the farthest screw tip
k_v reduction factor according to EN 1995-1-1, Equation (6.62)

Force acting perpendicular to direction of insertion F_3

$$F_{3,Rk} = min\begin{cases} F_{3,v,Rk,NT} \\ F_{3,t,Rk} \end{cases}$$

with

$$F_{3,v,Rk,NT} = n_{NT}^{0,9} \cdot F_{v,Rk,NT}$$

n_{NT} number of screws in the secondary beam (α angle to the grain direction)

Calculation of $F_{v,Rk}$ for screws in the secondary beam (NT) according to EN 1995-1-1, Equation (8.10), leads to

$$F_{v,Rk} = 2{,}3 \cdot \sqrt{M_{y,Rk} \cdot f_{h,k} \cdot d} + \frac{F_{ax,Rk}}{4}$$

$M_{y,Rk}$ char. yield moment for the screw acc. to ETA-11/0425 in Nmm

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$f_{h,k}$ embedding strength for the screw in pre-drilled holes in softwood acc. to ETA-11/0425 in N/mm²

d diameter of the screw in mm

$F_{ax,Rk}$ axial withdrawal capacity for screw acc. to ETA-11/0425 in N

For multiple arrangement of beam hangers on top of each other the following reduction factor shall be taken into account for the upper beam hanger:

$$k_m = \frac{n-1}{n}$$

In addition, it must be checked if the strength of the secondary beam regarding transverse tensile load according to EN 1995-1-1, Clause 6.5.2, is decisive with

$$F_{1,t,Rk} = \frac{b_{ef} \cdot h_{ef} \cdot k_v \cdot f_{v,k}}{1{,}5}$$

b_{ef} effective width according to EN 1995-1-1, Equation (6.13a)

h_{ef} distance from the loaded side of the wooden beam to the farthest screw tip for secondary beam width ≥ 100 mm or distance from the loaded side of the wooden beam to the centre of gravity of the farthest screw for secondary beam in between 60 mm and 100 mm

k_v reduction factor according to EN 1995-1-1, Equation (6.62)

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Product	Characteristic load bearing capacity		
	$F_{1,k}$ 1)	$F_{3,k}$ 1)	$F_{4,k}$ 1)
	N	N	N
LamellenFix LV 160	16 130	5 830	10 370
LamellenFix LV 120	9 590	4 910	7 140
LamellenFix LV 80	5 580	3 880	6 350
LamellenFix LV 80 small	5090	2400	6020

1) failure in beam hanger

The characteristic load bearing capacities of the beam hanger connections with SIHGA LamellenFix are given for glued laminated timber with a characteristic density of 365 kg/m^3. For timber with a lower characteristic density than 365 kg/m^3 the characteristic load bearing capacities shall be reduced by the factor k_{dens}

$$k_{dens} = \left(\frac{\rho_k}{365}\right)^{1,2}$$

Where

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

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

Product	Slip modulus	
	K_{1ser}	$K_{3,ser}$
	N/mm	N/mm
LamellenFix LV 160	1 600	2 500
LamellenFix LV 120	1 400	1 900
LamellenFix LV 80	1 000	1 200
LamellenFix LV 80 small	800	900

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Calculation of characteristic load bearing capacity for LamellenFix

When using alternative timber screws the dimensions are restricted to a nominal diameter d = 6 mm and a head diameter between 11.5 mm ≤ d_k ≤12.0 mm. The characteristic load bearing capacities of LamellenFix with alternative timber screws is to be determined as:

$$R_{1,k} = \min\begin{Bmatrix} F_{1,k} \\ n_{1,ef} \cdot R_{v,k} \end{Bmatrix}$$

$$R_{3,k} = \min\begin{Bmatrix} F_{3,k} \\ n_{3,ef} \cdot R_{v,k} * \end{Bmatrix}$$

$$R_{4,k} = \min\begin{Bmatrix} F_{4,k} \\ n_{4,ef} \cdot R_{ax,k} \end{Bmatrix}$$

with

$F_{i,k}$ characteristic load bearing capacity of connector acc. to Annex 4 [N]

$R_{v,k}$ characteristic lateral load bearing capacity of alternative timber screw [N]

$R_{ax,k}$ characteristic axial load bearing capacity of alternative timber screw acc. to respective European Technical Assessment or EN 1995-1-1 [N]

$n_{i,ef}$ effective number of screws for the screw pattern acc. to Annex 1 [-]
for deviating screw patterns or numbers of screws, the effective number of is to be determined acc. to the respective European Technical Assessment of the alternative screw in the decisive main or secondary beam

* Separate verification for combined loaded timber screws necessary due to resulting eccentricity moment when loading in F_3 direction

Characteristic lateral load bearing capacity $R_{v,k}$:

$$R_{v,k} = \min\begin{Bmatrix} 0{,}4 \cdot f_{h,k} \cdot t \cdot d \\ 1{,}15 \cdot \sqrt{2 \cdot M_{y,k} \cdot f_{h,k} \cdot d} + \min\begin{Bmatrix} 0{,}25 \cdot R_{ax,k} \\ F_{v,0} \end{Bmatrix} \end{Bmatrix} \text{[N]}$$

with

$f_{h,t,k}$ characteristic embedment strength of the alternative timber screw in the decisive main or secondary beam acc. to respective European Technical Assessment or EN 1995-1-1 [N/mm²]

t penetration depth of the alternative timber screw in the decisive in the decisive main or secondary beam [mm]

d effective diameter of the alternative timber screw acc. to respective European Technical Assessment or EN 1995-1-1 [mm]

$M_{y,k}$ characteristic yield moment of the alternative screw acc. to respective European Technical Assessment or EN 1995-1-1 [Nm]

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$R_{ax,k}$ characteristic axial load bearing capacity of alternative timber screw acc. to respective European Technical Assessment or EN1995-1-1 [3] [N]

$F_{v,0}$ respective first term of the respective failure mode of the Johansen yield theory [N]

Design considerations of alternative timber screws for LamellenFix:

$$\eta_{3,comb} = \left(\frac{E_{3,d}}{n_{3,ef} \cdot R_{v,d}}\right)^2 + \left(\frac{F_{3,Me,ax}}{n_{3,ax} \cdot R_{ax,d}}\right)^2 \leq 1$$

with

$E_{3,d}$ design value of acting load in load direction *F*3 [N]

$n_{i,ef}$ effective number of screws in acc. to Annex 1 [-]
for deviating screw patterns or numbers of screws, the effective number of is to be determined acc. to the respective European Technical Assessment of the alternative screw in the decisive main or secondary beam

$R_{v,d}$ design value of lateral load bearing capacity of the alternative timber screw [N]

$F_{3,Me,ax}$ resulting axial load on the effective timber screws (design value) [N]

$n_{3,ax}$ effective number of axially loaded screws for proposed screw pattern:
$n_{3,ax} = 2^{0,9}$ for LamellenFix LV80 small, LV 80 and LV 120
$n_{3,ax} = 3^{0,9}$ for LamellenFix LV 160

$R_{ax,d}$ design value of axial load bearing capacity of the alternative timber screw [N]

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Axial load on the timber screws in load direction F_3:

$$F_{3,Me,ax} = \frac{M_e}{x}$$

with

x distance between compressive force and tensional force

x = 12 mm for LamellenFix LV 80 small

x = 32 mm for LamellenFix LV 80, LV 120 and LV 160

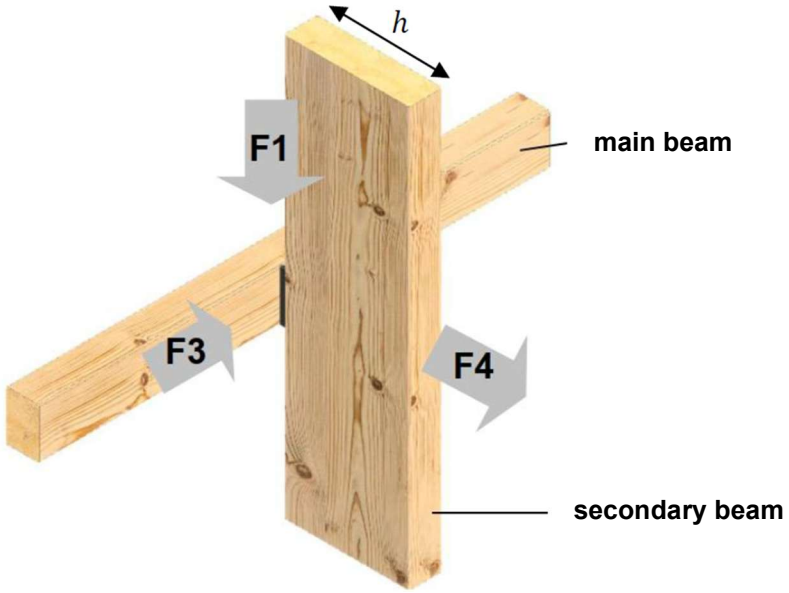
Eccentricity moment in direction F_3:

$$M_e = E_{3,d} \cdot \left(20 + \frac{h}{2}\right)$$

with

$E_{3,d}$ design value of acting load in load direction F_3 [N]

h height of the secondary beam (see Figure below)



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Design considerations for combined load cases

Where properties are claimed for more than one direction of loading, each shall be given together with the below interaction equation corresponding to the force directions (example of all force directions). Consideration is given to the duration of load, the effects of reversal of load from long- and medium-term actions and alternating between tension and compression actions in the members.

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