# Connecting systems

for timber construction, wood curtain and prefabricated walls

Gruendungsschule©Krogmann.

**KNAPP®**
*connectors.com*

Innovative
solutions
Made in Austria
Family Business
since 1983
Your business
partner for
timber frame
mass timber
constructions
or curtain and
prefabricated
walls

RICON® S, RICON® S, patented by KNAPP®
Adjustable collar bolt version for tolerance
compensation up to 5 mm.

Universal timber construction connector
with adjustable collar bolt, designed and
developed for timber construction

Since our establishment in 1986, our family-owned business has been committed to pioneering innovative connectors for timber construction. We pride ourselves on using sustainable and, when possible, renewable materials, ensuring easy assembly and disassembly. At Knapp Connectors, we've long championed the circular principle, even before its widespread recognition.

In the ever-evolving landscape of architecture, durability, sustainability, and adaptability are paramount. Structures need to be resilient, environmentally friendly, and capable of being repurposed or reused. This requires connection systems that can seamlessly integrate with the principles of circular construction.

With this vision in mind, we've meticulously crafted a diverse range of connection systems tailored to meet the demands of timber and structural engineering. Our solutions offer innovative, sustainable, and circular approaches to various construction challenges.

Knapp Connectors are renowned for their easy prefabrication assembly, quick on-site installation, and hassle-free disassembly. They are not only reusable but also recyclable and can be upcycled, allowing for flexible modification, disassembly, and reconstruction as needed. Our materials are of the highest quality, boasting longevity, and some are even partly or wholly composed of renewable resources, like our Mateo timber nail.

At Knapp, we aim to be the trusted partner for architects and engineers looking to incorporate sustainable and resilient practices into their projects while ensuring long-term viability. We take pride in the diverse range of projects our valued customers have undertaken using our connectors.

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We're excited to share our new brochure and website, showcasing our wide array of both familiar and innovative connection systems, accompanied by numerous inspirational references. Our aim is to provide you with detailed insights and practical guidance for your construction needs.

Explore our product range, including RICON, GIGANT, WALCO, RICON S, MEGANT by T-JOINT, and MATEO, and join us in our commitment to staying ahead of industry trends. At Knapp Connectors, we're here to support you at every step of your construction journey.

Best regards,

Friedrich Knapp and Family.

# Table of contents

**Guiding symbols**: you will find the following symbols for orientation with each type of connector.

| | | | |
|---|---|---|---|
| **H** Wood to wood connection | **Visible** | **Fire-resistance rating** | **Assembly every side-by-side** |
| **S** Wood to steel connection | **Concealed** | **Assembly from below** | **Assembly 3 or 4 sided** |
| **B** Wood to concrete connection | **Allow prefabrication in workshop** | **Assembly from above** | **Certifications** |

©defrancesco photography │ Chalets Alpegg von Foidl Holzbau

# KNAPP® - The main and secondary beams connecting revolution

**KNAPP® connectors for future-oriented timber construction and engineered timber construction**

We are the Austrian manufacturer and supplier for innovative connecting systems in timber construction and timber engineering. We offer with GIGANT, RICON®, WALCO® V, RICON® S , MEGANT® and T-JOINT a whole range of efficient connecting systems.

All connecting systems have the European Approval (ETA) with CE marking, for many types of wood and modern wood materials and are externally monitored.

Architects, planners and manufacturers have the security of a European approved connecting system, which even meets the Swiss national building regulations.

**Connecteur MEGANT®**

## The revolution

More than 20 years ago, we revolutionised end-grain fastening systems with, at the time, the only mechanical connector designed  for main and secondary beams. We named it GIGANT and were the first on the European market to get German building approval for this field.

## Tested, patented and approved

The proven and patented KNAPP® connecting systems can bear loads in all directions providing therefore the utmost safety and perfect functionality.

# PROGRESSIVE TIMBER CONSTRUCTION CONNECTORS

**Invisible connection for high loads**

The RICON® S connectors extend the innovative product range and enable invisible and fast connections for loads up to 230 kN.

Heavy duty applications up to 768 kN are covered by the MEGANT® connectors .

**High degree of prefabrication in house construction**

The WALCO® V system has been designed for connecting timber walls in prefabricated houses and, like all KNAPP® timber connectors, can be structurally calculated. Connections are possible to wood, steel, concrete and masonry. The greatest advantage of the WALCO® V connector is enabling the whole precast wall production in the factory followed by a precise and fast

assembly on site, preventing potential hazards on the construction site. Another advantage of the WALCO® V system is that wall openings, as required with conventional screw connections, are no longer needed.

This has the effect of a significantly tighter wall in direct comparison.  Over the time, the system has been complemented by variable base plates for modular and facade walls and now with the new wall to floor anchor WALCO® L and T.

**Product innovations**

The T-JOINT angled cylinder connects perfectly rigid frame corners and tension joints by means of a transverse screw connection and is ideal for assembling carports.

The MATEO wooden nail is used in ecological house construction.

**Analysis and Planner service**

We offer a planning and  dimensioning service to planners, structural engineers and architects.

You have the choice between an interactive load table, a dimensioning tool and a DC-Statik manufacturer's version of Dietrich's to create a pre-dimensioning yourself and our customized calculation service by our engineers.
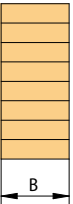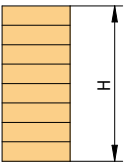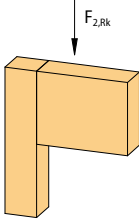
Only close cooperation during the planning phase guarantees the efficient realisation of all projects. All timber construction connectors are available directly from KNAPP® or from selected sales partners and dealers.

# Wood connectors overview

**Applications for timber connecting systems**

The chart provides a quick overview of the versatility and areas of application of all KNAPP® connectors.

| AREAS OF APPLICATION AND TYPES OF WOOD | Connectors | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | p. 13 | p. 21 | p. 37 | p. 47 | p. 89 | p. 109 | p. 115 | p. 127 | p. 133 | p. 141 | p. 147 | p. 153 | p. 161 |
| | RICON® inox | RICON® | GIGANT | RICON® S | MEGANT® | WALCO® Z | WALCO® V | WALCO® | WALCO® BOLT | WALCO® PIPE | WALCO® L and T | T-JOINT | MATEO |
| Balcony | ● | ● | ● | ● | | | | | | | | ● | |
| Carport | ● | ● | ● | ● | | | | | ● | | | ● | ● |
| Curtain wall, wall mounting | | ● | | | | ● | ● | ● | ● | ● | ● | | ● |
| Prefabricated house construction | ● | ● | | ● | | ● | ● | ● | ● | ● | ● | ● | ● |
| Industrial buildings | | ● | ● | ● | ● | | | | | | | ● | |
| Wood-aluminum curtain walls | ● | ● | ● | | | | | | | | | | |
| Timber frame construction | | ● | ● | ● | | | ● | ● | ● | ● | ● | ● | ● |
| Post and Beam construction | | ● | ● | ● | ● | | | | | | ● | | ● |
| Mass Timber Construction | | | ● | ● | | | | | | | ● | ● | ● |
| Modular building | | | | ● | ● | ● | ● | ● | ● | ● | | ● | ● |
| Playground and sports equipment | ● | ● | ● | | | | | | | | | | ● |
| Canopy, porch, pergola | ● | ● | ● | | | | | | ● | ● | | ● | |
| Winter garden, sunroom | ● | ● | ● | | | | | ● | | | | ● | |
| Solid wood (SCWD), Softwood (SWD), Hardwood (HWD) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Solid structural timber (KVH) | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● |
| Glue Laminated Timber Beams (GLT) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Laminated veneer lumber LVL (KERTO®) | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ● |
| BauBuche | | ● | ● | ● | ● | | | | | | | ● | |
| Duo and Trio laminated beams | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | |
| Cross-laminated Timber (CLT) | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **MAGNUM**BOARD® OSB | | | | | | ● | ● | | | | | | |
| Accoya | ● | ● | | ● | | | | | | | | ● | |

# BEAM HANGER SELECTION OVERVIEW (all RICON® ranges)

**Pre-selection tool for using KNAPP® connectors on glulam beams GL24h**

The overview allows a quick identification of the suitable KNAPP® connectors. The table shows the permissible loads for each system in relation to the minimum cross-section of the beam.

For more information on each connector, please refer to the pages indicated in the right-hand column of the table. Parameters such as geometry and special connections must be checked.

| Min. beam width | Min. beam height | Characteristic load bearing capacities $F_{2,Rk}$ [kN] | Connectors | Art.-No. | Page |
|---|---|---|---|---|---|
| mm | mm | 0   5   10   15   20 | | | |
| 30 | 86 | 4,8 | RICON® inox 66/16 | K267 | 15 |
| 30 | 90 | 4,8 | RICON® inox 70/20 | K271 | 15 |
| 38 | 120 | 7,5 | RICON® inox 100/25 | K268* | _ |
| | 140 | 8,9 | RICON® inox 120/25 | K272 | 16 |
| | 160 | 8,9 | RICON® inox 140/25 | K269* | _ |
| | 180 | 10,4 | RICON® inox 160/25 | K273 | 16 |
| 50 | 60 | 4,0 | RICON® inox 40/40 | K378 | 19 |
| | 80 | 5,0 | RICON® 60/40 | K360 | 25 |
| | 80 | 5,2 | RICON® inox 60/30 | K274 | 17 |
| | 100 | 7,3 | RICON® 80/40 | K361 | 25 |
| | 100 | 7,5 | RICON® inox 80/30 | K275 | 17 |
| | 100 | 7,3 | RICON® inox 80/40 | K372 | 19 |
| | 120 | 10,0 | RICON® 100/40 | K362 | 26 |
| | 120 | 10,4 | RICON® inox 100/30 | K276 | 17 |
| | 140 | 12,8 | RICON® 120/40 | K363 | 26 |
| | 140 | 13,2 | RICON® inox 120/30 | K277 | 18 |
| | 160 | 15,5 | RICON® 140/40 | K365 | 27 |
| | 160 | 16,1 | RICON® inox 140/30 | K278 | 18 |
| | 180 | 17,4 | RICON® inox 160/30 | K279 | 18 |
| | 180 | 17,4 | RICON® inox 160/40 | K376 | 19 |
| | 180 | 18,2 | RICON® 160/40 | K364 | 27 |
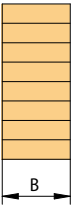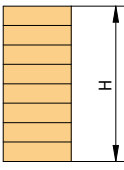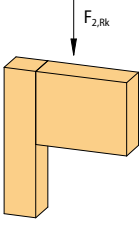
**\*** These RICON® stainless steel connectors are only available on request, for further information please contact our consultants directly.

**References**

# CONNECTEURS CONSTRUCTION BOIS

**Pre-selection tool for using KNAPP® connectors on glulam beams GL24h**

| Min. beam width | Min. beam depth | Characteristic connection load $F_{2,Rk}$ [kN] | Connectors | Art.-No. | Page |
|---|---|---|---|---|---|
| mm | mm | | | | |
| 60 | 150 | 12,5 | GIGANT 120/40 | K051 | 39 |
| | 200 | 16,7 | GIGANT 150/40 | K050 | 40 |
| | 200 | 19,2 | GIGANT 150/40 max¹ | K050 | 40 |
| | 220 | 25 | GIGANT 180/40 | K052 | 41 |
| | 220 | 30,7 | GIGANT 180/40 max² | K052 | 41 |
| 100 | 150 | 37,1 | RICON®S 140/60 VS | K126 | 52 |
| | 200 | 40,2 | RICON®S 140/60 VS max³ | K126 | 52 |
| | 200 | 56,7 | RICON®S 200/60 VS | K127 | 55 |
| | 220 | 66,5 | RICON®S 200/60 VS max⁴ | K127 | 55 |
| | 220 | 96,8 | MEGANT® 310/60/40 | K242 | 97 |
| | 520 | 152,1 | MEGANT® 430/60/40 | K243 | 98 |
| | 640 | 177,7 | MEGANT® 550/60/40 | K244 | 99 |
| 120 | 230 | 79 | RICON®S 200/80 VS | K128 | 58 |
| | 480 | 92,4 | RICON®S 200/80 VS max⁵ | K128 | 58 |
| | 320 | 118,1 | RICON®S 290/80 VS | K129 | 61 |
| | 560 | 142,7 | RICON®S 290/80 VS max⁶ | K129 | 61 |
| | 720 | 170,6 | RICON®S 390/80 VS+ZP | K191 | 64 |
| | 800 | 195,3 | RICON®S 390/80 VS+ZP max⁷ | K191 | 64 |
| 140 | 440 | 124,5 | MEGANT® 310/100/40 | K239 | 100 |
| | 520 | 207,4 | MEGANT® 430/100/40 | K240 | 101 |
| | 640 | 235,2 | MEGANT® 550/100/40 | K241 | 102 |
| 190 | 400 | 156 | MEGANT® 310/150/50 | K197 | 103 |
| | 520 | 260 | MEGANT® 430/150/50 | K220 | 104 |
| | 640 | 364 | MEGANT® 550/150/50 | K221 | 105 |
| | 710 | 416 | MEGANT® 610/150/50 | K270 | 106 |
| | 830 | 443,2 | MEGANT® 730/150/50 | K251 | 107 |
| | 1130 | 768 | MEGANT® 1030/150/50 SL | K180 | 108 |

**Screw connection alternatives (for higher load bearing capacities)**

¹ GIGANT 150x40 max with 4 CS-screws 10x200 in secondary beam
² GIGANT 180x40 max with 6 CS-screws 10x200 in secondary beam
³ RICON®S 140x60 VS max with 10 CS-screws 8x240 in secondary beam
⁴ RICON®S 200x60 VS max with 16 CS-screws 8x240 in secondary beam

⁵ RICON®S 200x80 VS max with 16 CS-screws 10x300 in secondary beam
⁶ RICON®S 290x80 VS max with 25 CS-screws 10x300 in secondary beam
⁷ RICON®S 390x80 VS+ZP max with 28 CS-screws 10x300 in secondary beam

# RICON® S range

**RICON®S EK GK  - Pre-selection tool for using KNAPP® connectors on glulam beams GL24h**

| Min. beam width | Min. beam depth | Characteristic connection load $F_{2,Rk}$ [kN] | Connectors | Art.-No. | Page |
|---|---|---|---|---|---|
| mm | mm | 0 — 100 — 180 | | | |
| 100 | 160 | 31,5 | RICON®S 140/60 VK | K130 | 75 |
| | 260 | 33,5 | RICON®S 140/60 VK max[8] | K130 | 75 |
| | 220 | 34,9 | RICON®S 200/60 VK | K132 | 76 |
| | 160 | 37,1 | RICON®S 140/60 EK | K146 | 67 |
| | 160 | 37,1 | RICON®S 140/60 GK | K134 | 79 |
| | 160 | 40,2 | RICON®S 140/60 EK max[9] | K146 | 57 |
| | 160 | 40,2 | RICON®S 140/60 GK max[9] | K134 | 79 |
| | 220 | 41,4 | RICON®S 200/60 VK max[10] | K132 | 76 |
| | 220 | 44,2 | RICON®S 200/60 EK | K148 | 68 |
| | 220 | 44,2 | RICON®S 200/60 GK | K136 | 80 |
| 120 | 230 | 48,8 | RICON®S 200/80 VK | K138 | 77 |
| | 320 | 48,8 | RICON®S 290/80 VK | K141 | 78 |
| | 230 | 58,4 | RICON®S 200/80 VK max[11] | K138 | 77 |
| | 320 | 59,7 | RICON®S 290/80 VK max[12] | K141 | 76 |
| | 230 | 65,0 | RICON®S 200/80 EK | K153 | 69 |
| | 230 | 65,0 | RICON®S 200/80 GK | K142 | 81 |
| | 320 | 72,2 | RICON®S 290/80 EK | K156 | 70 |
| | 320 | 72,2 | RICON®S 290/80 GK | K145 | 82 |

**Screw connection alternatives (for higher load bearing capacities)**

[8]  RICON®S 140x60 VK max with 8 CS-screws 8x240 in secondary beam
[9]  RICON®S 140x60 EK/GK max with 10 CS-screws 8x240 in secondary beam
[10]  RICON®S 200x60 VK max with 8 CS-screws 8x240 in secondary beam
[11]  RICON®S 200x80 VK max with 9 CS-screws 10x300 in secondary beam
[12]  RICON®S 290x80 VK max with 9 CS-screws 10x300 in secondary beam

# WALCO® range

**Pre-selection tool for using KNAPP® connectors on glulam beams GL24h**

| Min. wood width | Min. wood thickness | Characteristic connection load $F_{2,Rk}$ [kN] | Connectors | Art.-No. | Page |
|---|---|---|---|---|---|
| mm | mm | 0 — 5 — 10 — 15 | | | |
| 80 | 60 | 5,9 | WALCO® V60 KS | K701 | 130 |
| | 60 | 4,8 | WALCO® V60 EH | K704 | 130 |
| | 60 | 4,9 | WALCO® V60 VK | K700 | 130 |
| | 60 | 8,6 | WALCO® V60 GH | K702 | 130 |
| 100 | 60 | 7,1 | WALCO® V80 KS | K711 | 131 |
| | 60 | 6,5 | WALCO® V80 EH | K713 | 131 |
| | 60 | 6,2 | WALCO® V80 VK | K710 | 131 |
| | 60 | 16,0 | WALCO® V80 GH | K712 | 131 |
| 100 x 48 | 60 x 48 | 9,0 | WALCO® Z32 (C24) | K078 | 113 |
| 100 x 60 | 60 x 60 | 10,80 | WALCO® Z40 (C24) | K072 | 109 |

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## Planner service

## Dimensioning for all connections
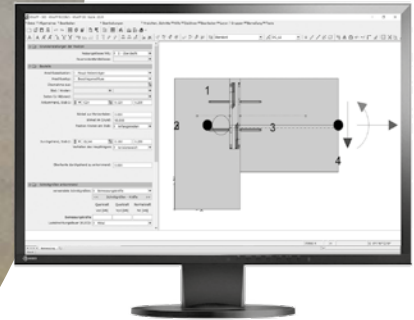
We help you to realise more projects in less time!
We offer a comprehensive planning and calculation
service, especially for architects, planners and wood builders.

- **KNAPP® DC-Statik design software**
- **Online dimensioning tool**
- **Interactive load capacity tables**
- **Custom planning service**

You can find all the information on our website under Design Service. Close cooperation during the planning phase guarantees optimal implementation of your projects.

## Partner software

**Recommended partner software for interfacing to machine processing:**

**Dietrich's**     **hsb**cad     WM WALLNER MILD HOLZBAUSOFTWARE     Nussreiner HOLZBAU PROGRAMME     WETO AG technologies

**DC Statik**    We now offer our KNAPP® DC-Statik design software. KNAPP® DC-Statik is available for the connector products MEGANT®, GIGANT, RICON®, RICON® S and RICON® stainless steel. With this software you can easily create verifiable documents and calculate your projects safely! You can download the programme free of charge.

**SEMA** SOFTWARE    The timber construction and wall connectors are implemented and available in the DataStore of SEMA. The SEMA user is able to download the master data for the KNAPP® connection systems in the SEMA programme. The master data of the KNAPP® fasteners are easily accessible in the SEMA DataStore via the DataStore button. These are available in the languages German, English and French.

**cadwork**    2D structural elements and their connection nodes are calculated with the structural analysis software from Wallner Mild und Dietrich structural analysis software. The connection nodes can be dimensioned with the Knapp connectors RICON®, GIGANT®, RICON®S and MEGANT®.

**PLANNER SERVICE**

# Wood connector

## Made of A2 stainless steel with usage classification 3
## Connecting up to 17,4 kN*

I Minimum timber width up from 30 mm

I Multiple disassembly and reassembly possible
I Prefabrication in factory
I Flexible installation from the outside and inside
I Joint can be adjusted to correct possible tolerances
I Secure connection with locking clip
I Available as single and double connection

**Available in 13 sizes and 3 versions.**

**The values only apply when used with original KNAPP®
screws! Design values are available on our website under
Planer Service.**

\* **Characteristic value $F_{2,Rk}$ in slide-in direction according to ETA 10/0189
(2022/08/25), for glulam GL24h.**

RICON® inox

KNAPP®
connectors.com

# RICON® inox

▌ **Applications: visible  and concealed connections**

▌ **Connections:  Steel, concrete, wood materials and special wood species. e.g. oak, Douglas fir, larch and impregnated woods (Accoya)**

▌ **Indoor and outdoor applications: garden furniture, balcony, terrace roofing, carport, playgrounds and sports equipments, pergola and other structures in service class 1 to 3.**

Corrosion resistance class 2 - Outdoors for pergolas, balconies, playground equipment and special types of wood.
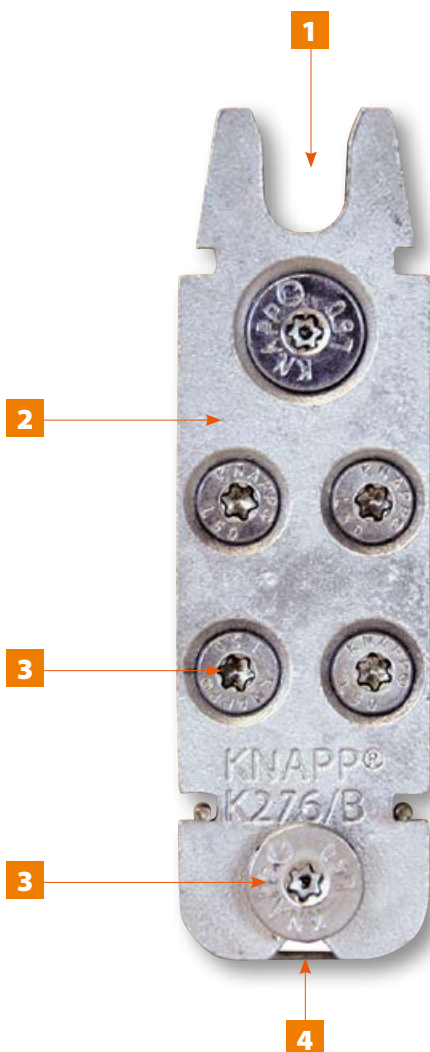
**1** The dovetail shape ensures optimum reception of the RICON® stainless steel retaining CS-screws. The short clamping distance makes it easy to hook in, while engaging the plates,  ensuring tightness and fast assembly of the elements.

**2** RICON® consists of two identical plates made of A2 inox (stainless steel). Inox screws and locking clip are included.

**3** Ø 5 mm and Ø 8 mm RICON® CS-screws have a reinforced shank and collar for optimum strength and grip.

**4** The stainless spring steel locking clip can be installed into the locating slots prior to final assembly.
It locks the connection against the slide-in direction and can be disassembled if needed.

Fire rating: Fire resistance (EN 1995-1-2) through 3-4 sided concealed, joint-tight installation (R30 ≥ 28 mm, R60 ≥ 49 mm)

RICON INOX

# RICON® inox 66/16

(Dimensions in mm)

## Minimum timber cross section
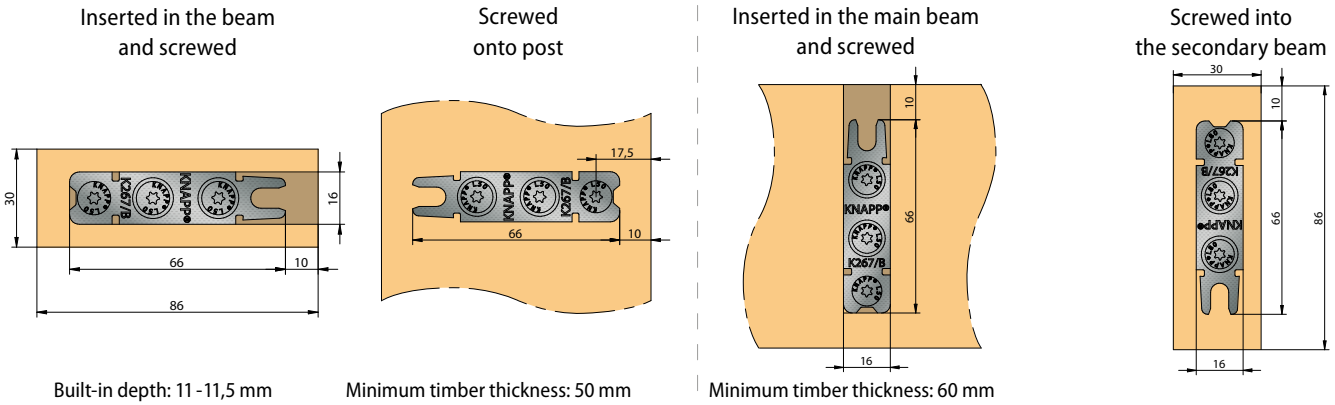
| Inserted in the beam and screwed | Screwed onto post | Inserted in the main beam and screwed | Screwed into the secondary beam |
|---|---|---|---|

Built-in depth: 11 - 11,5 mm

Minimum timber thickness: 50 mm

Minimum timber thickness: 60 mm

## RICON® 66/16 inox - single connection (EA)

Art.-No. K267
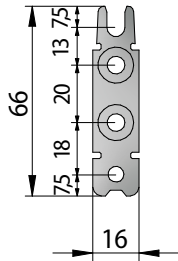
| RICON® inox | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,RK}$ [kN]** |
| 66/16 | EA | 3 CS 5x80 | 3 CS 5x50 | 3.5 | 4.8 |
| 1 locking clip: $F_{3,Rk}$ = 1,0 kN | | | 2 locking clips: $F_{3,Rk}$ = 2,0 kN | | |

Minimum timber cross section: 30 x 86 mm

Alternative screws: **load varies.
3 CS-screws 5x25          3 CS-screws 5x30
3 CS-screws 5x50          3 CS-screws 5x60

\* Homogeneous glulam - indoor

# RICON® inox 70/20

| Inserted in the beam and screwed | Screwed onto post | Inserted in the main beam and screwed | Screwed into the secondary beam |
|---|---|---|---|
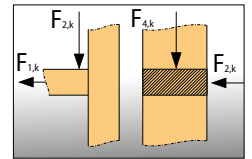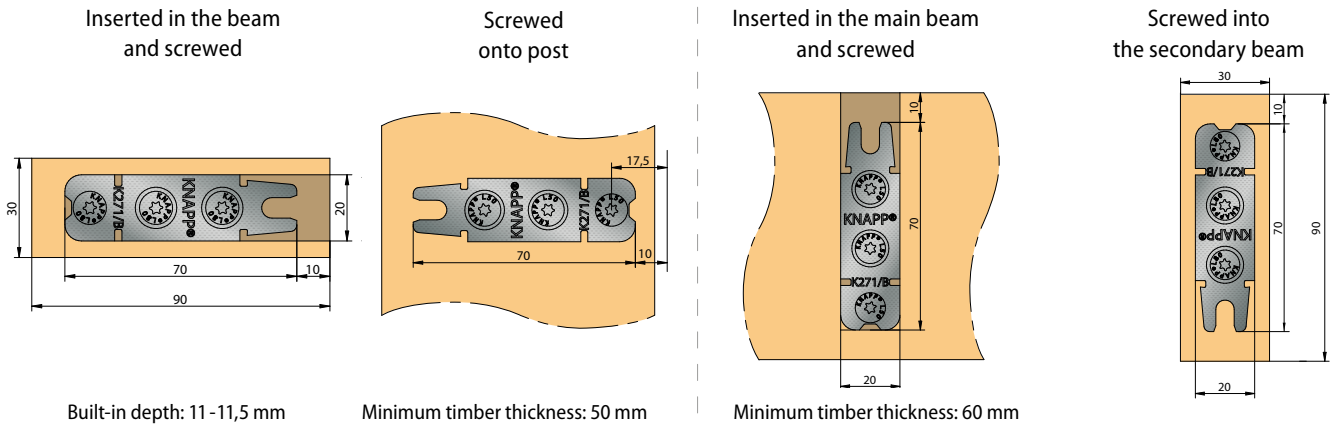
Built-in depth: 11 - 11,5 mm

Minimum timber thickness: 50 mm

Minimum timber thickness: 60 mm

## RICON® 70/20 inox - single connection (EA)

Art.-No. K271
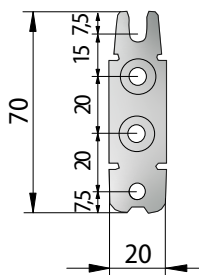
| RICON® inox | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,RK}$ [kN]** |
| 70/20 | EA | 3 CS 5x80 | 3 CS 5x50 | 3.5 | 4.8 |
| 1 locking clip: $F_{3,Rk}$ = 1,0 kN | | | 2 locking clips: $F_{3,Rk}$ = 2,0 kN | | |

Minimum timber cross section: 30 x 90 mm

Alternative screws: **load varies.
3 CS-screws 5x25          3 CS-screws 5x30
3 CS-screws 5x50          3 CS-screws 5x60

\* Homogeneous glulam - indoor
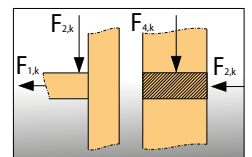
# RICON® inox 25

(Dimensions in mm)

**Minimum timber cross section**
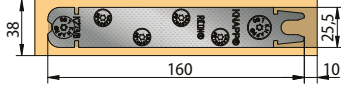
| Inserted in the beam and screwed | Screwed onto post | Inserted in the main beam and screwed | Screwed into the secondary beam |
|---|---|---|---|
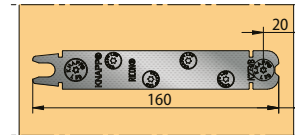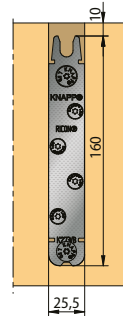
Built-in depth: 11 - 11,5 mm  ·  Minimum timber thickness: 50 mm  ·  Minimum timber thickness: 60 mm
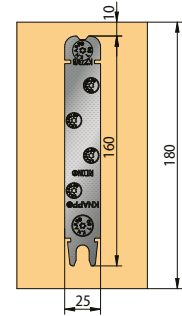
# RICON® inox series 25

## RICON® 120/25 inox - single connection (EA)

**Art.-No. K272**
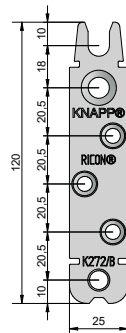
| RICON® inox | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,RK}$ [kN] |
| 120/25 | EA | 2 CS 8x80 3 CS 5x80 | 2 CS 8x50 3 CS 5x50 | 4.4 | 8.9 |
| 1 locking clip: $F_{3,Rk} = 1{,}0$ kN | | | 2 locking clips: $F_{3,Rk} = 2{,}0$ kN | | |

Minimum timber cross section: 38 x 140 mm          * Homogeneous glulam - indoor
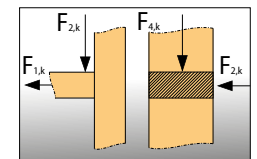


## RICON® 160/25 EA inox - single connection (EA)

**Art.-No.K273**

| RICON® inox | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,RK}$ [kN] |
| 160/25 | EA | 2 CS 8x80 4 CS 5x80 | 2 CS 8x50 4 CS 5x50 | 4.4 | 10.4 |
| 1 locking clip: $F_{3,Rk} = 1{,}0$ kN | | | 2 locking clips: $F_{3,Rk} = 2{,}0$ kN | | |

Minimum timber cross section: 38 x 180 mm          * Homogeneous glulam - indoor



## RICON® references

**Post-beam wood-glass curtain wall Primary school, Germany**
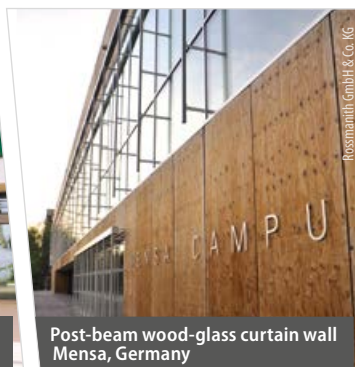
**Post-beam wood-glass curtain wall Mensa, Germany**

**Post-beam timber construction Winter garden, Germany**

**Post-beam timber construction Winter garden, Austria**

# RICON® inox 30

(Dimensions in mm)
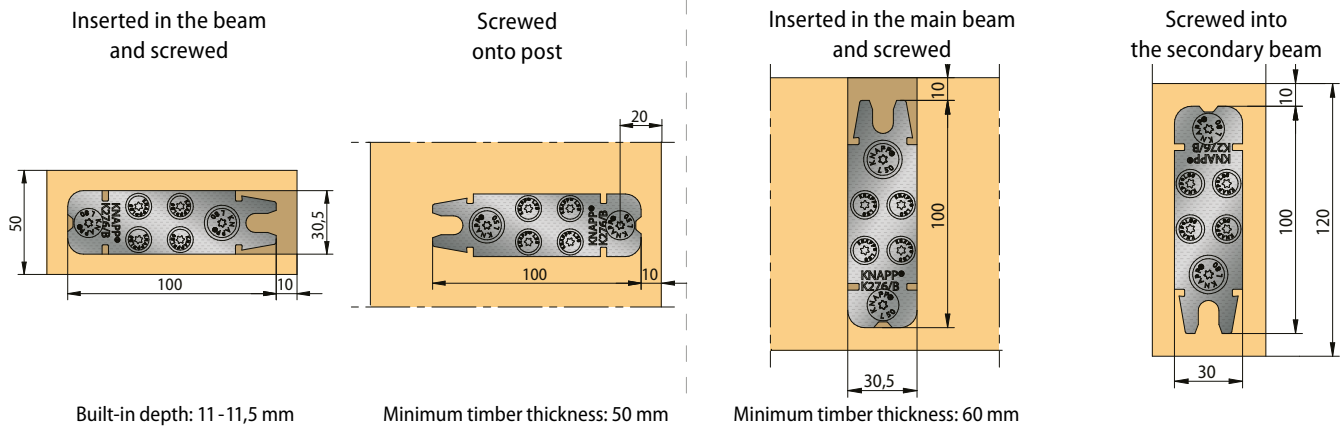
**Minimum timber cross section**

| Inserted in the beam and screwed | Screwed onto post | Inserted in the main beam and screwed | Screwed into the secondary beam |
|---|---|---|---|

Built-in depth: 11 - 11,5 mm    Minimum timber thickness: 50 mm    Minimum timber thickness: 60 mm

# RICON® inox 30

## RICON® 60/30 EA inox - single connection (EA)

**Art.-No.K274**
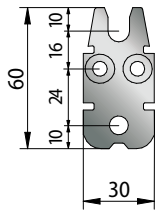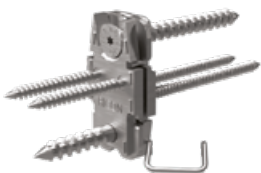
| RICON® inox | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,RK}$ [kN] |
| 60/30 | EA | 2 CS 5x80 1 CS 8x80 | 2 CS 5x50 1 CS 8x50 | 4.4 | 5.2 |
| 1 locking clip: $F_{3,Rk}$ = 1.9 kN | | | 2 locking clips: $F_{3,Rk}$ = 3.8 kN | | |

Minimum timber cross section: 50 x 80 mm

\* Homogeneous glulam - indoor
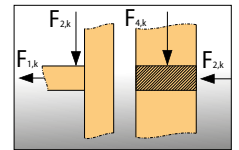
## RICON® 80/30 EA inox - single connection (EA)

**Art.-No.K275**

| RICON® inox | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,RK}$ [kN] |
| 80/30 | EA | 2 CS 8x80 2 CS 5x80 | 2 CS 8x50 2 CS 5x50 | 4.4 | 7.5 |
| 1 locking clip: $F_{3,Rk}$ = 1.9 kN | | | 2 locking clips: $F_{3,Rk}$ = 3.8 kN | | |

Minimum timber cross section: 50 x 100 mm

\* Homogeneous glulam - indoor

## RICON® 100/30 EA inox - single connection (EA)

**Art.-No.K276**
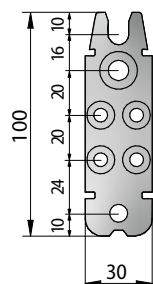
| RICON® inox | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,RK}$ [kN] |
| 100/30 | EA | 2 CS 8x80 4 CS 5x80 | 2 CS 8x50 4 CS 5x50 | 4.4 | 10.4 |
| 1 locking clip: $F_{3,Rk}$ = 1.9 kN | | | 2 locking clips: $F_{3,Rk}$ = 3.8 kN | | |

Minimum timber cross section: 50 x 120 mm

\* Homogeneous glulam - indoor
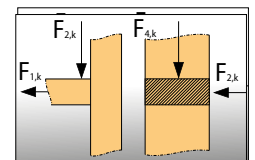
(Dimensions in mm)

## RICON® 120/30 EA inox - single connection (EA)

Art.-No.K277
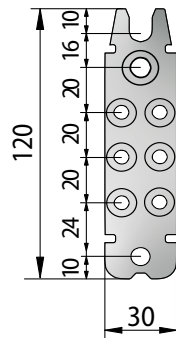
| RICON® inox | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,RK}$ [kN] |
| 120/30 | EA | 2 CS 8x80 6 CS 5x80 | 2 CS 8x50 6 CS 5x50 | 4.4 | 13.2 |
| 1 locking clip: $F_{3,Rk}$ = 1.9 kN | | | 2 locking clips: $F_{3,Rk}$ = 3.8 kN | | |

Minimum timber cross section: 50 x 140 mm

* Homogeneous glulam - indoor
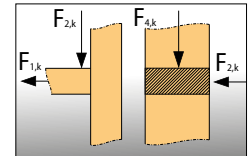
## RICON® 140/30 EA inox - single connection (EA)

Art.-No.K278
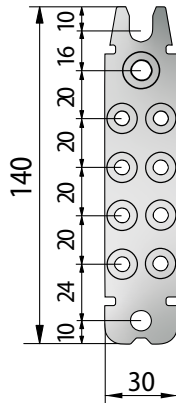
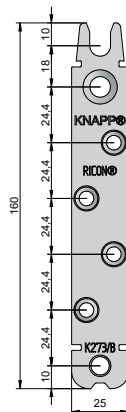| RICON® inox | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,RK}$ [kN] |
| 140/30 | EA | 2 CS 8x80 8 CS 5x80 | 2 CS 8x50 8 CS 5x50 | 4.4 | 16.1 |
| 1 locking clip: $F_{3,Rk}$ = 1.9 kN | | | 2 locking clips: $F_{3,Rk}$ = 3.8 kN | | |

Minimum timber cross section: 50 x 160 mm

* Homogeneous glulam - indoor
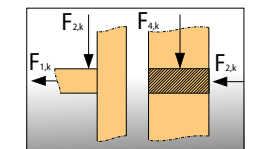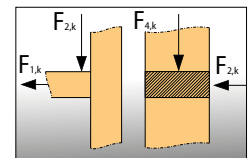
## RICON® 160/30 EA inox - single connection (EA)

Art.-No.K279
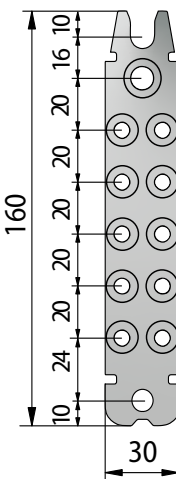
| RICON® inox | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,RK}$ [kN] |
| 160/30 | EA | 2 CS 8x80 10 CS 5x80 | 2 CS 8x50 10 CS 5x50 | 4.4 | 17.4 |
| 1 locking clip: $F_{3,Rk}$ = 1.9 kN | | | 2 locking clips: $F_{3,Rk}$ = 3.8 kN | | |

Minimum timber cross section: 50 x 180 mm

* Homogeneous glulam - indoor
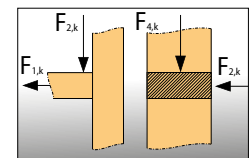
## Installing RICON® inox - Main-secondary beam connection type

Mill with with routing-jig

Pre-drill and screw

Assemble

Secured connection using a locking clip

# RICON® inox 40

(Dimensions in mm)

**Minimum timber cross section**

| Inserted in the beam and screwed | Screwed onto post | Inserted in the main beam and screwed | Screwed into the secondary beam |
|---|---|---|---|
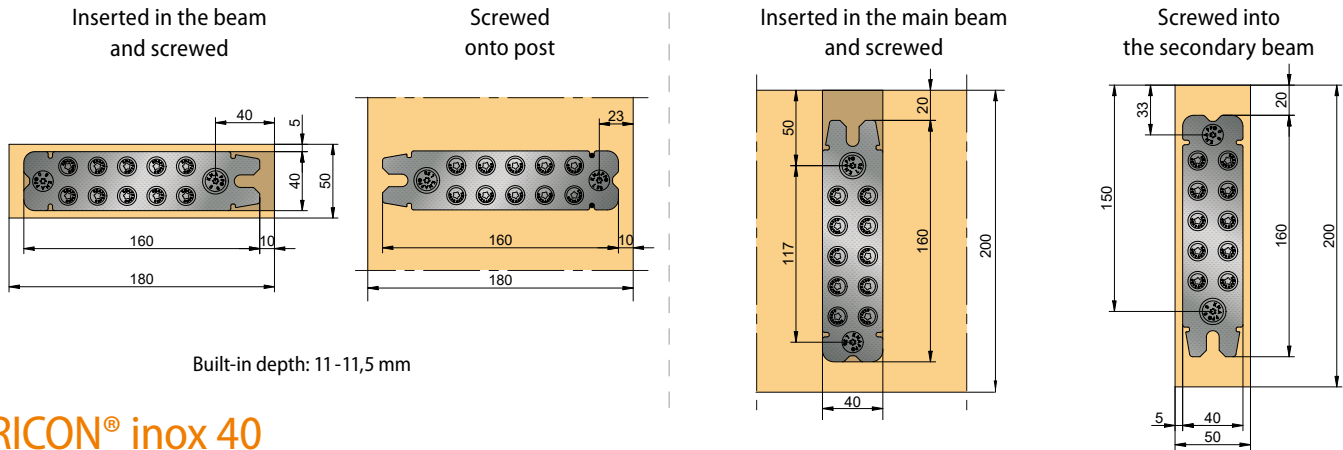
Built-in depth: 11 - 11,5 mm

# RICON® inox 40

## RICON® 40/40 EA inox - single connection (EA)

**Art.-No.K378**
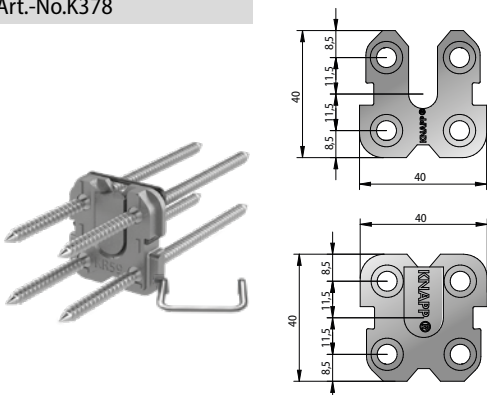
| RICON® inox | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,RK}$ [kN] |
| 40/40 | EA | 4 CS 5x80 | 4 CS 5x50 | 7.5 | 4.0 |
| 1 locking clip: $F_{3,Rk}$ = 2.7 kN | | | 2 locking clips: $F_{3,Rk}$ = 5.4 kN | | |

Minimum timber cross section: 50 x 60 mm

\* Homogeneous glulam - indoor
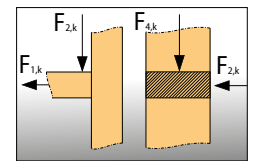
## RICON® 80/40 EA inox - single connection (EA)

**Art.-No.K372**
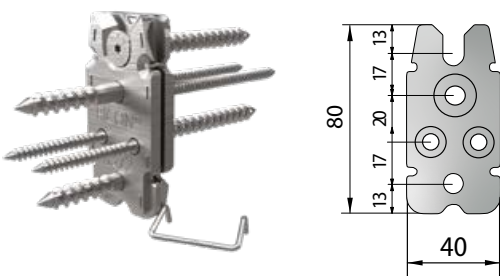
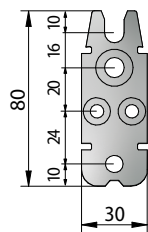| RICON® inox | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,RK}$ [kN] |
| 80/40 | EA | 2 CS 8x80 2 CS 5x80 | 2 CS 8x50 2 CS 5x50 | 4.4 | 7.5 |
| 1 locking clip: $F_{3,Rk}$ = 2.7 kN | | | 2 locking clips: $F_{3,Rk}$ = 5.4 kN | | |

Minimum timber cross section: 50 x 100 mm

\* Homogeneous glulam - indoor
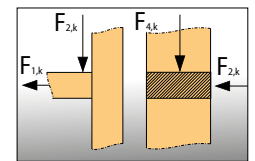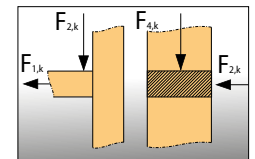
## RICON® 160/40 EA inox - single connection (EA)

**Art.-No.K376**
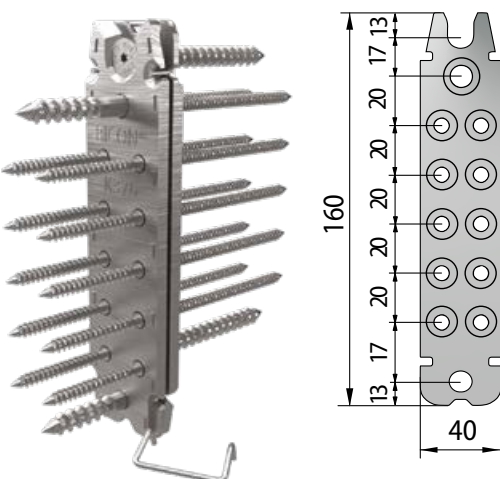
| RICON® inox | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,RK}$ [kN] |
| 160/40 | EA | 2 CS 8x80 10 CS 5x80 | 2 CS 8x50 10 CS 5x50 | 4.4 | 17.4 |
| 1 locking clip: $F_{3,Rk}$ = 2.7 kN | | | 2 locking clips: $F_{3,Rk}$ = 5.4 kN | | |

Minimum timber cross section: 50 x 180mm

\* Homogeneous glulam - indoor
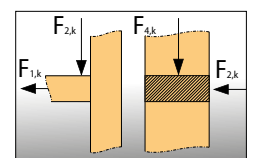
# RICON® inox DA and EAR for all sizes

| Double connection with connecting nuts and RICON® inox CS-screws (available upon request) | Single or double connection with inserts and RICON® inox CS-screws (available upon request) |
|---|---|

**DA**

**EAR**
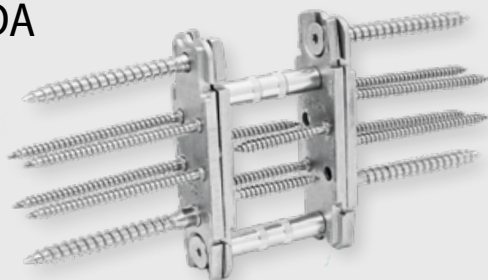
**RICON DA**      **RICON EAR**

# RICON® inox screws

### RICON® Self-tapping CS-screws with reinforced shaft
(delivery includes CS-screws with the matching RICON® connectors)

| Art.-No. Z950 | Inox A2 CS-screws 5x50 |
| Art.-No. Z953 | Inox A2 CS-screws 8x50 |

**Application:** to screw the RICON® inox plate into the side grain of main beam/post.

| Art.-No. Z952 | Inox A2 CS-screws 5x80 |
| Art.-No. Z954 | Inox A2 CS-screws 8x80 |

**Application:** to screw the RICON® inox plate into the side grain of secondary beam/latch.

### RICON® inox DA - EAR CS-screws

| Art.-No. Z955 | Inox A2 CS-screws M5x16 (for RICON® 60/40 DA) |
| Art.-No. Z956 | Inox A2 CS-screws M8x18 (for RICON® DA and EAR) |

**Application:** to mount RICON® plate in a cross joint double connector (DA or EAR).

### RICON® DA connecting nuts
(delivery includes connecting nuts with the matching RICON® connectors)

| Art.-No. K540 | Connecting nut M5 8x48 | 50 mm post thickness |
| Art.-No. K541 | Connecting nut M5 8x53 | 55 mm post thickness |
| Art.-No. K542 | Connecting nut M5 8x58 | 60 mm post thickness |
| Art.-No. K543 | Connecting nut M5 8x78 | 80 mm post thickness |

**Application:** to mount RICON® inox 60/40 double connector (DA).

| Art.-No. K544 | Connecting nut M8 10x36 | <50 mm post thickness |
| Art.-No. K545 | Connecting nut M8 10x48 | 50 mm post thickness |
| Art.-No. K546 | Connecting nut M8 10x53 | 55 mm post thickness |
| Art.-No. K547 | Connecting nut M8 10x58 | 60 mm post thickness |
| Art.-No. K548 | Connecting nut M8 10x68 | 70 mm post thickness |
| Art.-No. K549 | Connecting nut M8 10x78 | 80 mm post thickness |

**Application:** to mount RICON® and RICON® inox bigger sizes double connectors (DA).

### Insert RICON® inox EAR
(delivery for connecting nuts with the matching RICON® connectors are available upon request)

| Art.-No. Z540 | Insert M5x14 for RICON® 60/40 |
| Art.-No. Z541 | Insert M8x18 |

**Application:** to mount unique applications and post sizes.

# Connector for curtain walls

**Connecting post-beam curtain walls
up to 700 kg as glass load and**

**main to secondary beam
up to 23 kN\* as vertical load**

▎ Minimum timber width up from 50 mm
▎ Can be assembled and disassembled at will, repeatedly
▎ High degree of prefabrication in factory for fast and
　precise assembly on site
▎ Elements are assembled on site without the need for
　any further screw fastening
▎ Later adjustment of gap between joints
▎ Compensating for structural tolerances
▎ Application also permitted on interlayer
▎ For 90°-45° screw connection along the grain

## RICON®

**Available in 6 sizes and 3 versions.**

The values only apply when used with original KNAPP®
screws! Design values are available on our website under
Planer Service.

\* Characteristic value $F_{2,Rk}$ in slide-in direction according to ETA 10/0189
　(2022/08/25), for hardwood D30 (e.g. oak).

**KNAPP®**
*connectors.com*

Installation example: RICON® Mensa Schloss Holte

©Hecker System Holzbau

© Dietel

# RICON®

▌ Applications: concealed post-beam and main-secondary beam connections

▌ Connections: wood materials e.g. laminated veneer lumber (Kerto®), BauBuche, hardwoods, steel and concrete

▌ Areas of application: aluminum-wood-glass curtain wall, winter garden, canopy, pergola, timber frame construction in service class 1 and 2.
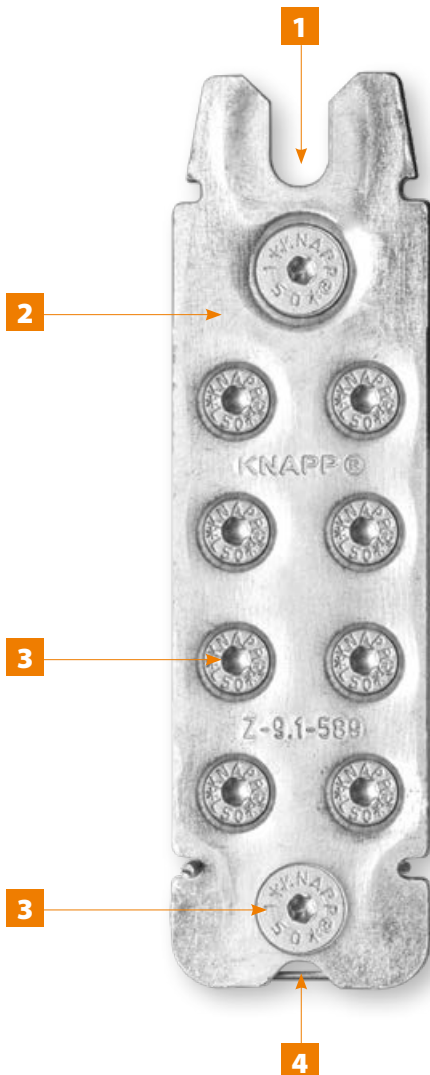
**1** The dovetail shape ensures optimum reception of the RICON® retaining CS-screws. The short clamping distance makes it easy to hook in, while engaging the plates, ensuring tightness and fast assembly of the elements.

**2** RICON® consists of two identical parts. It is made in Austria from a premium quality steel and is also available hot-dip galvanized.

**3** Ø 5 mm and Ø 8 mm RICON® CS-screws. These adjustable holding screws compensate fabrication tolerances. The reinforced shaft with integrated stop guarantees exact positioning.

**4** The stainless spring steel locking clip can be installed into the locating slots prior to final assembly.
It locks the connection against the slide-indirection and can be released again.

Fire rating: Fire resistance (EN 1995-1-2) through 3-4 sided concealed, joint-tight installation (R30 ≥ 28 mm, R60 ≥ 49 mm)

ETA ETA-10/0189 (2022/08/25)

RICON

# RICON®

## Application examples and connection details

### Wood curtain wall up to 700 kg

(Dimensions in mm)

**F₄₅,d** (Glass load)

Aluminium profile

RICON® with locking clip

ISK M8x25

RICON® CS-screw 5x50 with alternating pattern

A
≤ 53　16
42,5　10　120
50

**A**

10
50

Connecting nut M8x48

RICON® double connection

F₄,d

x
16
t　10　80　40　80　≥10
240
≥ 50

F₄₅,d

≤53　16　10　120　120　10
42,5　260-450
≥ 50

Traverse 50/260
Traverse 50/260
Poteau 50/260
Poteau 50/150
Poteau
Traverse 50/150
Traverse 50/260
Poteau 50/260

**A**
**B**

**C**

**C**

Reinforcing plate

50
47
35
12　18
50

PH 4.5x50
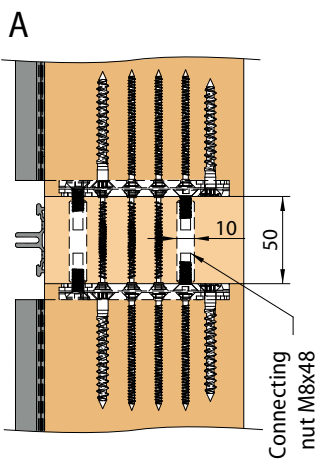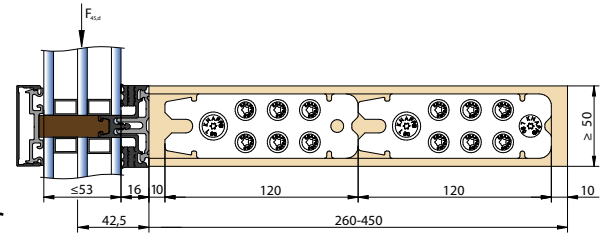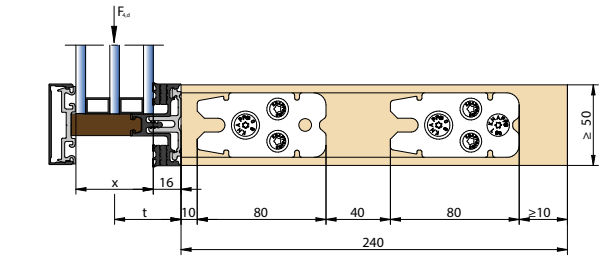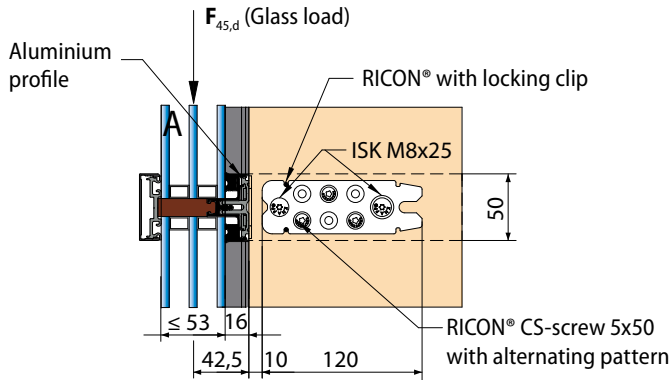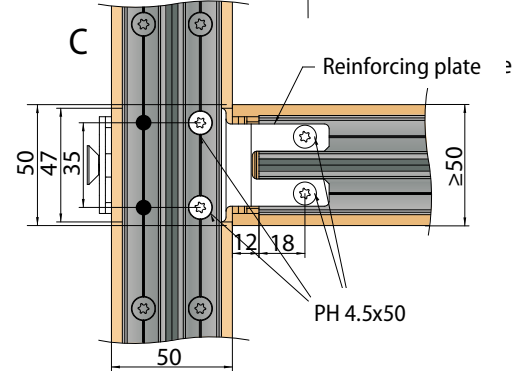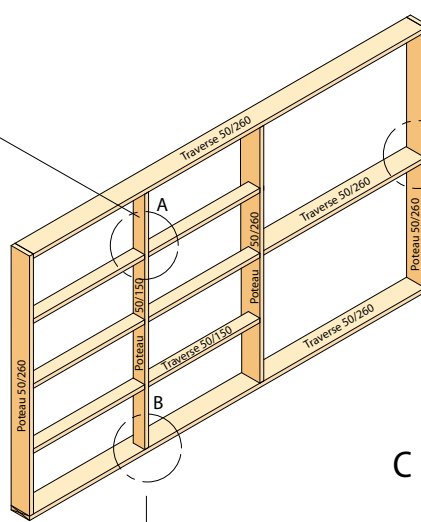
RICON® double connection with reinforcing plate (RP)

**B**

≥50

Poteau

RICON® CS-screw 5x80
RICON® CS-screw 8x80

12
≥50

RICON® with locking clip

40

Continuous beam

RICON® CS-screw 5x50
RICON® CS-screw 8x50

Insertion direction

Insertion direction

Polygon facade
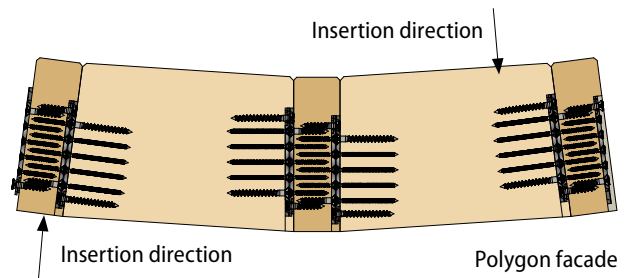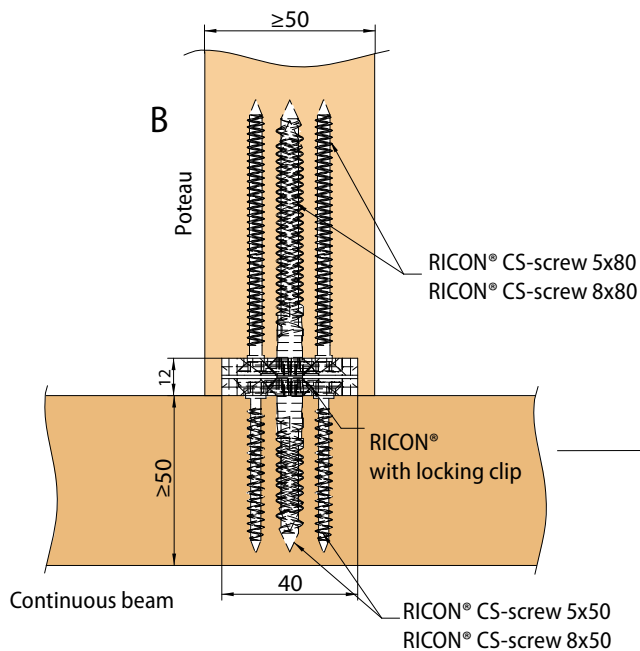
# RICON®

## Application examples and assembly details

| Main-secondary beam connections e.g. wood beam ceilings, roofs and sunrooms. | Wood to steel connection | Wood to concrete connection e.g. with RICON® 140/40 |

(Dimensions in mm)

RICON® single connection, inclined installation.

Ridge purlin

Rafter

α

A

Concrete wall

97

Main beam 180x200

RICON® single connection, installation with concrete anchors upon ETA approval

RICON® double connection

RICON® 80/40 DA38 with locking clip

50

80

130

40

Rafter 60/160

A

B

Ridge purlin 60/200

Rafter 60/160

Middle purlin 60/120

Interior purlin

Post 60/160

Crossbeam 60/160

Post 60/160

Crossbeam 60/160

B

Connecting nut 10x36

Middle purlin

12

36

≥60

Rafter

Middle purlin

12

C

RICON® single connection

≥50

Post

12

≥50

RICON® CS-screw 5x80
RICON® CS-screw 8x80

RICON® with locking clip

Continuous beam

40

RICON® CS-screw 5x50
RICON® CS-screw 8x50

© Solarlux

Construction of a sunroom.

# RICON® 60/40

(Dimensions in mm)
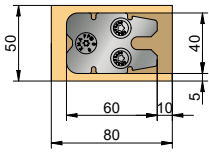
## Minimum timber cross section

| Inserted in the beam and screwed | Screwed onto post | Inserted in the main beam and screwed | Screwed into the secondary beam |
|---|---|---|---|
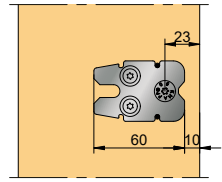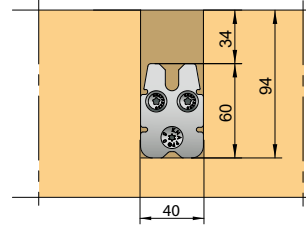
Built-in depth: 12 - 12.5 mm     Min. width of beam and post: 50 mm     Min. width of of main beam: 60 mm
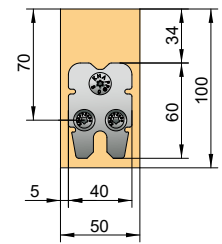
## RICON® 60/40 EA - single connection

Art.-No. K360
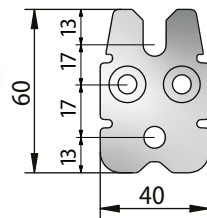
| Connector | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,Rk}$ [kN] |
| 60/40 | EA | 2 CS 5x80 1 CS 8x80 | 2 CS 5x50 1 CS 8x50 | 4.4 | 5.0 |
| 1 locking clip: $F_{3,Rk}$ = 2.7 kN | | | 2 locking clips: $F_{3,Rk}$ = 5.15 kN | | |
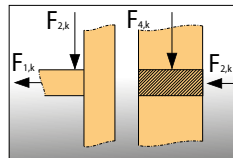
Minimum timber dimensions: 50 x 80 mm

Single connection for post and beam connection with a minimum timber cross section of 50 mm (stress at mid to the axis of beam)

* alternatively, longer screws can be used in end grain.
1 CS-screw 8x160 - $F_{2,RK}$ = 6.3 kN

# RICON® 80/40

## Minimum timber cross section
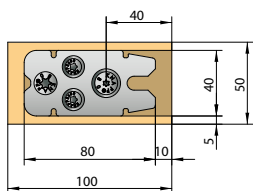
| Inserted in the beam and screwed | Screwed onto post | Inserted in the main beam and screwed | Screwed into the secondary beam |
|---|---|---|---|
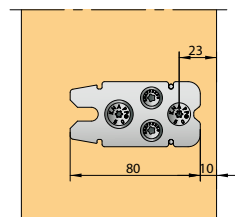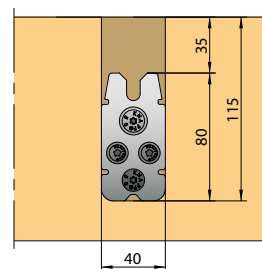
Built-in depth: 12 - 12.5 mm     Min. width of beam and post: 50 mm     Min. width of of main beam: 60 mm
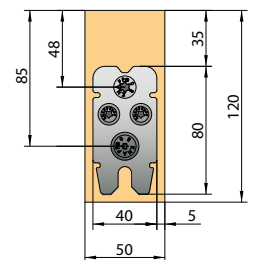
## RICON® 80/40 EA - single connection

Art.-No. K361
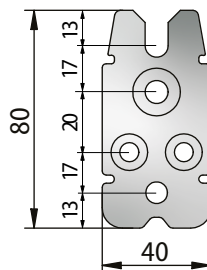
| Connector | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,Rk}$ [kN] |
| 80/40 | EA | 2 CS 5x80 2 CS 8x80 | 2 CS 5x50 2 CS 8x50 | 4.4 | 7.3 |
| 1 locking clip: $F_{3,Rk}$ = 2.7 kN | | | 2 locking clips: $F_{3,Rk}$ = 5.4 kN | | |
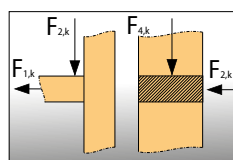
Minimum timber dimensions: 50 x 100 mm

Single connection for post and beam connection with a minimum timber cross section of 50 mm (stress at mid to the axis of beam)

* alternatively, longer screws can be used in end grain.
2 CS-screws 8x160 - $F_{2,RK}$ = 10.3 kN

# RICON® 100/40

(Dimensions in mm)
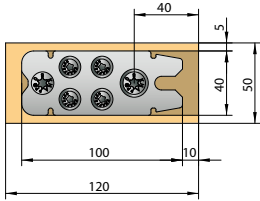
## Minimum timber cross section

| Inserted in the beam and screwed | Screwed onto post | Inserted in the main beam and screwed | Screwed into the secondary beam |
|---|---|---|---|
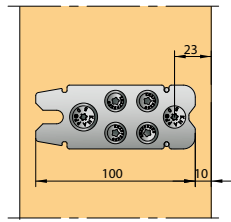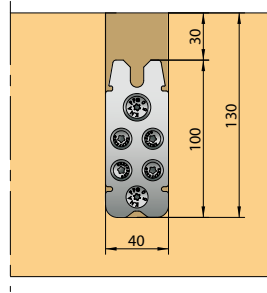


Built-in depth: 12 - 12.5 mm    Min. width of beam and post: 50 mm    Min. width of of main beam: 60 mm
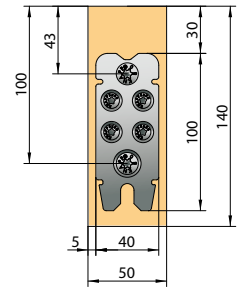
## RICON® 100/40  EA - single connection

Art.-No. K362
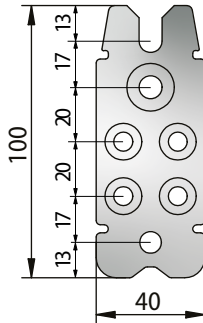


| Connector | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,Rk}$ [kN] |
| 100/40 | EA | 4 CS 5x80 2 CS 8x80 | 4 CS 5x50 2 CS 8x50 | 4.4 | 10.0 |
| 1 locking clip: $F_{3,Rk}$ = 2.7 kN | | | 2 locking clips: $F_{3,Rk}$ = 5.4 kN | | |
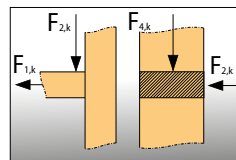


Minimum timber dimensions:  50 x 120 mm

Single connection for post and beam connection with a minimum timber cross section of 50 mm (stress at mid to the axis of beam)

* alternatively, longer screws can be used in end grain.
2 CS-screws 8x160 - $F_{2,RK}$ = 13.9 kN

# RICON® 120/40

## Minimum timber cross section
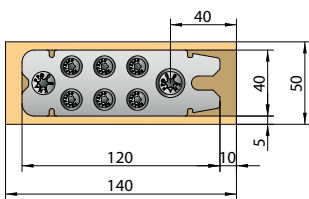
| Inserted in the beam and screwed | Screwed onto post | Inserted in the main beam and screwed | Screwed into the secondary beam |
|---|---|---|---|
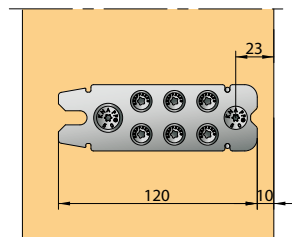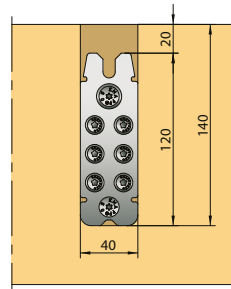


Built-in depth: 12 - 12.5 mm    Min. width of beam and post: 50 mm    Min. width of of main beam: 60 mm
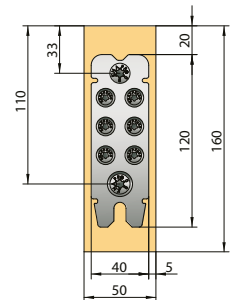
## RICON®  120/40  EA - single connection

Art.-No. K363
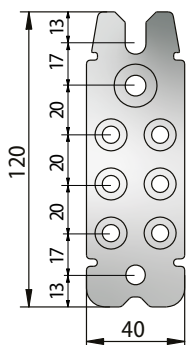


| Connector | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,Rk}$ [kN] |
| 120/40 | EA | 6 CS 5x80 2 CS 8x80 | 6 CS 5x50 2 CS 8x50 | 4.4 | 12.8 |
| 1 locking clip: $F_{3,Rk}$ = 2.7 kN | | | 2 locking clips: $F_{3,Rk}$ = 5.4 kN | | |
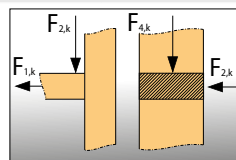


Minimum timber dimensions:  50 x 140 mm

Single connection for post and beam connection with a minimum timber cross section of 50 mm (stress at mid to the axis of beam)

* alternatively, longer screws can be used in end grain.
2 CS-screws 8x160 - $F_{2,RK}$ = 16.6 kN

# RICON® 140/40

(Dimensions in mm)

## Minimum timber cross section

| Inserted in the beam and screwed | Screwed onto post | Inserted in the main beam and screwed | Screwed into the secondary beam |
|---|---|---|---|

Built-in depth: 12 - 12.5 mm　　Min. width of beam and post: 50 mm　　Min. width of of main beam: 60 mm
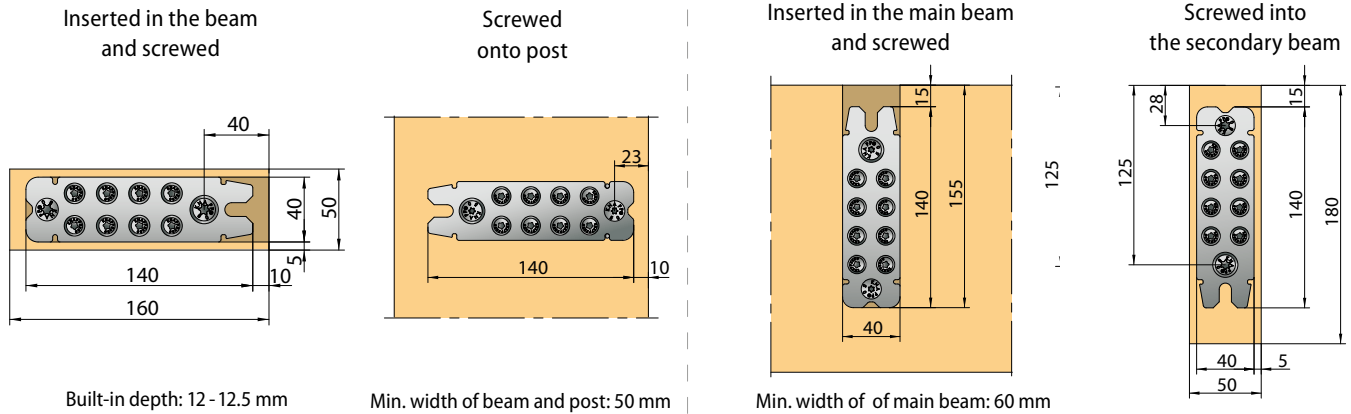
## RICON® 140/40  EA - single connection

Art.-No. K365
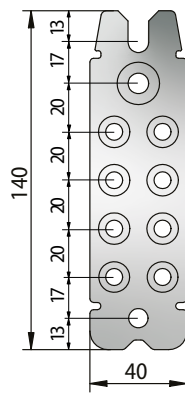
| Connector | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,Rk}$ [kN] |
| 140/40 | EA | 8 CS 5x80 2 CS 8x80 | 8 CS 5x50 2 CS 8x50 | 4.4 | 15.5 |
| 1 locking clip: $F_{3,Rk}$ = 2,7 kN | | | 2 locking clips: $F_{3,Rk}$ = 5,4 kN | | |
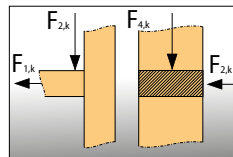
Minimum timber dimensions:  50 x 160 mm

Single connection for post and beam connection with a minimum timber cross section of 50 mm (stress at mid to the axis of beam)

* alternatively, longer screws can be used in end grain.
2 CS-screws 8x160 - $F_{2,RK}$ = 19,3 kN

# RICON® 160/40

## Minimum timber cross section

| Inserted in the beam and screwed | Screwed onto post | Inserted in the main beam and screwed | Screwed into the secondary beam |
|---|---|---|---|

Built-in depth: 12 - 12.5 mm　　Min. width of beam and post: 50 mm　　Min. width of of main beam: 60 mm
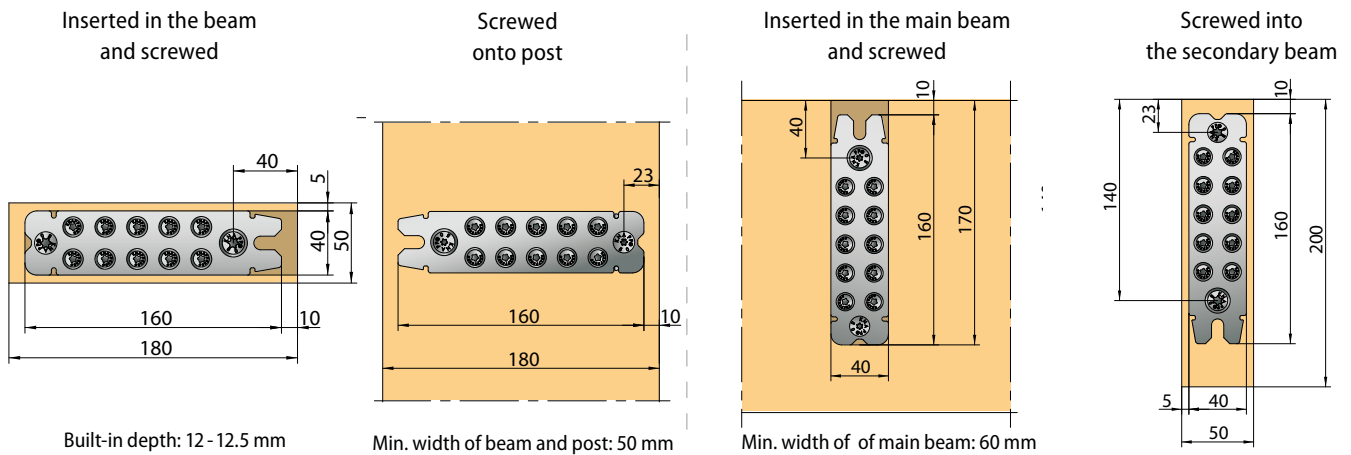
## RICON® 160/40  EA - single connection

Art.-No. K364
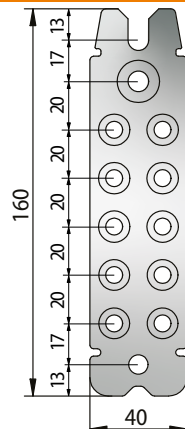
| Connector | Connection | Screw connection | | Charact. charge. [GL24h] C.SER.1* | |
|---|---|---|---|---|---|
| | | Joist | Header | $F_{1,RK}$ [kN] | $F_{2,Rk}$ [kN] |
| 160/40 | EA | 10 CS 5x80 2 CS 8x80 | 10 CS 5x50 2 CS 8x50 | 4.4 | 18.2 |
| 1 locking clip: $F_{3,Rk}$ = 2.7 kN | | | 2 locking clips: $F_{3,Rk}$ = 5.4 kN | | |
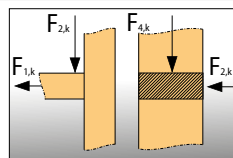
Minimum timber dimensions:  50 x 180 mm

Single connection for post and beam connection with a minimum timber cross section of 50 mm (stress at mid to the axis of beam)

* alternatively, longer screws can be used in end grain.
2 CS-screws 8x160 - $F_{2,RK}$ = 22.0 kN

# RICON®

## Load bearing capacities for timber curtain wall example

(Dimensions in mm)
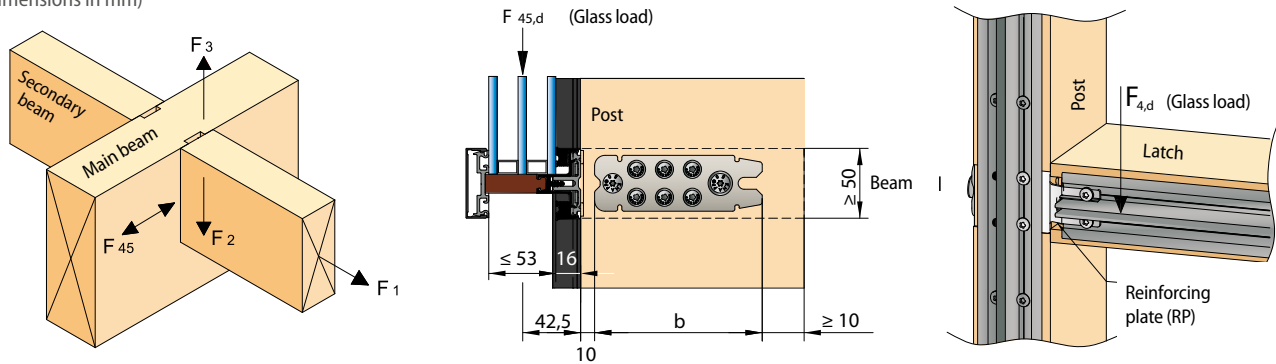


| RICON® | Timber grade | Characteristic values | | | Charact. charge. [kN] $F_{3,Rk}$ | | Eccentric glass loads/post $F_{4,Rd}$ | |
|---|---|---|---|---|---|---|---|---|
| | | $F_{1,Rk}$ [kN] | $F_{2,Rk}$ [kN] | Centred $F_{45,Rk}$ [kN] | Locking clip(s) | | without VP [kg] | with VP [kg] |
| | | | | | 1 | 2 | | |
| 60/40 | C24 | 4,1 | 4,7 | 5,2 | 2,7 | 5,0 | 43 | 317 |
| | GL24h | 4,4 | 5,0 | 5,2 | | | 47 | 320 |
| | GL32h | 4,9 | 5,5 | 5,2 | | | 52 | 326 |
| 80/40 | C24 | 4,1 | 6,8 | 8,0 | 2,7 | 5,4 | 59 | 332 |
| | GL24h | 4,4 | 7,3 | 8,7 | | | 64 | 337 |
| | GL32h | 4,9 | 8,1 | 9,7 | | | 71 | 345 |
| 100/40 | C24 | 4,1 | 9,4 | 11,8 | 2,7 | 5,4 | 94 | 368 |
| | GL24h | 4,4 | 10,0 | 12,8 | | | 102 | 376 |
| | GL32h | 4,9 | 11,0 | 14,3 | | | 114 | 388 |
| 120/40 | C24 | 4,1 | 12,0 | 15,4 | 2,7 | 5,4 | 131 | 404 |
| | GL24h | 4,4 | 12,8 | 15,6 | | | 142 | 415 |
| | GL32h | 4,9 | 14,0 | 15,6 | | | 158 | 432 |
| 140/40 | C24 | 4,1 | 14,5 | 15,6 | 2,7 | 5,4 | 169 | 443 |
| | GL24h | 4,4 | 15,5 | 15,6 | | | 183 | 457 |
| | GL32h | 4,9 | 16,9 | 15,6 | | | 205 | 478 |
| 160/40 | C24 | 4,1 | 17,1 | 15,6 | 2,7 | 5,4 | 210 | 484 |
| | GL24h | 4,4 | 18,2 | 15,6 | | | 227 | 501 |
| | GL32h | 4,9 | 19,9 | 15,6 | | | 254 | 528 |
| 2 x 80/40 | C24 | 4,1 | 11,5 | 10,4 | 2,7 | 5,4 | 180 | 453 |
| | GL24h | 4,4 | 12,3 | 10,4 | | | 195 | 468 |
| | GL32h | 4,9 | 13,6 | 10,4 | | | 218 | 491 |
| 2 x 100/40 | C24 | 4,1 | 16,6 | 15,6 | 2,7 | 5,4 | 270 | 543 |
| | GL24h | 4,4 | 17,8 | 15,6 | | | 292 | 566 |
| | GL32h | 4,9 | 19,5 | 15,6 | | | 327 | 600 |
| 2 x 120/40 | C24 | 4,1 | 21,8 | 15,6 | 2,7 | 5,4 | 356 | 630 |
| | GL24h | 4,4 | 23,2 | 15,6 | | | 385 | 659 |
| | GL32h | 4,9 | 25,4 | 15,6 | | | 431 | 704 |

**Tested** at the University of Karlsruhe (KIT), **Building certification:** ETA-10/0189
**Monitored** by Univ.-Prof. Dr.-Ing. Blaß. at the University of Karlsruhe (KIT) Research Center for Steel, Timber and Masonry.

$F_{1,Rk}/F_{1,Rd}$    Characteristic/Design values of load-bearing capacity in the case of single stress perpendicular to the connector plate (tension)
$F_{2,Rk}/F_{2,Rd}$    Characteristic/Design values in slide-in direction
$F_{3,Rk}/F_{3,Rd}$    Characteristic/Design values against the slide-in direction
$F_{45,Rk}/F_{45,Rd}$    Characteristic/Design values perpendicular to slide-in direction

**Glazing up to 1100 kg with the Schüco AOC.TI curtain wall profile system:**

In combination with RICON® connectors for the assembly of the wooden supporting structure and with the help of suitable glazing supports, this system allows glazing loads of up to 1,100 kg per crossbar.
www.schueco.com

## RICON® reinforcing plate (inox)**

| K519 | K523 | K530 | K531 | K533 | K534 | K535 | K536 | K537 | K538 | K539 |
|---|---|---|---|---|---|---|---|---|---|---|
| Schüco GP 50/50 50 mm* | Schüco GP 50/60 60 mm* | RP RP-tecline 50A0-HA 50mm* | RP RP-tecline 60A0-HA 60mm* | RP RP-tecline 80A0-HA 80mm* | Gutmann P GF 50 50 mm* | Gutmann P GF 60 60 mm* | Gutmann P GF 80 80 mm* | RAICO GP 41 and 47 50 mm* | RAICO GP 41 and 47 60 mm* | RAICO GP 67 80 mm* |

**Application:**   The reinforcing plate connects the base aluminium profiles and increases the load capacity of the post and beam connection. The reinforcing plate is available for different base profiles (see table). Reinforcing plates for other profiles on request.
*width of post and beam



** Reinforcing plates are approved by the building authorities for all common systems as shown in ETA-10/0189.

# RICON® DA and EAR for all sizes

| Double connection with connecting nuts and RICON® CS-screws | Single- or dual connection with insert and RICON® CS-screws |
|---|---|
| DA | EAR |
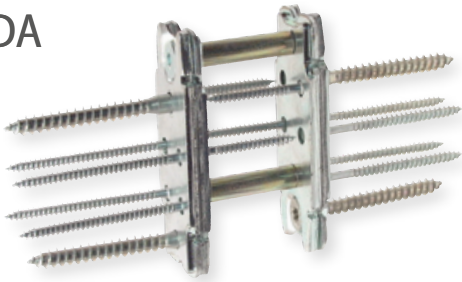
RICON DA    RICON EAR

# RICON® screws

## RICON® Self-tapping CS-screws with reinforced shaft
(CS-screws are included with all RICON® connectors)

| Art.-No. Z533 | CS-screws 5x50 |
|---|---|
| Art.-No. Z531 | CS-screws 8x50 |

**Application:** to mount RICON plate into the side grain of main beam/post.

| Art.-No. Z534 | CS-screws 5x80 |
|---|---|
| Art.-No. Z532 | CS-screws 8x80 |
| Art.-No. Z581 | CS-screws 8x160 |

**Application:** to mount RICON plate into the end grain of secondary beam.

## CS-screws (CS) RICON® DA

| Art.-No. Z545 | CS-screws RICON® M5x20 (for RICON® 60/40 DA) |
|---|---|
| Art.-No. Z548 | CS-screws RICON® M8x25 |

**Application:** to mount RICON plate in a cross joint double connector application.

## Connecting nuts RICON® DA
(Connecting nuts are included with all RICON DA connectors)

| Art.-No. K540 | Connecting nut M5 8x48 | 50 mm post thickness |
|---|---|---|
| Art.-No. K541 | Connecting nut M5 8x53 | 55 mm post thickness |
| Art.-No. K542 | Connecting nut M5 8x58 | 60 mm post thickness |
| Art.-No. K543 | Connecting nut M5 8x78 | 80 mm post thickness |

**Application:** to mount RICON® 60/40 double connector (DA).

| Art.-No. K544 | Connecting nut M8 10x36 | <50 mm post thickness |
|---|---|---|
| Art.-No. K545 | Connecting nut M8 10x48 | 50 mm post thickness |
| Art.-No. K546 | Connecting nut M8 10x53 | 55 mm post thickness |
| Art.-No. K547 | Connecting nut M8 10x58 | 60 mm post thickness |
| Art.-No. K548 | Connecting nut M8 10x68 | 70 mm post thickness |
| Art.-No. K549 | Connecting nut M8 10x78 | 80 mm post thickness |

**Application:** to mount RICON 80/40 and bigger sizes double connectors.

## Inserts RICON® EAR
(connecting inserts can be included upon request)

| Art.-No. Z540 | Insert M5x14 for RICON® 60/40 |
|---|---|
| Art.-No. Z541 | Insert M8x18 |

**Application:** for unique applications and post sizes.

# RICON® accessories

## Routing-jig for all RICON® sizes

| Art.-No. K502 | Routing-jig MULTI F40 (plywood) |

**Note**: the routing-jig MULTI F is suitable for a Ø 30 mm bushing guide
(for plunge router) and a Ø 15 mm TCT router cutter.

**Application:** for milling the pocket to recess connector for concealed mounting.

## RICON® EA/DA drilling-jig guide (galvanized steel)

| Art.-No. | K621 | K622 | K623 | K624 | K629 | K630 |
|---|---|---|---|---|---|---|
| | 60/40 | 80/40 | 100/40 | 120/40 | 140/40 | 160/40 |

**Application:** for installation into the drilling-jig and exact pre-drilling of the positioning srews.

## TCT slotting cutter

| Art.-No. Z066 | 2 flute straight router bits Ø 15 mm, 25 mm length with Ø 8 mm shank |

**Application:** to recess the rebate for RICON® and GIGANT.

## RICON® locking clip (stainless spring steel)

| Art.-No. K064 | RICON® locking clip |

**Application:** to lock the connectors against slide-in direction. If necessary, the connection can be released again.

## RICON® EA/DA drilling-jig for post-beam connections

| Art.-No. | K634 | K635 | K636 | K637 | K638 | K639 |
|---|---|---|---|---|---|---|
| | 60/40 Set | 80/40 | 100/40 | 120/40 | 140/40 | 160/40 |

## RICON® EA/DA drilling-jig for header-joint connections

| Art.-No. | K634 | K642 | K643 | K644 | K645 | K646 |
|---|---|---|---|---|---|---|
| | 60/40 Set | 80/40 | 100/40 | 120/40 | 140/40 | 160/40 |

**Application:** guide for pre-drilling holes of all RICON® connectors.

## RICON® drilling-jig with adjustable drilling blocks

| Art.-No. | - | K647 | K647 | K647 | K647 | K647 |
|---|---|---|---|---|---|---|
| Drilling blocks: | - | 80/40 | 100/40 | 120/40 | 140/40 | 160/40 |

**Application:** guide for pre-drilling holes of all RICON® connectors.
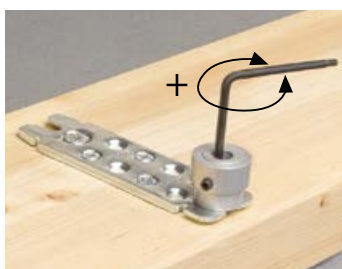
## RICON® mounting set

| Art.-No. K065 | Consisting of: 1 RICON®-depth gauge incl. 1 Torx wrench T25 combined with Allen key SW5 |

**Application:** for fine tuning of RICON® CS-screws.

# RICON® and RICON® inox

## Post-beam connection for curtain walls (EA and DA)



Recess with routing-jig



Pre-drill with drilling-jig



Screw connection



Install the locking clip



Slide together



Secure connection with locking clip
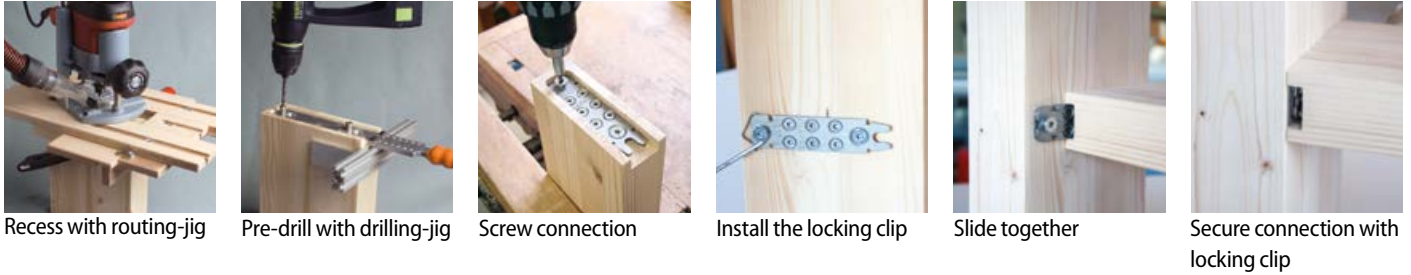
### Locking clip

Depending on load requirements, the locking clip can be inserted on one or onboth sides. If the connection is accessible, it can be unlocked.



To unlock the connection, it is necessary tobend up the locking clip in its center e.g. with a screwdriver.

| Routing dimension RICON® inox | | |
|---|---|---|
| **Width** | **Height** | **Depth** |
| 40.5 mm | variable | $11.5^{+0,5}$ mm |
| 30.5 mm | variable | $11.5^{+0,5}$ mm |
| 20.0 mm | 80 mm | $11.0^{+0,5}$ mm |
| 16.0 mm | 66 mm | $11.0^{+0,5}$ mm |

| Routing dimension RICON® | | |
|---|---|---|
| **Width** | **Height** | **Depth** |
| 40 mm | variable | 12 mm |

The recess can be routed on either side depending on the application. In this case (left picture), the connector plate is recessed into the beam/latch.
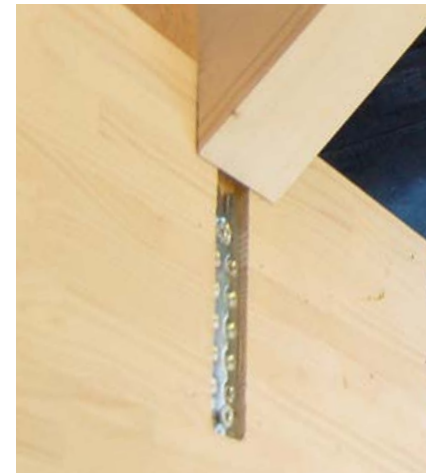


Rafter connection with RICON® 160/40.

# RICON® wood to steel connection
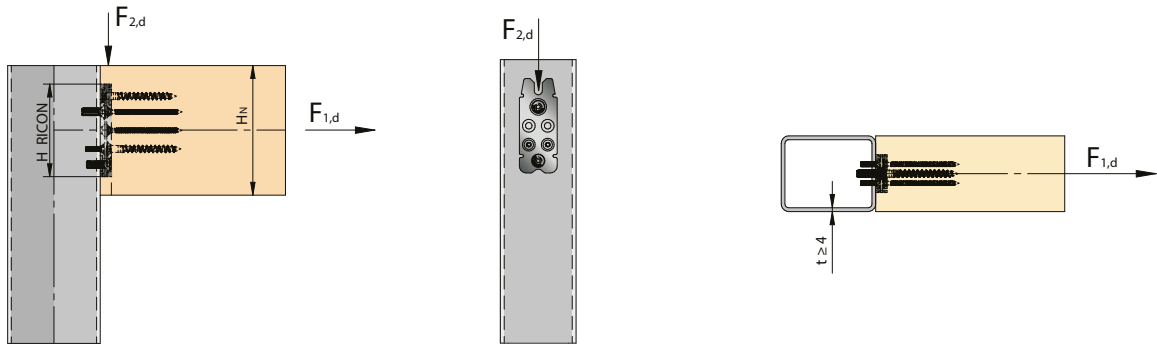


| KNAPP® connector | Traction | | Shear force | |
|---|---|---|---|---|
| | $F_{t,Rk}$ [kN]* on 4 mm steel | $F_{1,Rk}$ [kN]* on glulam GL24h | $F_{v,Rk}$ [kN]* on 4 mm steel | $F_{2,Rk}$ [kN]* on glulam GL24h |
| RICON 60x40 | | | | 5,0 |
| RICON 80x40 | | | | 7,3 |
| RICON 100x40 | | | | 10,0 |
| RICON 120x40 | 30,8 | 4,4 | 31,6 | 12,8 |
| RICON 140x40 | | | | 15,5 |
| RICON 160x40 | | | | 18,2 |

| Sizing value calculation | $F_{t,Rd} = F_{t,Rk} / \gamma_{M,2}$ | $F_{1,Rd} = k_{mod} \times F_{1,Rk}/\gamma_M$ | $F_{v,Rd} = F_{v,Rk} / \gamma_{M,2}$ | $F_{1,Rd} = k_{mod} \times F_{1,Rk} /\gamma_M$ |
|---|---|---|---|---|
| | $\gamma_{M,2} = 1,25$ | $\gamma_M = 1,3$ | $\gamma_{M,2} = 1,25$ | $\gamma_M = 1,3$ |
| | | $k_{mod} = 0,8$  KLED medium | | $k_{mod} = 0,8$  KLED medium |
| | | $k_{mod} = 0,9$  KLED short | | $k_{mod} = 0,9$  KLED short |

| *Screw connection | 2 CS M8x25 | RICON® end-grain screw connection | 2 CS M8x25 | RICON® end-grain screw connection |
|---|---|---|---|---|
| | 2 CS M5x20 | CS 8x80, CS 5x80 | 2 CS M5x20 | CS 8x80, CS 5x80 |

# RICON® wood to concrete connection

**Header-joist connection with glued anchor**

(Dimensions in mm)
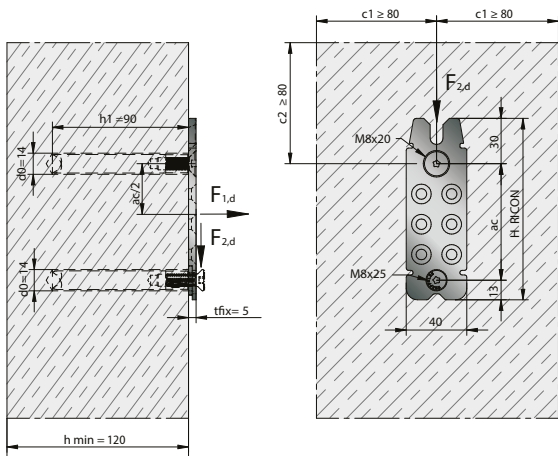


Concrete strength class C20/25

**fischer RG 12x90 M18 I (8.8) with CS M8x25 and CS M8x20** (zinc-coated steel)
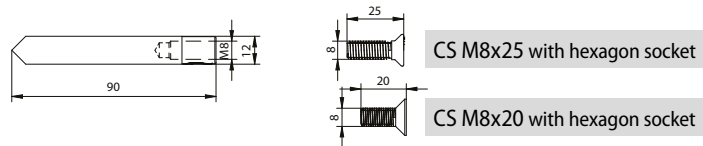


CS M8x25 with hexagon socket

CS M8x20 with hexagon socket

**fischer Superbond-System: FIS SB 390 S**

| | |
|---|---|
| Drill hole diameter $d_0$ = | 14 mm |
| Drill hole depth $h_1$ = | 90 mm |
| Total fixing thickness $C_{Six}$ = | 5 mm |
| Spacing $a_c$ = | cf. table |
| Minimal edge distance $c_{1,min} = c_{2,min}$ = | 80 mm |
| Minimal concrete wall thickness $h_{min}$ = | 120 mm |
| Approval: | ETA-12/0258 |

## Wood to concrete connection in slide-in direction $F_2$

### $F_2$ load-bearing values in the direction of insertion

| KNAPP® connector | Concrete connection | | Timber connection | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | $F_{2,Rd,concrete}$ | Spacing | Wood material | | $F_{2,Rd,timber}$ | | | | |
| | Shear force $F_{2,Rd,concrete}$ [kN] | Dowel spacing ac [mm] | Wood type | Char. Density $\rho_k$ [kg/m³] | Characteristic values [kN] | | Design values $F_{2,Rd}$, $\gamma_M$ =1,3 [kN] | | |
| | | | | | $F_{2,KCC,Rk}$ , $\gamma_M$ =1,0 | $F_{2,Rk}$ | $k_{mod}$ = 0,6 | $k_{mod}$ = 0,8 | $k_{mod}$ = 0,9 |
| RICON® 100/40 | 14,00 | 57,00 | C24 | 350 | 14,00 | 9,40 | 4,34 | 5,78 | 6,51 |
| | | | GL24h | 385 | | 10,00 | 4,62 | 6,15 | 6,92 |
| RICON® 120/40 | 18,00 | 77,00 | C24 | 350 | | 12,00 | 5,54 | 7,38 | 8,31 |
| | | | GL24h | 385 | | 12,80 | 5,91 | 7,88 | 8,86 |
| RICON® 140/40 | 18,00 | 97,00 | C24 | 350 | 18,00 | 14,50 | 6,69 | 8,92 | 10,04 |
| | | | GL24h | 385 | | 15,50 | 7,15 | 9,54 | 10,73 |
| RICON® 160/40 | 18,00 | 117,00 | C24 | 350 | | 17,10 | 7,89 | 10,52 | 11,84 |
| | | | GL24h | 385 | | 18,20 | 8,40 | 11,20 | 12,60 |

Service class: 1-2
$\gamma_{M,timber}$ = 1,3

**Calculation of $F_{2,Rd}$ for timber-concrete connection:**

$$F_{2,Rk} = min \begin{cases} min\ F_{2,Rd,\ timber} \\ min\ F_{2,Rd,\ concrete} \end{cases}$$

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

**Note:**
The fischer anchors for KNAPP wood-to-concrete connections were determined according to the above tables and on the basis of a concrete class C20/25 with the fischer C-FIX calculation tool. They have been specially checked by fischer. Any cases outside the tables must be checked by KNAPP®, fischer or a competent engineer. In many cases, dimensioning with the C-FIX calculation tool is sufficient. The complete analysis of concrete fasteners is available on request from KNAPP®. KNAPP® accepts no liability for the incorrect use of the tables in this document. The condition of the concrete elements (strength classes and surfaces) must be checked by a professional, KNAPP® accepts no responsibility for this. KNAPP® products and KNAPP® connectors must be installed in accordance with the respective installation rules and instructions as well as the respective Technical Assessments.

**Other anchoring solutions are possible, they must be technically suitable and have an ETA technical assessment.**

(Dimensions in mm)

## Header-joist connection with heavy duty anchor



Concrete strength class C20/25

### fischer FH II 12/M8 I (8.8) with CS M8x30 (zinc-coated steel)
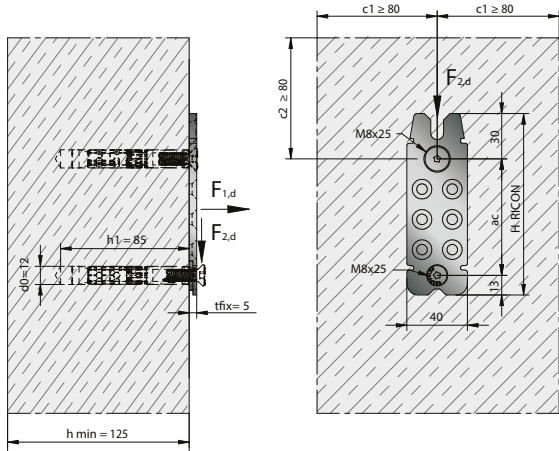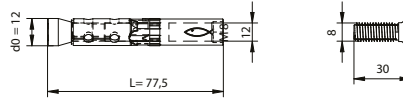


CS M8x30 with hexagon socket

| | |
|---|---|
| Drill hole diameter $d_0$ = | 12 mm |
| Drill hole depth $h_1$ = | 85 mm |
| Total fixing thickness $C_{Six}$ = | 5 mm |
| Spacing $a_c$ = | cf. table |
| Minimal edge distance $c_{1,min} = c_{2,min}$ = | 80 mm |
| Minimal concrete wall thickness $h_{min}$ = | 125 mm |
| Approval: | ETA-07/0025, Option 1 |

## Wood to concrete connection in slide-in direction $F_2$

### $F_2$ load-bearing values in the direction of insertion

| KNAPP® connector | Concrete connection | | Timber connection | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | $F_{2,Rd,concrete}$ | Spacing | Wood material | | $F_{2,Rd,timber}$ | | | | |
| | Shear force $F_{2,Rd,concrete}$ [kN] | Dowel spacing ac [mm] | Wood type | Char. Density. $\rho_k$ [kg/m³] | Characteristic values [kN] | | Design values $F_{2,Rd}$, $\gamma_M$ =1,3 [kN] | | |
| | | | | | $F_{2,KCC,Rk}$ , $\gamma_M$ =1,0 | $F_{2,Rk}$ | $k_{mod}$ = 0,6 | $k_{mod}$ = 0,8 | $k_{mod}$ = 0,9 |
| RICON® 100/40 | 14,00 | 57,00 | C24 | 350 | 14,00 | 9,40 | 4,34 | 5,78 | 6,51 |
| | | | GL24h | 385 | | 10,00 | 4,62 | 6,15 | 6,92 |
| RICON® 120/40 | 16,00 | 77,00 | C24 | 350 | | 12,00 | 5,54 | 7,38 | 8,31 |
| | | | GL24h | 385 | | 12,80 | 5,91 | 7,88 | 8,86 |
| RICON® 140/40 | 18,00 | 97,00 | C24 | 350 | 18,00 | 14,50 | 6,69 | 8,92 | 10,04 |
| | | | GL24h | 385 | | 15,50 | 7,15 | 9,54 | 10,73 |
| RICON® 160/40 | 18,00 | 117,00 | C24 | 350 | | 17,10 | 7,89 | 10,52 | 11,84 |
| | | | GL24h | 385 | | 18,20 | 8,40 | 11,20 | 12,60 |

Service class : 1-2

$\gamma_{M,bois}$ = 1,3

### Calculation of $F_{2,Rd}$ for timber-concrete connection:

$$F_{2,Rk} = \min \begin{cases} \min F_{2,Rd,\,timber} \\ \min F_{2,Rd,\,concrete} \end{cases}$$

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

**Note:**

The fischer anchors for KNAPP wood-to-concrete connections were determined according to the above tables and on the basis of a concrete class C20/25 with the fischer C-FIX calculation tool. They have been specially checked by fischer. Any cases outside the tables must be checked by KNAPP®, fischer or a competent engineer. In many cases, dimensioning with the C-FIX calculation tool is sufficient. The complete analysis of concrete fasteners is available on request from KNAPP®. KNAPP® accepts no liability for the incorrect use of the tables in this document. The condition of the concrete elements (strength classes and surfaces) must be checked by a professional, KNAPP® accepts no responsibility for this. KNAPP® products and KNAPP® connectors must be installed in accordance with the respective installation rules and instructions as well as the respective Technical Assessments.

**Other anchoring solutions are possible, they must be technically suitable and have an ETA technical assessment.**

# Connection types and fire rating

## Connection options

❚ The Beam Hanger System can be installed with various housing options to provide an architecturally appealing and fully concealed connection in mass timber elements.

❚ This concealed arrangement also helps provide fire protection, as explained in the following sections.

Typical concealed configuration achieved through routing for fire-rated connections
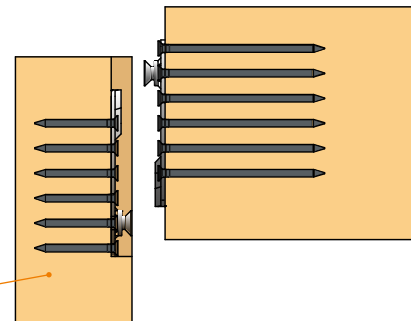
## Application examples and connection details

## Top view of 3 concealed installation options
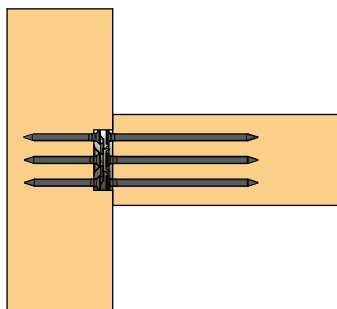
Connector housed
in main beam
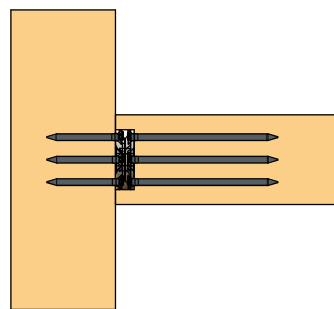
Connector housed
in secondary beam
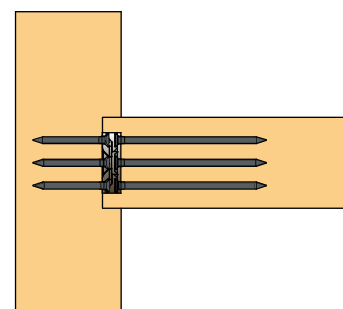
Connector housed
in secondary beam

## Fire protection

❚ Due to the concealed installation of the connectors on three or four sides, the wooden cover can provide the appropriate fire protection.

❚ Due to the joint-tight connection, no additional coverings or fire or fire protection tapes are required. According to EN 1995-1-2 point 3.4.3.1 the joint must not exceed 2 mm.

❚ If, due to manufacturing tolerances or for installation reasons, larger joints are required (2 - 10 mm), PROMASEAL®-PL* intumescent sealant can be used as protection. The flexible joint tape is placed around the connector, expands and fills the joint in the event of fire in the event of fire, thus protecting the connector.

❚ According to Eurocode EN 1995-1-2 5, 30 minutes of fire resistance requires a wood covering of 60 minutes - 49 mm, 90 minutes - 70 mm, 120 minutes - 91 mm (see calculations on page 35).

❚ In special situations (e.g. where the wood overlap is not respected), combustion can be reduced by using Promat PROMADUR® transparent fireproof paint. In the event of fire, the material expands and forms a protective insulating foam that delays combustion by 6 to 17 min (depending on the thickness of the paint) and allows smaller sections of wood to be used.

RICON®S connector after 120 minutes and MEGANT® connector after 60 minutes fire tests. The wood is charred all around. The connectors withstood the the vertical load applied in the fire test.

© Softwood Lumber Board, Arup, MTC, DR Johnson

* For more information on the use and specification of fire protection materials, please contact our Planer Service department.

# Connectors

## Fire resistance / Fire protection

### RICON®

Connection
3 sided covered

Connection
4 sided covered

### RICON® S

Connection
3 sided covered

Connection
4 sided covered
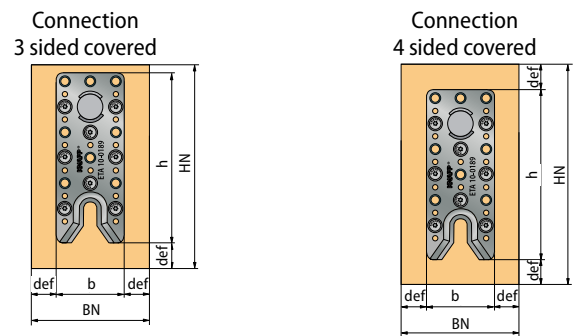
**I** Fully concealed connections (3 - 4 sides) possible where required by architect or fire code consultant.

**I** Jointless connection (joint < 2 mm according to EN 1995-1-2 chap. 3.4.3.1) => no additional covers or fire protection tapes required.

**I** According to EN 1995-1-2 ch. 4, 28 mm of timber covering is required for 30 minutes of fire resistance. Higher coverages are also possible through larger timber cross-sections for R60, R90 and R120.

## Calculation of the protecting wood covering for the fire resistance of the KNAPP® connectors according to EN 1995-1-2 ch. 4:

Common formula: $d_{ef} = \beta_n \cdot t + k_0 \cdot d_0$

### Mass burning rate $\beta_n$:

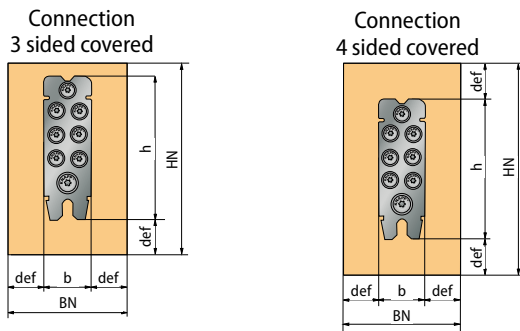| | |
|---|---|
| Softwood and beach glulam with charact. density $\rho_k \geq 290$ kg/m$^3$ | $\beta_n = 0,7$ mm/min |
| Softwood and beach solid wood with charact. density $\rho_k \geq 290$ kg/m$^3$ | $\beta_n = 0,8$ mm/min |
| Hardwood and Hardwood glulam with charact. density $\rho_k \geq 290$ kg/m$^3$ | $\beta_n = 0,7$ mm/min |
| Hardwood and Hardwood glulam with charact. density $\rho_k \geq 450$ kg/m$^3$ | $\beta_n = 0,55$ mm/min |
| LVL with charact. density $\rho_k \geq 480$ kg/m$^3$ | $\beta_n = 0,7$ mm/min |
| Duration of fire exposure | $t = 30, 60, 90, 120$ min |
| Temperature-dependent reduction factor for strength and stiffness properties | $k_0 = 1$ ($t \geq 20$ min) |
| Time factor | $k_0 = t / 20$ ($t < 20$ min) |
| Layer depth with the strength and stiffness properties equal to zero | $d_0 = 7$ mm |

### Softwood Gluelam, Beach solid wood and laminated wood

| | | |
|---|---|---|
| Wood overlap for 30 minutes fire resistance | $d_{ef} = 0,7 \times 30 + 1,0 \times 7 =$ | 28 mm for R30 |
| Wood overlap for 60 minutes fire resistance | $d_{ef} = 0,7 \times 60 + 1,0 \times 7 =$ | 49 mm for R60 |
| Wood overlap for 90 minutes fire resistance | $d_{ef} = 0,7 \times 90 + 1,0 \times 7 =$ | 70 mm for R90 |
| Wood overlap for 120 minutes fire resistance | $d_{ef} = 0,7 \times 120 + 1,0 \times 7 =$ | 91 mm for R120 |

### Solid Hardwood and Hardwood Gluelam (e.g. oak):

| | | |
|---|---|---|
| Wood overlap for 30 minutes fire resistance | $d_{ef} = 0,55 \times 30 + 1,0 \times 7 =$ | 23,5 mm for R30 |
| Wood overlap for 60 minutes fire resistance | $d_{ef} = 0,55 \times 60 + 1,0 \times 7 =$ | 40 mm for R60 |
| Wood overlap for 90 minutes fire resistance | $d_{ef} = 0,55 \times 90 + 1,0 \times 7 =$ | 56,5 mm for R90 |
| Wood overlap for 120 minutes fire resistance | $d_{ef} = 0,55 \times 120 + 1,0 \times 7 =$ | 73 mm for R120 |

## Connectors installation options
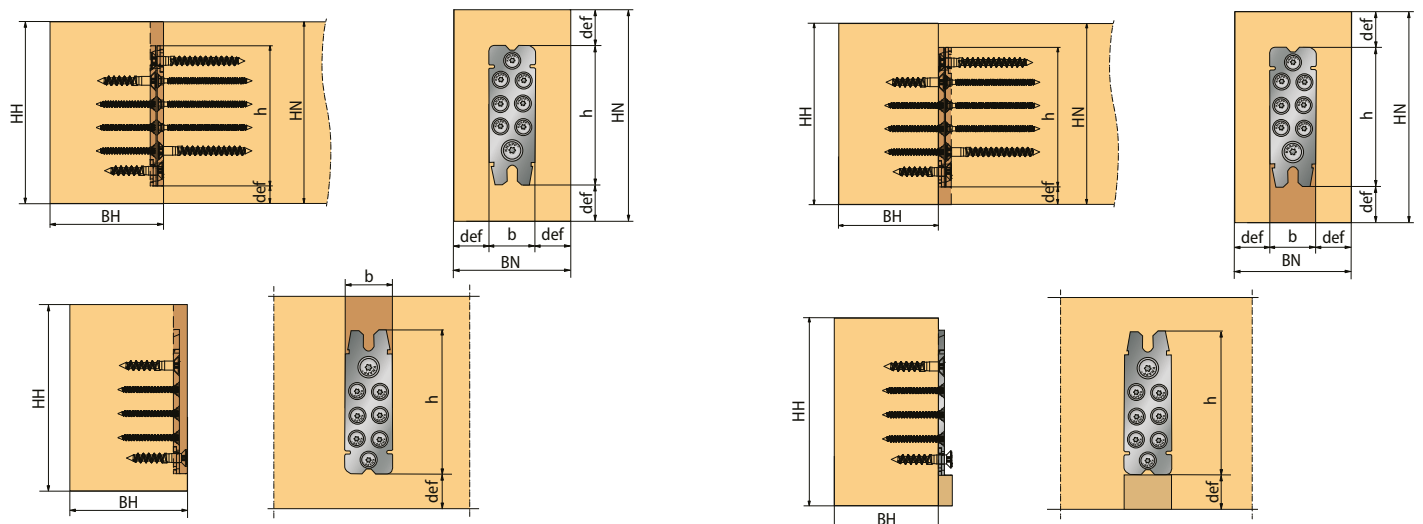
3 sided fire protection, milling in main beam

3 sided fire protection, milling in secondary beam

# RICON® EA Startbox

## RICON® Boxes - for post-beam and main-secondary beam connections up to 23.4 kN

Art.-No. K364/B



RICON®

TCT slotting cutter 15x25 mm

Routing-jig MULTI F

Drilling-jig

Depth gauge

Locking clip

**Each RICON® Box includes:**
6, 12 or 24 pairs RICON®,
1 HM routing cutter,
1 routing-jig MULTI F 40/R,
1 drilling-jig,
1 depth gauge, CS-screws and
the locking clips

**Applications :** Curtain wall,
Winter garden,  carport, etc.

**RICON® EA Box** | Art.-No. K364/B
6 pairs of 60/40 EA, 80/40 EA, 100/40 EA
and  120/40 EA, 24 locking clips and
RICON® CS-screws

AUSTRIA  CE
ETA  ETA-10/0189
(2022/08/25)  **PRODUCT**

### RICON® EA 60 Box

| Art.-No. K366 | 24 pairs of RICON 60/40 |
|---|---|
| | 48 CS-screws RICON® 5x50 mm |
| | 48 CS-screws RICON® 5x80 mm |
| | 24 CS-screws RICON® 8x50 mm |
| | 24 CS-screws RICON® 8x80 mm |
| | 24 locking clips |

### RICON® EA 80 Box

| Art.-No. K367 | 24 pairs of RICON® 80/40 |
|---|---|
| | 48 CS-screws RICON® 5x50 mm |
| | 48 CS-screws RICON® 5x80 mm |
| | 48 CS-screws RICON® 8x50 mm |
| | 48 CS-screws RICON® 8x80 mm |
| | 24 locking clips |

### RICON® EA 100 Box

| Art.-No. K368 | 24 pairs of RICON® 100/40 |
|---|---|
| | 96 CS-screws RICON® 5x50 mm |
| | 96 CS-screws RICON® 5x80 mm |
| | 48 CS-screws RICON® 8x50 mm |
| | 48 CS-screws RICON® 8x80 mm |
| | 24 locking clips |

### RICON® EA 120 Box

| Art.-No. K369 | 12 pairs of RICON® 120/40 |
|---|---|
| | 72 CS-screws RICON® 5x50 mm |
| | 72 CS-screws RICON® 5x80 mm |
| | 24 CS-screws RICON® 8x50 mm |
| | 24 CS-screws RICON® 8x80 mm |
| | 12 locking clips |

### RICON® EA 140 Box

| Art.-No. K370 | 12 pairs of RICON® 140/40 |
|---|---|
| | 96 CS-screws RICON® 5x50 mm |
| | 96 CS-screws RICON® 5x80 mm |
| | 24 CS-screws RICON® 8x50 mm |
| | 24 CS-screws RICON® 8x80 mm |
| | 12 locking clips |

### RICON® EA 160 Box

| Art.-No. K371 | 12 pairs of RICON® 160/40 |
|---|---|
| | 120 CS-screws RICON® 5x50 mm |
| | 120 CS-screws RICON® 5x80 mm |
| | 24 CS-screws RICON® 8x50 mm |
| | 24 CS-screws RICON® 8x80 mm |
| | 12 locking clips |

RICON® is also available in A2 stainless steel up to 17.4 kN and in 13 sizes.

# T-JOINT Box

## T-JOINT Box - for inclined screw connection

Art.-No. Z606/Box

**T-JOINT (Startbox)**

50 T-JOINT 20, 25 CS-screws 6x100 mm,
25 CS-screws 6x120 mm,
1 drilling-jig T-JOINT D20, 1 ajustable drilling-jig,
1 HM drill bit 20 mm depth stop, 1 HSS drill bit 6/160 mm

**Applications :** angle cylinder for flush 30° and 45°
angled screw connections with rigid connections
and and tensile joints.

AUSTRIA  CE
ETA  ETA-19/0628
(2022/06/13)  **T-JOINT**

# Beam Hangers

## Connecting main / secondary beams and column up to 39 kN*

I Timber width up from 60mm
I Multiple disassembly and reassembly possible
I High degree of prefabrication for rapid
 on-site assembly
I Load-bearing In all directions
I Short hooking way – only 50 mm
I Tight joints - self-tightening due to permanent
 permanent contact pressure
I Locking clip secures the connection against
 the slide-in direction (e.g. wind suction)

**GIGANT**

**Available in 3 sizes.**

**The values only apply when used with original KNAPP®
screws! Design values are available on our website under
Planer Service.**

* Characteristic value $F_{2,Rk}$ in slide-in direction according to ETA 10/0189
(2022/08/25), for hardwood D30 (e.g. oak).

**KNAPP®**
connectors.com

© Christina Wurm, TW Holzbau

# GIGANT

▌ **Applications: concealed main-secondary beam connections**

▌ **Connection: wood materials e.g. hardwoods (e.g. oak)**

▌ **Areas of application: hall construction, timber frame construction, timber frame construction, canopy, pergola**

Safe, simple and quick assembly.
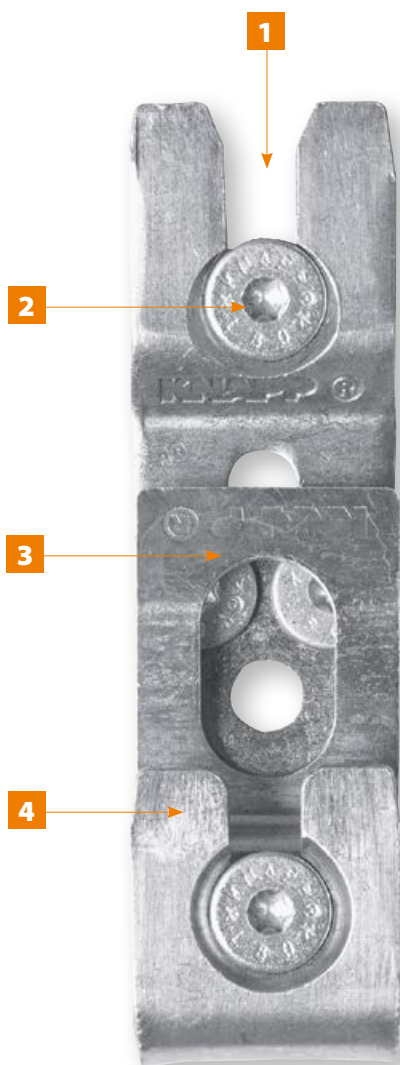
**1** The dovetail receiving bracket catches the counter bracket and CS-screw with ease, while the angle on the dovetail ensures a self-tightening connection.

**2** Ø10 mm self-tapping CS-screws guarantee fast installation and the reinforced shank provides an additional strong connection.

**3** Locking clip latches the connector against the slide-in direction.

**4** GIGANT is made of premium quality steel and blue galvanized and produced in Austria. Hot-dip galvanizing is available upon request.

Fire rating: Fire resistance (EN 1995-1-2) through 3-4 sided concealed, joint-tight installation (R30 ≥ 28 mm, R60 ≥ 49 mm)

AUSTRIA   CE

ETA   ETA-10/0189 (2022/08/25)

GIGANT

# GIGANT 120/40

## Application examples and connection details

Art.-No. K051

(Dimensions in mm)
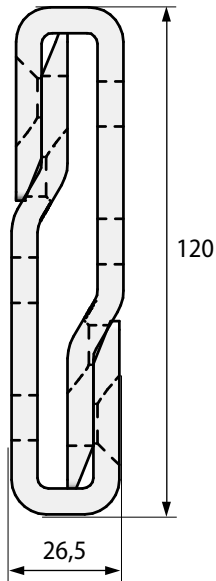
| Connector | Connection | Screw connection | | Charact. values [GL24h] | |
|---|---|---|---|---|---|
| | | Joint | Header | $F_{1,Rk}$ [kN] | $F_{2,Rk}$ [kN] |
| 120/40 | without locking clip | 3 x CS 10x120 | 3 x CS 10x80 | 12,5 | 12,5 |
| 120/40 | without locking clip | 3 x CS 10x200 | 3 x CS 10x80 | 14,0 | 12,5 |
| 120/40 | with locking clip | 3 x CS 10x120 | 3 x CS 10x80 | 12,5 | 12,5 |
| Clip lock: $F_{3,Rk}$ = 12,0 kN | | | | | |

Minimum timber dimensions with/without locking clip: 60 x 150 mm



Single connection for post-latch connections



Single connection:
Header thickness from 100 mm;
Joint thickness from 60 mm

120

26,5

Ø 10,5

22,5
32
25,5
112

40



Standard screw connection without locking clip

# GIGANT locking clip

## Functionality of the locking clip (galvanized steel plate)



1    2    3
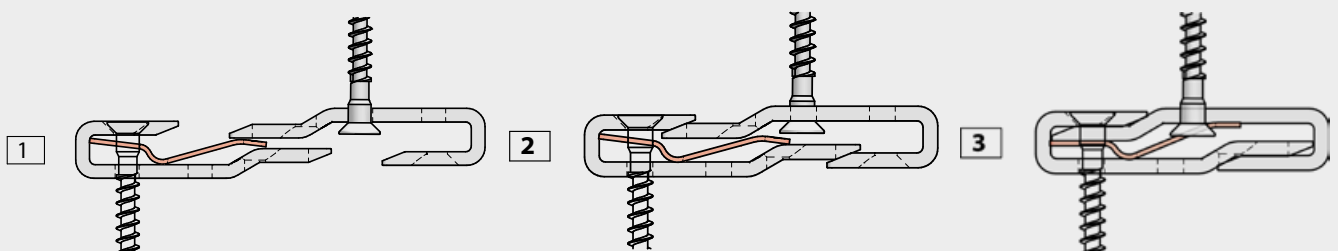
# GIGANT 150/40

## Application examples and connection details

Art.-No. K050

(Dimensions in mm)
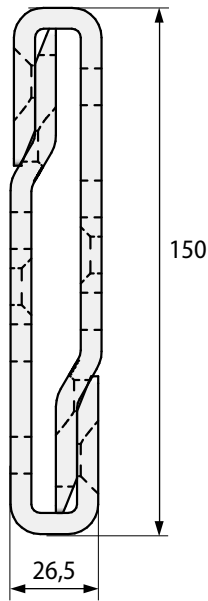
| Connector | Connection | Screw connection | | Charact. values [GL24h] | |
|---|---|---|---|---|---|
| | | Joint | Header | $F_{1,Rk}$ [kN] | $F_{2,Rk}$ [kN] |
| 150/40 | without locking clip | 4 x CS 10x120 | 4 x CS 10x80 | 12,5 | 16,7 |
| 150/40 | without locking clip | 4 x CS 10x200 | 4 x CS 10x80 | 14,0 | 19,2 |
| 150/40 | with locking clip | 4 x CS 10x120 | 4 x CS 10x80 | 12,5 | 16,7 |
| Clip lock: $F_{3,Rk}$ = 12,0 kN | | | | | |

Minimum timber dimensions without locking clip: 80 x 200 mm
Minimum timber dimensions with locking clip: 60 x 200 mm
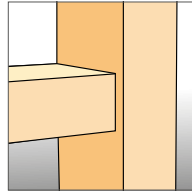
Single connection for
post-latch connections
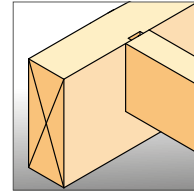
Single connection:
Header thickness from 100 mm;
Joint thickness from 60 mm
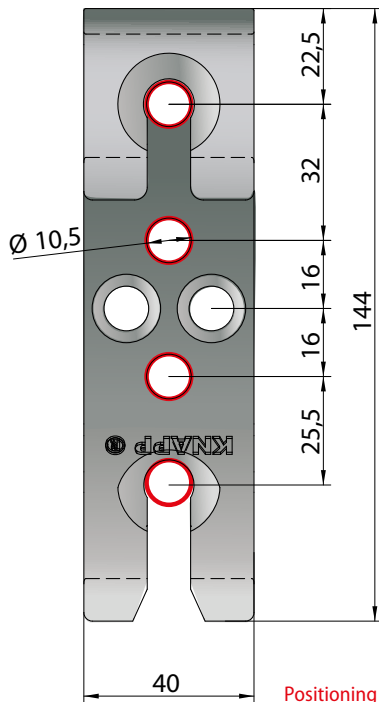
Positioning of srews in the centre
when using the locking clip

Standard screw connection without locking clip

# GIGANT locking clip

## Functionality of the locking clip (galvanized steel plate)
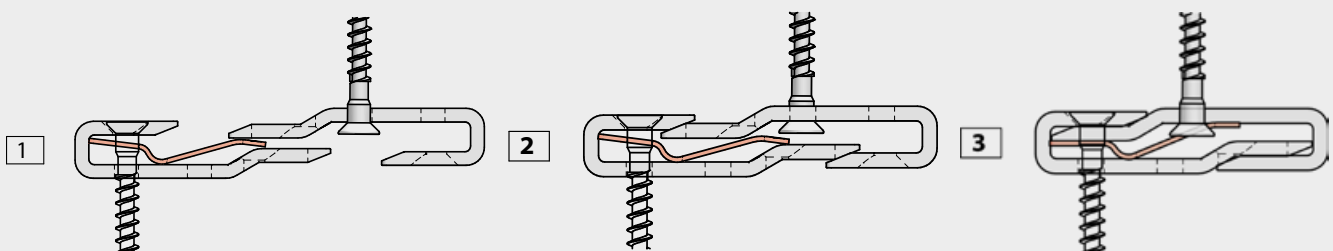
# GIGANT 180/40

## Application examples and connection details

Art.-No. K052

(Dimensions in mm)
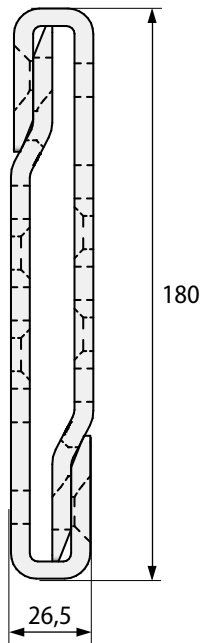
180

26,5

| Connector | Connection | Screw connection | | Charact. values [GL24h] | |
|---|---|---|---|---|---|
| | | Joint | Header | $F_{1,Rk}$ [kN] | $F_{2,Rk}$ [kN] |
| 180/40 | without locking clip | 6 x CS 10x120 | 6 x CS 10x80 | 12,5 | 25,0 |
| 180/40 | without locking clip | 6 x CS 10x200 | 6 x CS 10x80 | 14,0 | 30,7 |
| 180/40 | with locking clip | 5 x CS 10x120 | 6 x CS 10x80 | 12,5 | 20,8 |
| Clip lock: $F_{3,Rk}$ = 12,0 kN | | | | | |

Minimum timber dimensions without locking clip:  80 x 200 mm
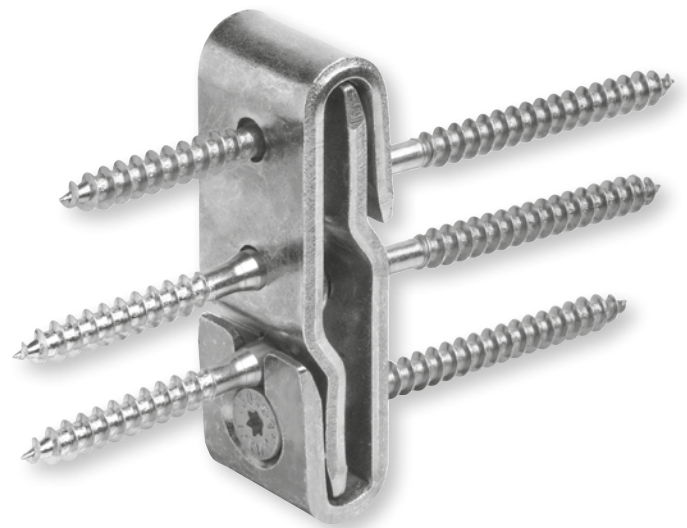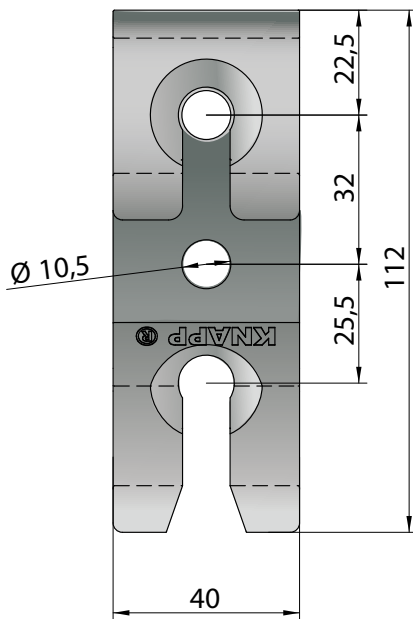Minimum timber dimensions withlocking clip:  60 x 200 mm

Single connection for
post-latch connections

Single connection:
Header thickness from 100 mm;
Joint thickness from 60 mm

22,5
32
16
16
16
16
25,5
174

Ø 10,5

40

Positioning of srews in the centre
when using the locking clip

Standard screw connection without locking clip

# GIGANT locking clip

## Functionality of the locking clip (galvanized steel plate)

1    2    3

# GIGANT 150/40 and 180/40 wood to concrete connection

**Wood to concrete connection with injection mortar**

(Dimensions in mm)
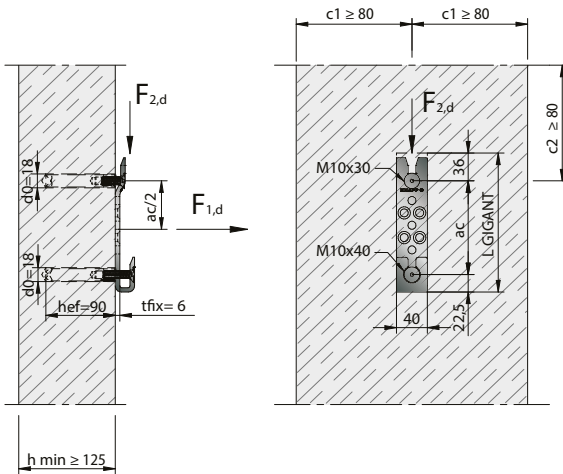


Concrete C20/25

**fischer RG 16x90 M10 I (8.8) with CS M10x30 and CS M10x40** (zinc plated steel)
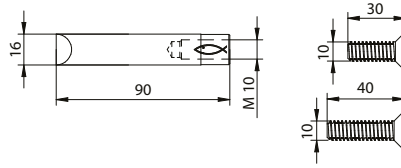


CS M10x30 with hexagon socket

CS M10x40 with hexagon socket

**fischer Superbond-System: FIS SB 390 S**

| | |
|---|---|
| Drill hole diameter $d_0$ = | 18 mm |
| Drill hole depth $h_1$ = | 90 mm |
| Total fixing thickness $t_{fix}$ = | 6 mm |
| Spacing $a_c$ = | see table below |
| Minimal edge distance $c_{1,min} = c_{2,min}$ = | 80 mm |
| Minimal concrete wall thickness $h_{min}$ = | 125 mm |
| Approval: | ETA-12/0258 |

## $F_2$ Load direction in the direction of insertion

| KNAPP® Connectors | Concrete connection | | Timber connection | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | $F_{2,Rd,concrete}$ | Distances | Wood material | | $F_{2,Rd,timber}$ | | | | |
| | Shear force $F_{2,Rd,concrete}$ [kN] | Dowel spacing ac [mm] | Wood type | Char. density $\rho_k$ [kg/m³] | Charact. values [kN] | | Design values $F_{2,Rd}$, $\gamma_M$ = 1,3 [kN] | | |
| | | | | | $F_{2,KCC,Rk}$ , $\gamma_M$ =1,0 | $F_{2,Rk}$ | $k_{mod}$ = 0,6 | $k_{mod}$ = 0,8 | $k_{mod}$ = 0,9 |
| **GIGANT 150/40 *** Concrete: 2 RG M10 I | 18,00 | 90 | C24 | 350 | 24,0 | 15,4 | 7,1 | 9,5 | 10,7 |
| | | | GL24h | 385 | | 16,7 | 7,7 | 10,3 | 11,6 |
| **GIGANT 150/40 max **** Concrete: 2 RG M10 I | 18,00 | 90 | C24 | 350 | | 17,7 | 8,2 | 10,9 | 12,3 |
| | | | GL24h | 385 | | 19,2 | 8,9 | 11,8 | 13,3 |
| **GIGANT 180/40 *** Concrete: 2 RG M10 I | 22,00 | 122 | C24 | 350 | 33,0 | 23,1 | 10,7 | 14,2 | 16,0 |
| | | | GL24h | 385 | | 25,0 | 11,5 | 15,4 | 17,3 |
| **GIGANT 180/40 max **** Concrete: 2 RG M10 I | 22,00 | 122 | C24 | 350 | | 28,3 | 13,1 | 17,4 | 19,6 |
| | | | GL24h | 385 | | 30,7 | 14,2 | 18,9 | 21,3 |

\* GIGANT standard screw connection in end-grain with CS-screws 10x120

\*\* GIGANT maximal screw connection in end-grain with CS-screws 10x200

Service class timber: 1-2
$\gamma_{M,timber}$ = 1,3

**Calculation of $F_{2,Rd}$ for timber-concrete connection:**
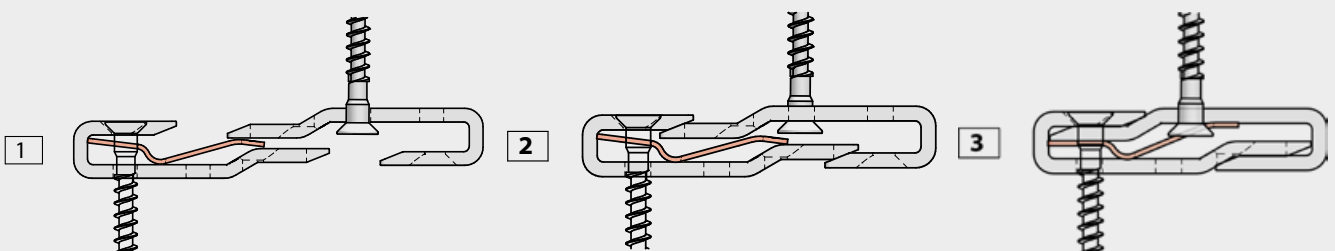
$$F_{2,Rk} = \min \begin{cases} \min F_{2,Rd,\,timber} \\ \min F_{2,Rd,\,concrete} \end{cases}$$

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

**Notes**

The fischer anchors for KNAPP® wood-concrete connections were defined with the dimensions shown on the drawings and a concrete strength class of C20/25. The calculations were made with the C-FIX design tool and verified by fischer. All other configurations must be checked. This can be done by KNAPP®, fischer or a professional (engineer or competent technician). KNAPP® accepts no liability for the inappropriate use of the value tables given in this catalogue. The condition of the concrete element (concrete strength class and surface) must be checked by a specialist. KNAPP® accepts no liability in this respect. KNAPP® products and connectors must be installed according to the installation instructions manuals. KNAPP® - fischer wood-concrete joints must be made in accordance with their respective ETA technical evaluations.

**Equivalent anchoring solutions (e.g. Hilti,…) permitted if technically tested beforehand by a qualified design professional and have a European Technical Assessment.**

## Header-joist connection with bolt anchor

(Dimensions in mm)



Concrete C20/25

### fischer RG 16x90 M10 I (8.8) with CS M10x30 and CS M10x40 (zinc plated steel)



CS M10x30 with hexagon socket

CS M10x40 with hexagon socket
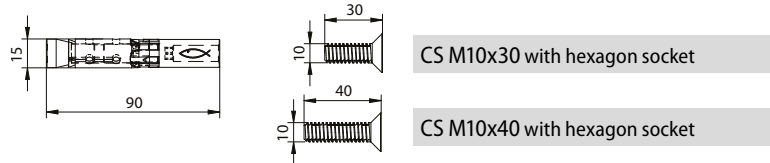
| | |
|---|---|
| Drill hole diameter $d_0 =$ | 15 mm |
| Drill hole depth $h_1 =$ | 95 mm |
| Total fixing thickness $t_{fix} =$ | 6 mm |
| Spacing $a_c =$ | see table below |
| Minimal edge distance $c_{1,min} = c_{2,min} =$ | 80 mm |
| Minimal concrete wall thickness $h_{min} =$ | 150 mm |
| Approval: | ETA-07/0025, Option 1 |

### $F_2$  Load direction in the direction of insertion

| KNAPP® Connectors | Concrete connection | | Timber connection | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $F_{2,Rd,concrete}$ | Distances | Wood material | | $F_{2,Rd,timber}$ | | | |
| | | | Wood type | Char. density $\rho_k$ [kg/m³] | Charact. values [kN] | | Design values $F_{2,Rd}$, $\gamma_M = 1,3$ [kN] | |
| | Shear force $F_{2,Rd,concrete}$ [kN] | Dowel spacing ac [mm] | | | $F_{2,KCC,Rk}$ , $\gamma_M =1,0$ | $F_{2,Rk}$ | kmod = 0,6 | kmod = 0,8 | kmod = 0,9 |
| GIGANT 180/40 * Concrete: 2 RG M10 I | 21,00 | 122 | C24 | 350 | 33,0 | 23,1 | 10,7 | 14,2 | 16,0 |
| | | | GL24h | 385 | | 25,0 | 11,5 | 15,4 | 17,3 |
| GIGANT 180/40 max ** Concrete: 2 RG M10 I | 21,00 | 122 | C24 | 350 | | 28,3 | 13,1 | 17,4 | 19,6 |
| | | | GL24h | 385 | | 30,7 | 14,2 | 18,9 | 21,3 |

\*  GIGANT standard screw connection in end-grain with CS-screws 10x120

\*\* GIGANT maximal screw connection in end-grain with CS-screws 10x200

Service class timber:  1-2
$\gamma_{M,timber} = 1,3$

### Calculation of $F_{2,Rd}$ for timber-concrete connection:

$$F_{2,Rk} = \min \begin{cases} \min F_{2,Rd, timber} \\ \min F_{2,Rd, concrete} \end{cases}$$

$$F_{2,Rk, timber} = \min \begin{cases} \min F_{2,KCC, Rk} / \gamma_M \\ \dfrac{\min F_{2,Rk} \cdot k_{mod}}{\gamma_{M, timber}} \end{cases}$$
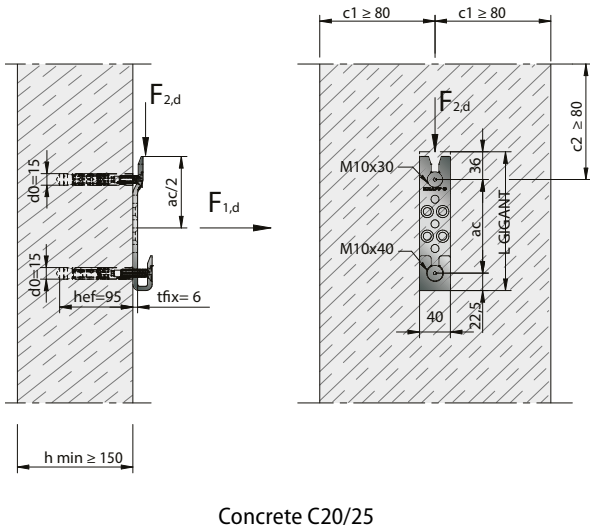
### Notes

The fischer anchors for KNAPP® wood-concrete connections were defined with the dimensions shown on the drawings and a concrete strength class of C20/25. The calculations were made with the C-FIX design tool and verified by fischer. All other configurations must be checked. This can be done by KNAPP®, fischer or a professional (engineer or competent technician). KNAPP® accepts no liability for the inappropriate use of the value tables given in this catalogue. The condition of the concrete element (concrete strength class and surface) must be checked by a specialist. KNAPP® accepts no liability in this respect. KNAPP® products and connectors must be installed according to the installation instructions manuals. KNAPP® - fischer wood-concrete joints must be made in accordance with their respective ETA technical evaluations.

**Equivalent anchoring solutions (e.g. Hilti,…) permitted if technically tested beforehand by a qualified design professional and have a European Technical Assessment.**

# GIGANT wood to steel connection

**Main and secondary beam and post and beam connections.**

(Dimensions in mm)

$F_{2,d}$

$F_{1,d}$

$F_{2,d}$

TF M10x30

TF M10x40

H GIGANT

$F_{1,d}$

t ≥ 4
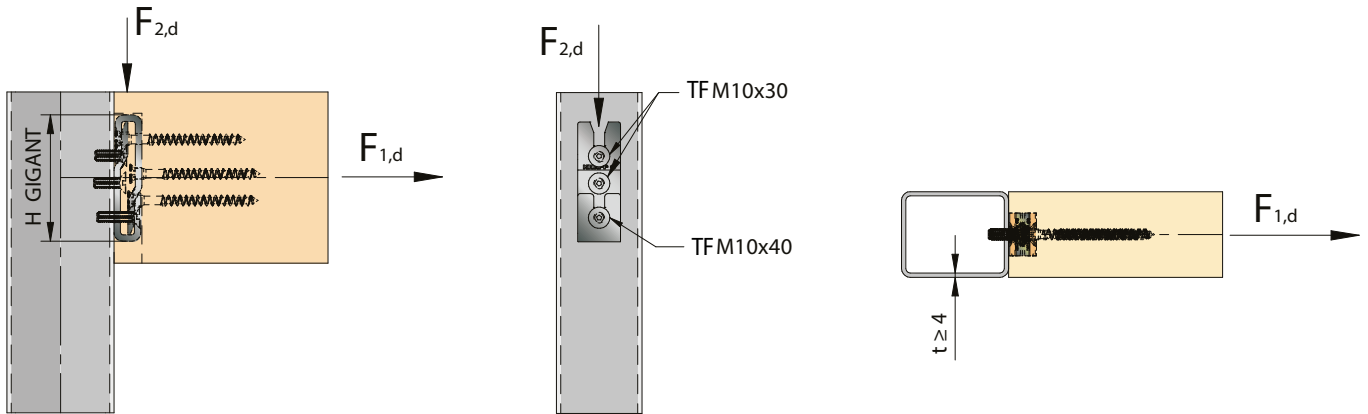
| KNAPP® Connectors | Traction | | Shear force | |
|---|---|---|---|---|
| | $F_{t,Rk}$ [kN]* on 4 mm steel | $F_{1,Rk}$ [kN]* on glulam GL24h | $F_{v,Rk}$ [kN]* on 4 mm steel | $F_{2,Rk}$ [kN]* on glulam GL24h |
| GIGANT 120/40 * | 57,0 | 12,5 | 38,4 | 12,5 |
| GIGANT 120/40 max ** | | 14,0 | | 12,5 |
| GIGANT 150/40 * | | 12,5 | | 16,7 |
| GIGANT 150/40 max ** | | 14,0 | | 19,2 |
| GIGANT 180/40 * | | 12,5 | | 25,0 |
| GIGANT 180/40 max ** | | 14,0 | | 30,7 |

| Sizing value calculation | $F_{t,Rd} = F_{t,Rk} / \gamma_{M,2}$ | $F_{1,Rd} = k_{mod} \times F_{1,Rk} / \gamma_M$ | $F_{v,Rd} = F_{v,Rk} / \gamma_{M,2}$ | $F_{1,Rd} = k_{mod} \times F_{1,Rk} / \gamma_M$ |
|---|---|---|---|---|
| | $\gamma_{M,2} = 1{,}25$ | $\gamma_M = 1{,}3$ | $\gamma_{M,2} = 1{,}25$ | $\gamma_M = 1{,}3$ |
| | | $k_{mod} = 0{,}8$  LDC medium | | $k_{mod} = 0{,}8$  LDC medium |
| | | $k_{mod} = 0{,}9$  LDC short | | $k_{mod} = 0{,}9$  LDC short |

| Screw connection * | 2 CS M10x30 | End-grain screw connection | 2 CS M10x30 | End-grain screw connection |
|---|---|---|---|---|
| | 1 CS M10x40 | Self-tapping CS-screw 10xx120 / CS 10x200 for max | 1 CS M10x40 | CS 10x120 / CS 10x200 for max |

\*   GIGANT standard screw connection in end-grain with CS 10x120

\*\*  GIGANT maximal screw connection in end-grain with CS 10x200

Service class timber:  1-2

**Case studies**



© Hantschel GmbH

Wirtschaftsgebäude  © Dreyle

Alpigg ©defrancesco photography

TW Holzbau © Christina Wurm

TW Holzbau © Christina Wurm

# GIGANT

## Installation

Manufacturing with CNC joinery machine is possible – all datas are available on the standard CNC joinery machine programs.
Milling with KNAPP® routing-jig.


Mill


Pre-drill header


Screw on connector


Pre-drill secondary beam


Screw on connector


Optionally installed with locking clip


Easy assembling without jamming





| GIGANT routing dimension | | |
|---|---|---|
| Width | Length | Depth |
| 40 mm | variable | 26,5 mm |

**Recommended software partners for machine processing:**

SEMA SOFTWARE

hsbcad CAD/CAM für den Holzbau

Dietrich's

cadwork

Zimmermeister HOLZBAU PROGRAMME

WETO AG technologies

# Vis GIGANT

| **KNAPP® self-tapping CS-screws with reinforced shaft** **(GIGANT comes in a set including CS-screws)** | |
|---|---|
| Art.-No.Z523 | CS-screw 10x80 |
| Art.-No.Z524 | CS-screw 10x120 (end grain and CLT) |
| Art.-No.Z583 | CS-screw 10x200 |
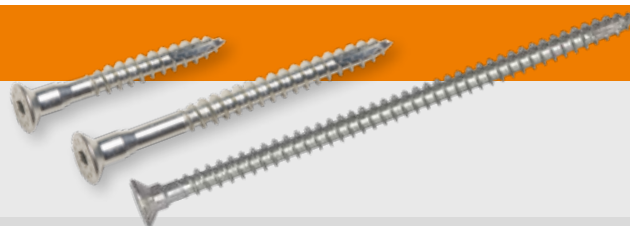
**Application:** pour le vissage de GIGANT sur les poutres principales (poteaux) ou secondaires (traverses).

# GIGANT

| **GIGANT locking clip (galvanized steel plate)** | |
|---|---|
| Art.-No.Z525 | GIGANT Locking Clip |

**Application:** to latch the connection against the slide-in direction.

# GIGANT accessories

| **Routing-jig for all GIGANT sizes** | |
|---|---|
| Art.-No. K502 | MULTI F40 Routing-jig (plywood) |
| | Note: The MULTI F40 routing template is designed for the use of a Ø30 mm copying sleeve (for router) and a Ø15 mm TCT straight router bit. MULTI F is adjustable depending on wood sizes. |
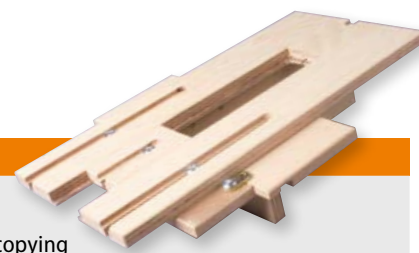
**Application:** for milling the pocket to recess GIGANT.

| **TCT slotting cutter** | |
|---|---|
| Art.-No. Z068 | TCT straight slotting bit with Ø15 mm, 40 mm length and Ø12 mm shank |

**Application:** for milling the pocket to recess GIGANT.

| **GIGANT drilling-jig (galvanized steel)** | |
|---|---|
| Art.-No. K631 | Drilling-jig guide GIGANT 120 |
| Art.-No. K632 | Drilling-jig guide GIGANT 150 |
| Art.-No. K633 | Drilling-jig guide GIGANT 180 |

**Application:** place into MULTI F routing jig for exact positioning and pre-drilling of GIGANT CS-screws.

| **GIGANT drilling-jig (adjustable)** | |
|---|---|
| Art.-No. K463 | Drilling-jig GIGANT 120 |
| Art.-No. K464 | Drilling-jig GIGANT 150 |
| Art.-No. K465 | Drilling-jig GIGANT 180 |

Jig with hardened drill bushes for Ø6 mm

**Application:** for pre-drilling of GIGANT CS-screws.

# Connectors for timber construction engineering

## Connecting main and secondary beams up to 230 kN*

❙ Minimum timber width up from 100 mm
❙ Multiple disassembly and reassembly possible
❙ High degree of prefabrication for industrial production
❙ Simple screw connection without pre-drilling
❙ Can be assembled crosswise, lengthwise and diagonally
❙ Assembly made easy due to V-shaped bracket and only 35 mm hook way
❙ Installation tolerances due to adjustable collar bolts
❙ Three- and four-sided concealed connection
❙ Secured connection against the direction of insertion with matching locking clip

**RICON®S**

**Available in 5 sizes and 4 versions.**

The values only apply when used with original KNAPP® screws! Design values are available on our website under Planer Service.

\* Characteristic value $F_{2,Rk}$ in slide-in direction according to ETA 10/0189 (2022/08/25), for hardwood D30 (e.g. oak).

**KNAPP®**
connectors.com

©Huf Haus


©Rubner

Installation example: pillar connection,
Sky project, Sophia in the South of France.

# RICON® S

❚ Applications: concealed main-secondary beam connections.
❚ Connections: wood to wood, wood to steel, steel to steel, and wood to concrete
❚ Applications: timber engineering, timber frame, timber frame and hall construction
❚ Service class 1 and 2
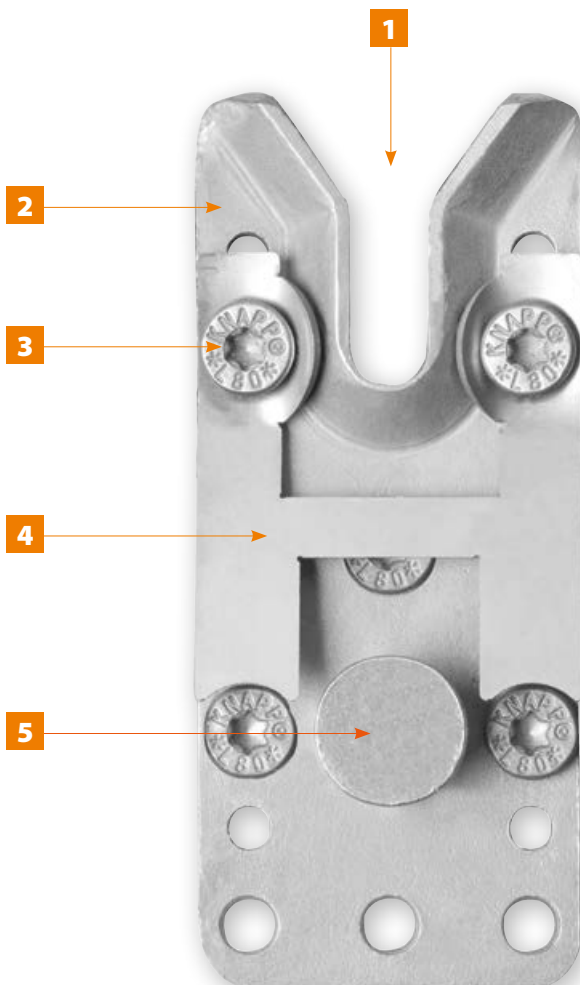


**1** The V-shaped receiver provides perfect catch of the collar bolt. The strong tension and the short slide-in alleviates the connecting and guarantees joint sealing.

**2** RICON® S is made of premium quality steel, hot-dip galvanized and produced in Germany.

**3** KNAPP® CS-screws with cut point for extra fast starting and screw connection. The reinforced shaft provides a force-fit connection.

**4** The RICON®S locking clip, made from stainless spring steel, locks the connection against slide-in direction and can optionally be used for stress against slide-in direction or wind suction.

**5** VS = welded collar bolt, for highest load capacities
EK = retaining screw collar bolt, for tolerance adjustment
VK = screwed collar bolt, for moderate charge capacities
GK = spring-loaded collar bolt for special assembly requirements

Fire rating: Fire resistance (EN 1995-1-2) through 3-4 sided concealed, joint-tight installation (R30 ≥ 28 mm, R60 ≥ 49 mm)
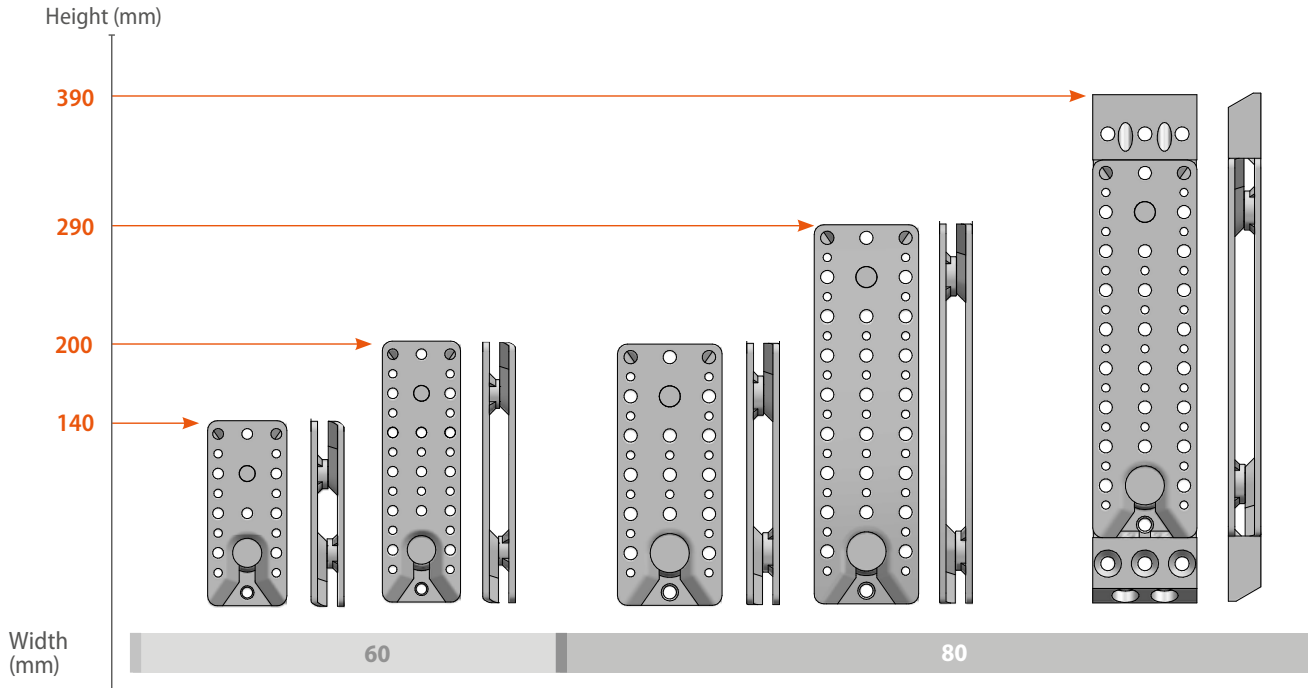
made in Germany

CE

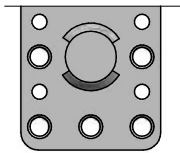ETA   ETA-10/0189
(2022/08/25)

RICON®S

# RICON®S

## RICON®S Standard Sizes

Height (mm)

390

290

200

140

Width (mm)

| 60 | 80 |

# RICON®S views

## Top view of RICON®S collar bolt versions

| Welded collar bolt | Adjustable collar bolt | Screwed collar bolt | Spring-loaded collar bolt | Welded collar bolt XL version |
|---|---|---|---|---|
| VS | EK | VK | GK | VS + ZP |

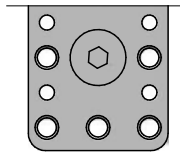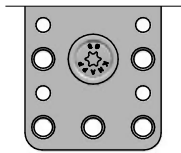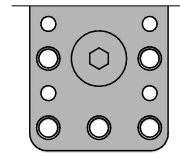## Side view of RICON®S collar bolt

Welded collar bolt (VS)
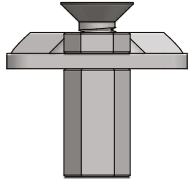
Adjustable collar bolt (EK)
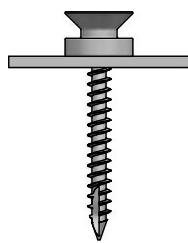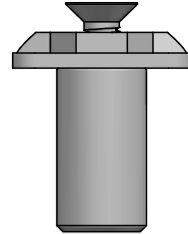
Screwed collar bolt (VK)

Spring-loaded collar bolt (GK)
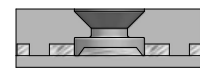
Welded collar bolt XL version
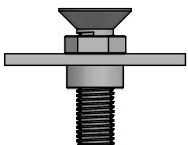
Adjustable collar bolt S80 with insert screw

# RICON®S

**Application examples and connection details**

**Ridged roof with purlins and post and beam connections**

(Dimensions in mm)

**Header**

Full-thread, self-tapping screws for lateral compression

$F_2$ reinforcements of main and/or secondary beam

Joist

$B_H$

Column

**Single connection**

$F_2$

Joist

Header

**Main/secondary beam joint with RICON® S Single and double connection**

Purlin

Saddle roof gluelam beam

Beam

Two-pieces column

**Double connection**

$F_2$    $F_2$

Joist    Header    Joist

26    $t_2$    5

∅

RICON® S60:
Fit bolt/thread bar Ø 8 mm with jam nut M8

RICON® S80:
Fit bolt/thread bar Ø 10 mm with jam nut M10

RICON® EK with adjustable collar bolt

≥ 50    e

F

Latch

Column/Post



© Charpenterie S. Hinrichsen (DE)

**❙ Hall roof of carpentry S. Hinrichsen (Germany)**

Connection RICON®S60 200x60 VK

Ridge beam 240/1640

Rafter 100/400
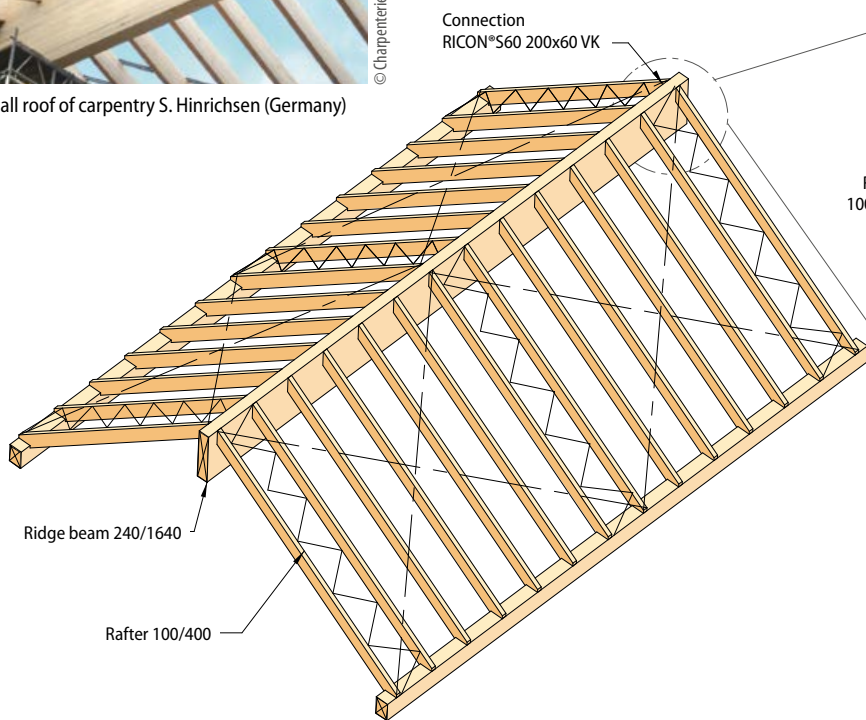
**RICON® S housed into a rafter - totally concealed**

RICON® S

400    400

22°    22°

Rafter 100/400

Rafter 100/400

1640
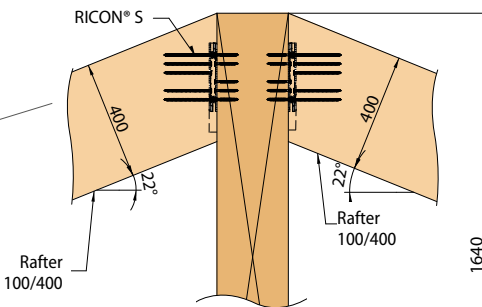
**RICON® S housed into the ridge beam - totally concealed**

RICON® S

400    400

Rafter 100/400

1640
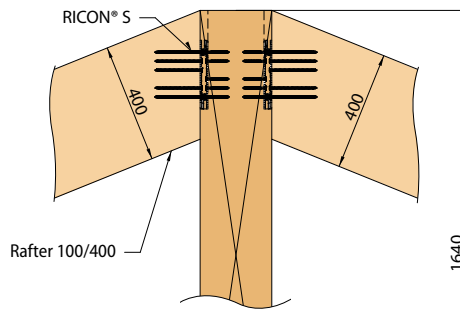
# RICON® S

## Timber engineering

### Connecting header with timber frame construction or cross-laminated timber wall

(Dimensions in mm)

Header

Beam

$F_2$

$F_1$

tzw < 26

Interlayer

Cross-laminated timber wall

$F$

Main/
Secondary Beam

$H_N$

$F_1$

W

4,50

4,50

4,50

Solive 200/360,
e=100 cm, BS11

E1

E2  Beam 200/360

E3  Header 140/240

E1  Joist 120/240,
e=100 cm

E1.1) Bearer 160/240

**Main floor footprint**
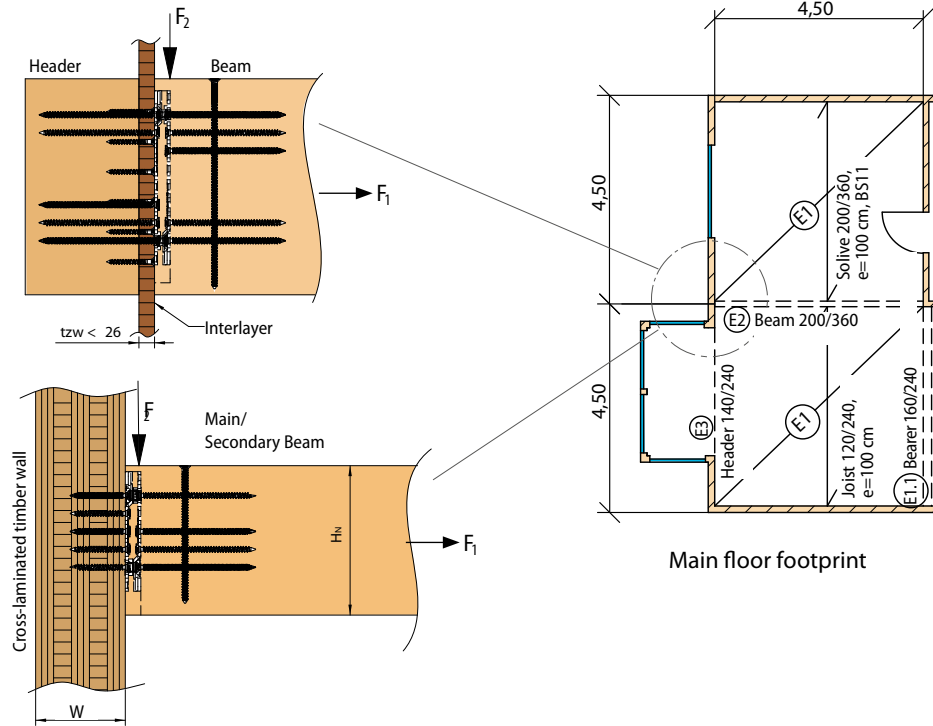
### Steel connection



I Ridge node for dome

### Ceiling of a timber frame construction



$F_2$

$F_1$

$F_2$

Post 140/140

$F_2$

$F_1$

$F_2$

$F_1$

Beam 140/240, e = 1,00 m connection
to post with RICON® S 200x80

$F_1$

Header 140/360 connection
to post with RICON® S 290x80
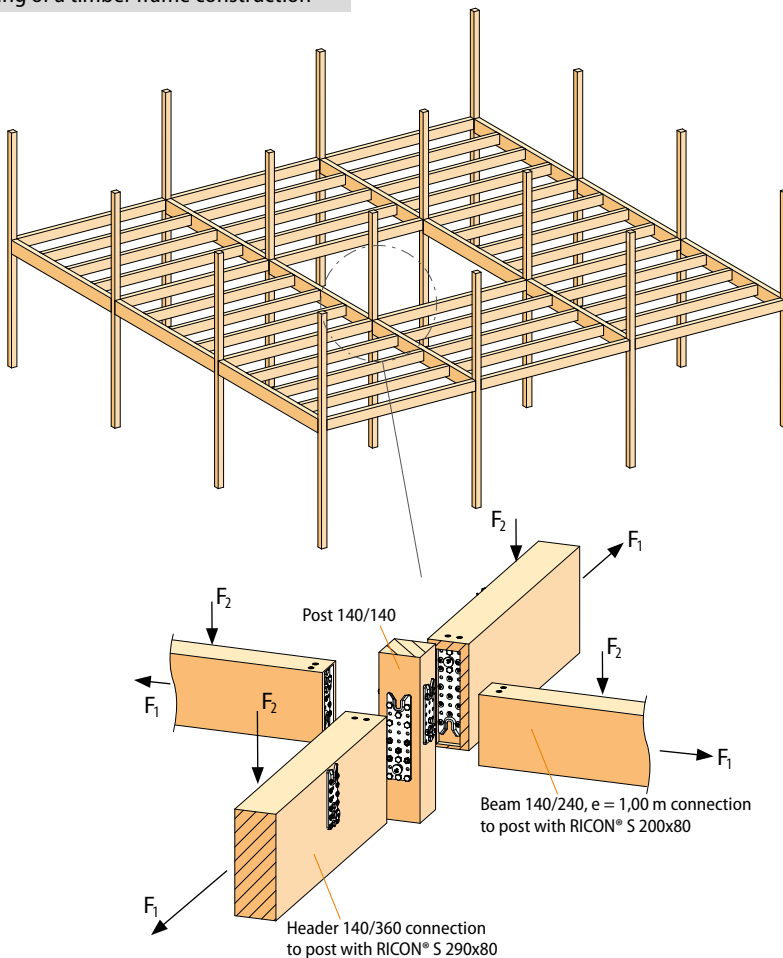
### Alternative ways to connect

RICON® S 200x80 connection
of a secondary beam

$F_2$  $F_1$

$F_2$

$F_2$

$F_1$

$F_2$

$F_1$

Joist 120/240

$F_1$

Header 120/360

Steel I-beam post
IPE 240, ST 37

320

220

2 RICON® S with
11 PB 10x160 each

$F_2$

$F_2$

$F_4$

$F_4$

$F_5$

$F_5$
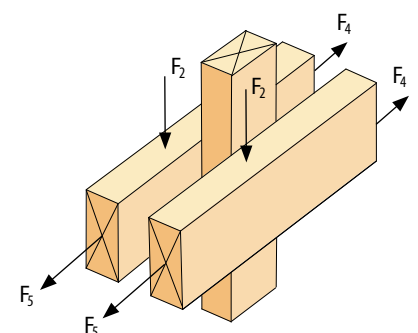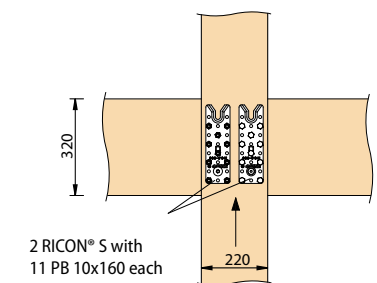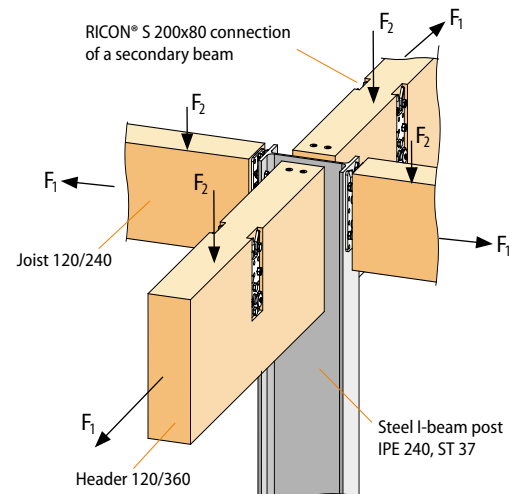
# RICON® S 60 VS

**RICON® S 140/60 VS - Welded collar bolt header-joint connection**

Art.-No.K126

(Dimensions in mm)
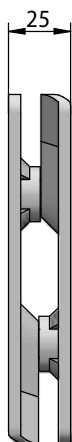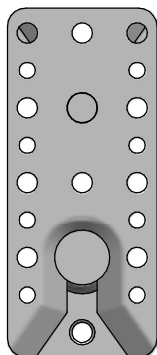
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|----------|----------|-------------|------|--------|-------------------|
| | | | Joist | Header | |
| K126 MIN ● | 140/60 | **VS** | 7 x CS 8x160 | 7 x CS 8x80 | 26.9 |
| K126 ST | 140/60 | **VS** | 10 x CS 8x160 | 10 x CS 8x80 | 37.1 |
| K126 MAX | 140/60 | **VS** | 10 x CS 8x240 | 10 x CS 8x80 | 40.2 |
| Axial tension:  $F_{1,Rk}$ = 31.5 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

Min. timber cross-section: 100 x 160 mm
All design values are available on our website under the Planner Service tab.

**Welded collar bolt**

**PRODUCT**

# RICON® S locking clip

**RICON® S 60 locking clip (made of stainless spring steel)**

Art.-No.K157

**Application:** the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON®S 140/60 VS - Welded collar bolt post connection

Art.-No. K126

(Dimensions in mm)

| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Column | |
| K126 MIN ● | 140/60 | **VS** | 6 x CS 8x80 | 10 x CS 8x160 | 27.2 |
| K126 ST | 140/60 | **VS** | 8 x CS 8x80 | 10 x CS 8x160 | 29.7 |
| Axial tension: $F_{1,Rk}$ = 31.5 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.
Min. timber cross-section:  MIN = 100 x 100 mm    ST = 120 x 120 mm
All design values are available on our website under the Planner Service tab.

### Welded collar bolt

MIN. screw connection
in column

ST. screw connection
in column

① Arrangement of fully threaded screws for transverse tensile reinforcement. According to the expert opinion (10.09.2021) of Prof. Dr. Blaß, the transverse tensile bolts should have the same screw diameter as the RICON®S screws used. These bolts should have the same length as the column cross-section width.
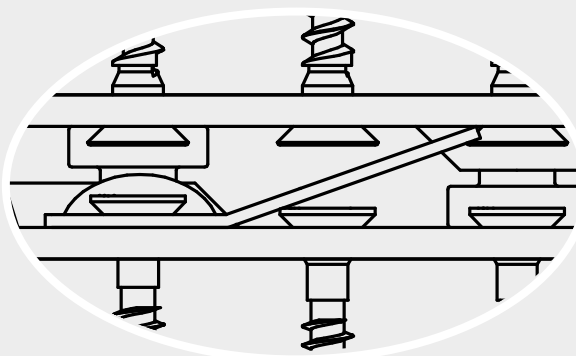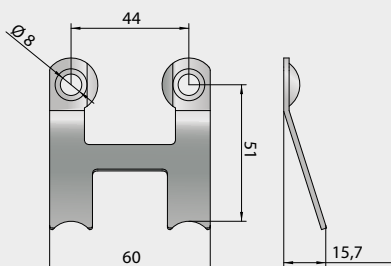
**PRODUCT**

# RICON®S locking clip

## RICON®S 60 locking clip (made of stainless spring steel)

Art.-No.K157

**Application:** the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON®S 140/60 VS - Welded collar bolt double post connection
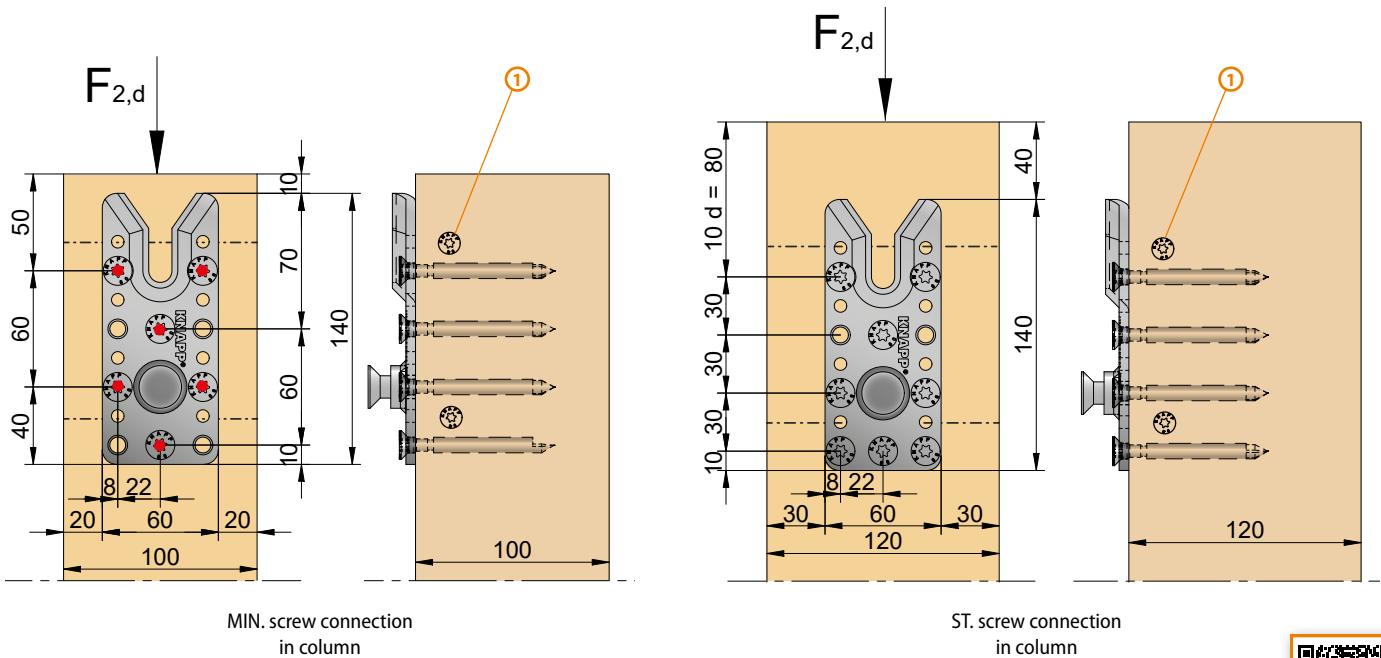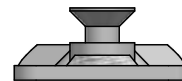
Art.-No.K126

(Dimensions in mm)

| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|----------|----------|-------------|------|--------|--------|
| | | | Joist | Column | |
| K126 ST | 2x 140/60 | **VS** | 16x CS 8x80 | 20 x CS 8x160 | 57.6 |
| Axial tension: $F_{1,Rk} = 63$ kN | | | | | |
| 2 clip locks: $F_{3,Rk} = 36$ kN | | | | | |

ST = standard screw cxn.

All design values are available on our website under the Planner Service tab.

### Welded collar bolt

$F_{2,d}$

$10 \times d = 80$

40

30

30

140

10  30

8  22

20   60   40   60   20

200

120

## RICON®S locking clip

### RICON®S 60 locking clip (made of stainless spring steel)

Art.-No.K157

Ø 8

44

51

60

15,7

**Application: t**he locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

PRODUCT

## RICON® S 200/60 VS - Welded collar bolt header-joist connection

Art.-No. K127

(Dimensions in mm)



| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Header | |
| K127 MIN ● | 200/60 | **VS** | 8 x CS 8x160 | 8 x CS 8x80 | 30.4 |
| K127 ST | 200/60 | **VS** | 16 x CS 8x160 | 16 x CS 8x80 | 56.7 |
| K127 MAX | 200/60 | **VS** | 16 x CS 8x240 | 16 x CS 8x80 | 66.5 |
| Axial tension: $F_{1,Rk} = 31.5$ kN | | | | | |
| Clip lock: $F_{3,Rk} = 18.0$ kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.   MAX = maximum screw cxn.

Min. timber cross-section: 100 x 220 mm
All design values are available on our website under the Planner Service tab.

### Welded collar bolt







**PRODUCT**
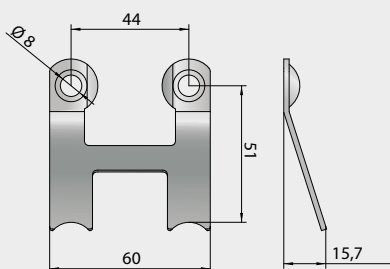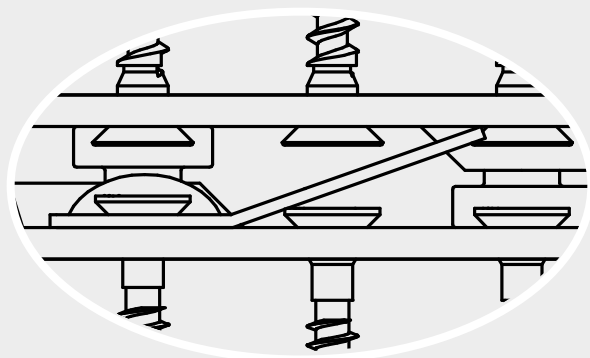
# RICON® S locking clip

## RICON® S 60 locking clip (made of stainless spring steel)

Art.-No. K157





**Application:** the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON® S 200/60 VS - Welded collar bolt post connection
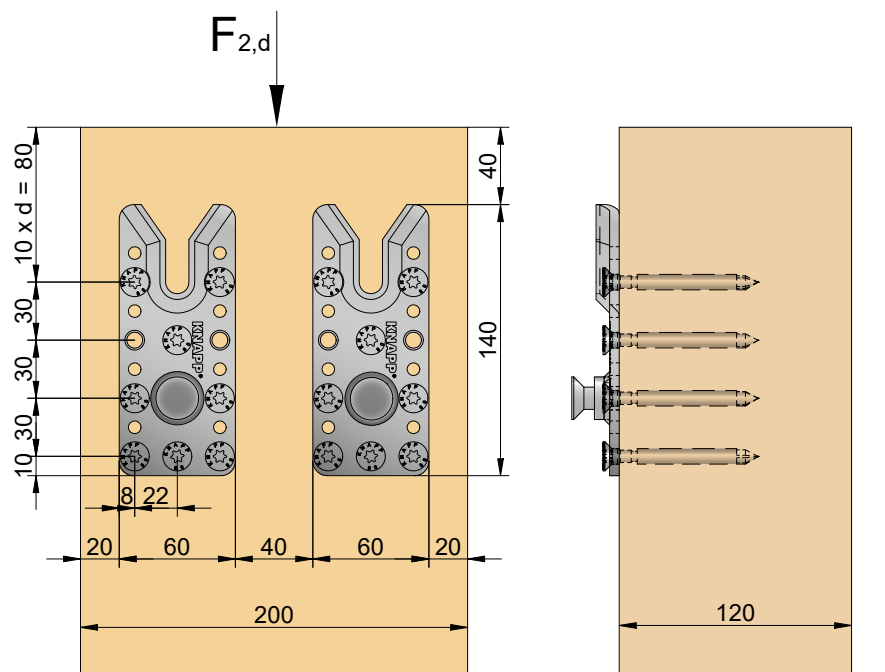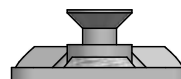
Art.-No. K127

(Dimensions in mm)

| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Column | |
| K126 MIN ● | 200/60 | **VS** | 9 x CS 8x80 | 16 x CS 8x160 | 43.0 |
| K126 ST | 200/60 | **VS** | 13 x CS 8x80 | 16 x CS 8x160 | 51.7 |
| Axial tension: $F_{1,Rk} = 31.5$ kN | | | | | |
| Clip lock: $F_{3,Rk} = 18.0$ kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.
Min. timber cross-section:  MIN = 100 x 100 mm    ST = 120 x 120 mm
All design values are available on our website under the Planner Service tab.

### Welded collar bolt

MIN. screw connection
in column

ST. screw connection
in column

① Arrangement of fully threaded screws for transverse tensile reinforcement. According to the expert opinion (10.09.2021) of Prof. Dr. Blaß, the transverse tensile bolts should have the same screw diameter as the RICON®S screws used. These bolts should have the same length as the column cross-section width.
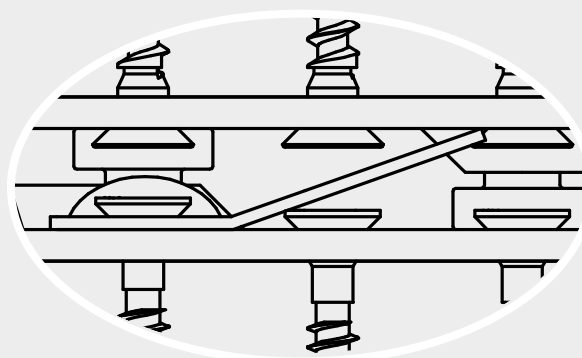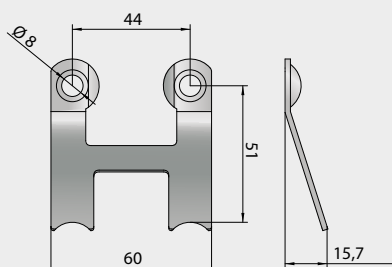
**PRODUCT**

# RICON® S locking clip

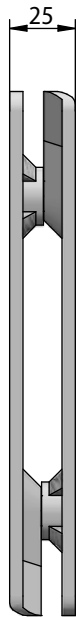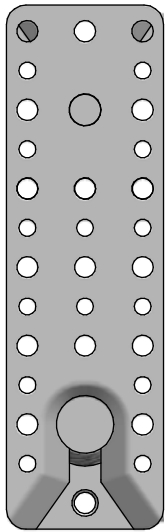## RICON® S 60 locking clip (made of stainless spring steel)

Art.-No. K157

**Application: t**he locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON® S 200/60 VS - Welded collar bolt double post connection
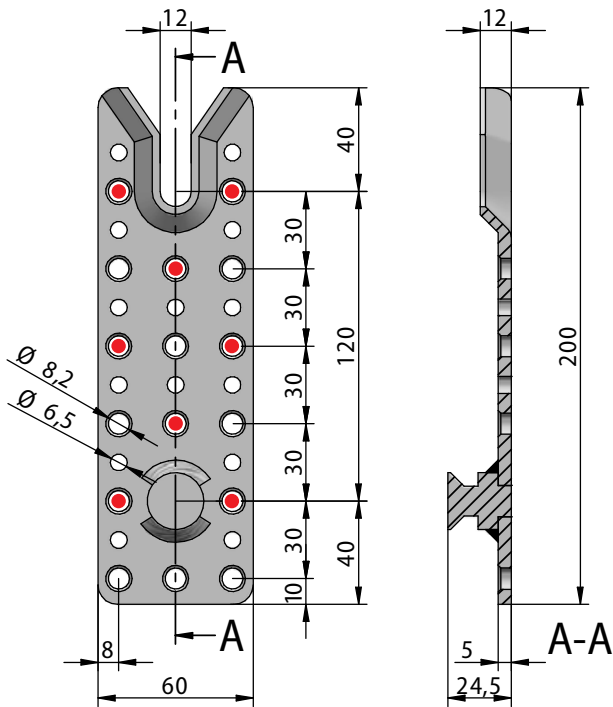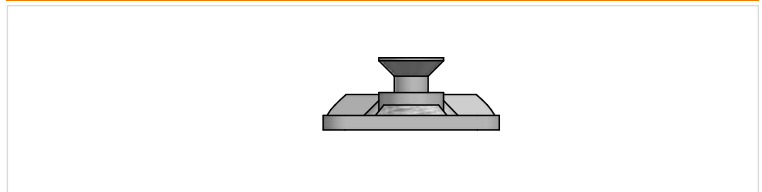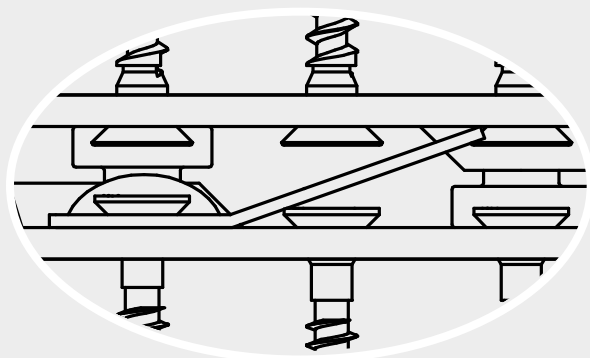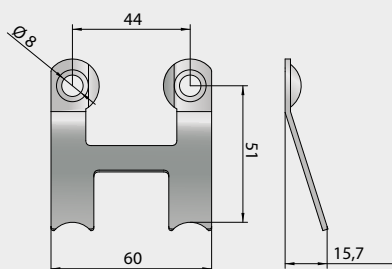
Art.-No.K127

(Dimensions in mm)

| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
| | | | Joist | Column | |
|---|---|---|---|---|---|
| K127 ST | 2x 200/60 | **VS** | 26x CS 8x80 | 32 x CS 8x160 | 103.5 |
| Axial tension:  $F_{1,Rk}$ = 63 kN | | | | | |
| 2 clip locks: $F_{3,Rk}$ = 36 kN | | | | | |

ST = standard screw cxn.
All design values are available on our website under the Planner Service tab.

### Welded collar bolt

$F_{2,d}$

10 x d = 80

30 30 30 30 30 10

40 200

8 22

20 60 40 60 20

200

120

**PRODUCT**

# RICON® S locking clip

## RICON® S 60 locking clip (made of stainless spring steel)

Art.-No.K157

Ø 8 · 44 · 51 · 60 · 15,7

**Application:** the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

# RICON® S 80 VS

**RICON® S 200/80 VS - Welded collar bolt header-joist connection**

Art.-No. K128

(Dimensions in mm)
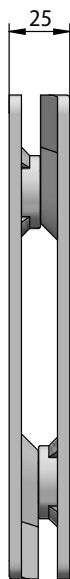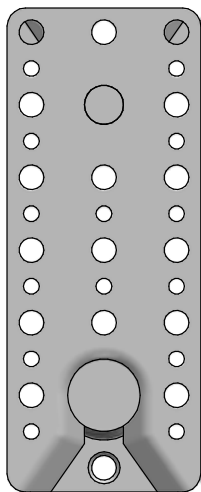


| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
| --- | --- | --- | --- | --- | --- |
| | | | Joist | Header | |
| K128 MIN ● | 200/80 | **VS** | 8 x CS 10x200 | 8 x CS 10x100 | 42.3 |
| K128 ST | 200/80 | **VS** | 16 x CS 10x200 | 16 x CS 10x100 | 79.0 |
| K128 MAX | 200/80 | **VS** | 16 x CS 10x300 | 16 x CS 10x100 | 92.4 |
| Axial tension:  $F_{1,Rk}$ = 36.0 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.   MAX = maximum screw cxn.

Min. timber cross-section: 120 x 230 mm
All design values are available on our website under the Planner Service tab.

**Welded collar bolt**





**PRODUCT**

# RICON® S locking clip

**RICON® S 80 locking clip (made of stainless spring steel)**

Art.-No.K158





**Application: t**he locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON® S 200/80 VS - Welded collar bolt post connection
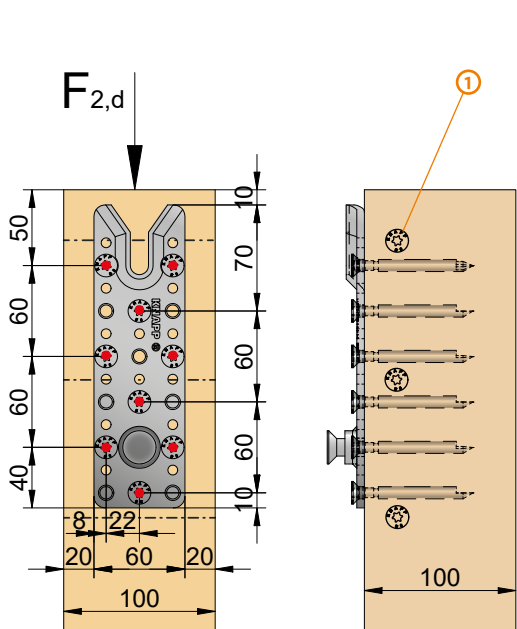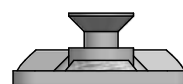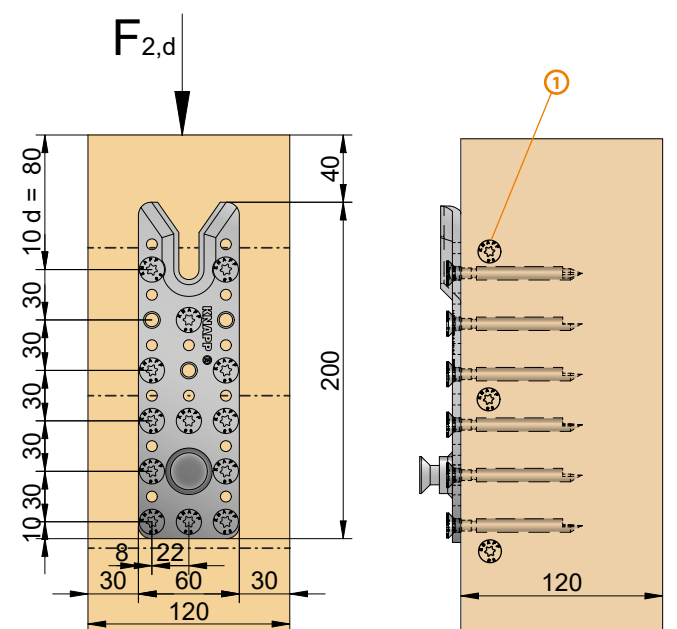
Art.-No. K128

(Dimensions in mm)

| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Column | |
| K128 MIN ● | 200/80 | **VS** | 9 x CS 10x100 | 16 x CS 8x160 | 56.8 |
| K128 ST | 200/80 | **VS** | 13 x CS 10x100 | 16 x CS 8x160 | 68.3 |
| Axial tension: $F_{1,Rk}$ = 36.0 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

Min. timber cross-section: MIN = 120 x 120 mm   ST = 160 x 160 mm

All design values are available on our website under the Planner Service tab.

### Welded collar bolt



$F_{2,d}$



MIN. screw connection in column

$F_{2,d}$



ST. screw connection in column

① Arrangement of fully threaded screws for transverse tensile reinforcement. According to the expert opinion (10.09.2021) of Prof. Dr. Blaß, the transverse tensile bolts should have the same screw diameter as the RICON®S screws used. These bolts should have the same length as the column cross-section width.
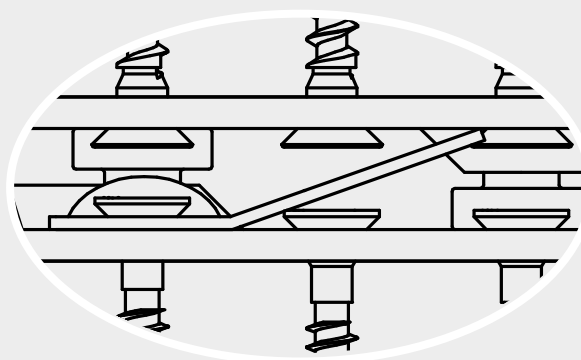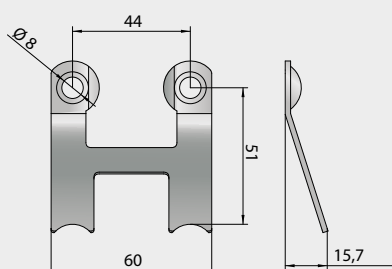
PRODUCT

# RICON® S locking clip

## RICON® S 80 locking clip (made of stainless spring steel)

Art.-No.K158



**Application**: the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON®S 200/80 VS - Welded collar bolt double post connection
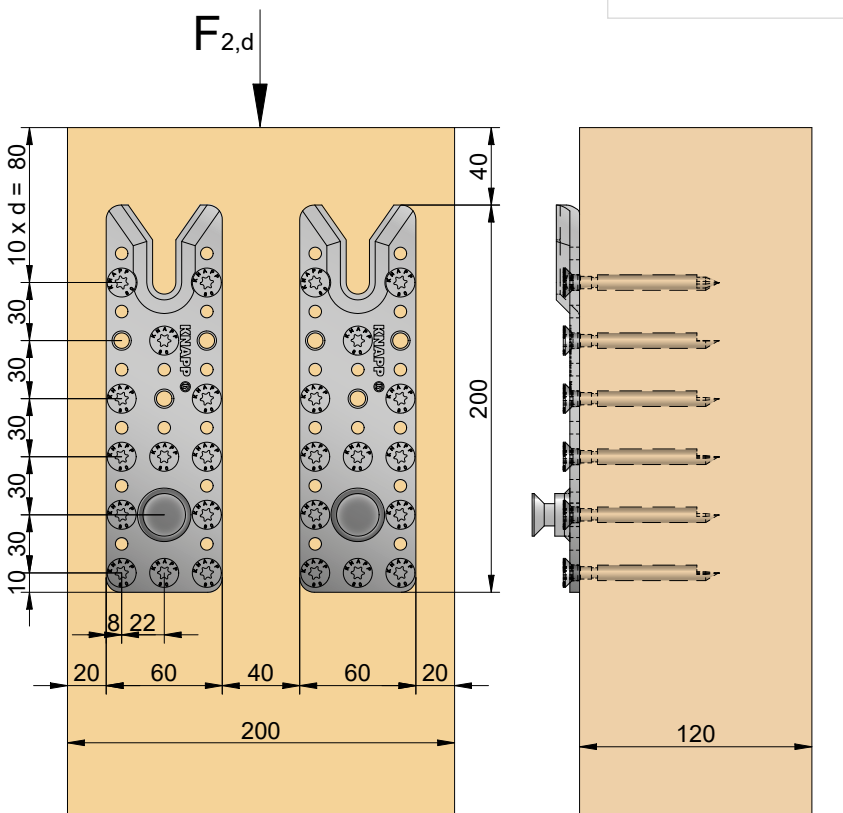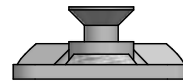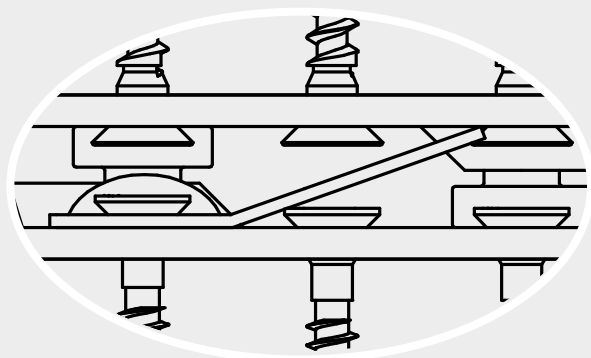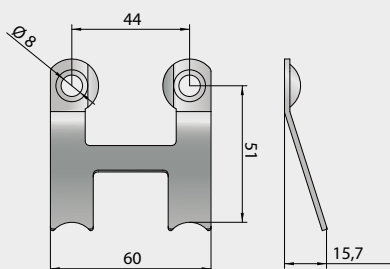
Art.-No. K128

(Dimensions in mm)

| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Column | |
| K128 ST | 2x 200/80 | **VS** | 26x CS 10x100 | 32 x CS 10x160 | 136.6 |
| Axial tension: $F_{1,Rk} = 63$ kN | | | | | |
| 2 clip locks: $F_{3,Rk} = 36$ kN | | | | | |

ST = standard screw cxn.

Min. timber cross-section: 240x160 mm

All design values are available on our website under the Planner Service tab.

| Welded collar bolt |
|---|





$F_{2,d}$

PRODUCT

# RICON®S locking clip

## RICON®S 80 locking clip (made of stainless spring steel)

Art.-No.K158



**Application**: the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON® S 290/80 VS - Welded collar bolt header-joist connection

Art.-No.K129

(Dimensions in mm)
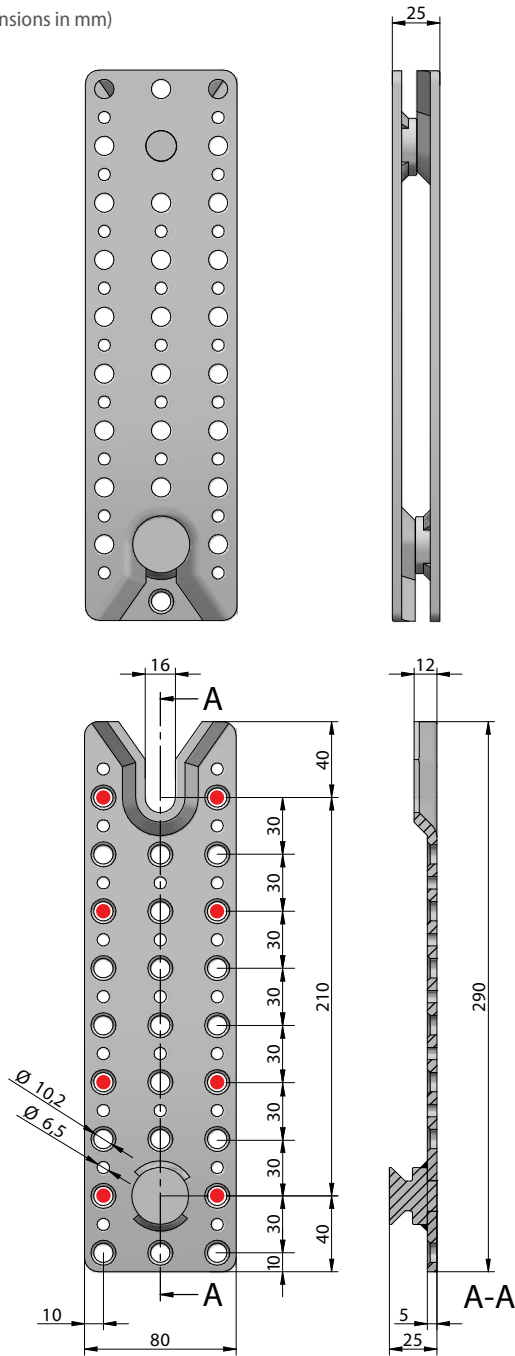
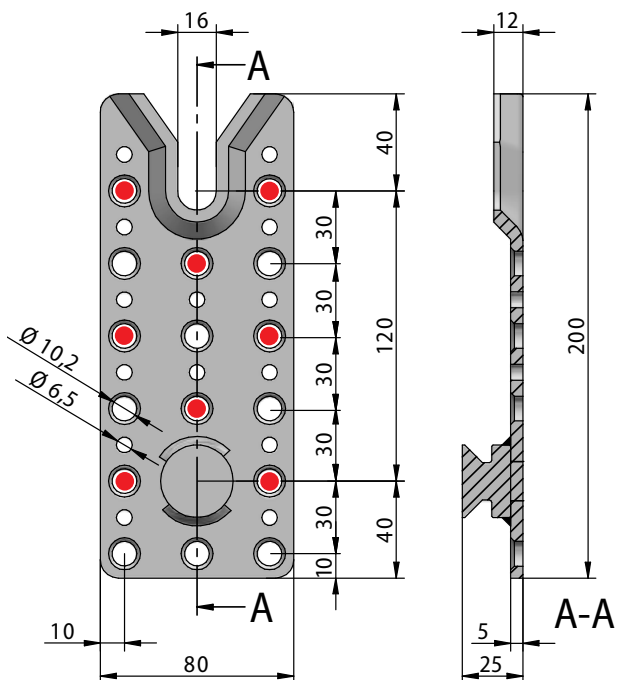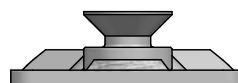| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Header | |
| K129 MIN ● | 290/80 | **VS** | 8 x CS 10x200 | 8 x CS 10x100 | 42.3 |
| K129 ST | 290/80 | **VS** | 25 x CS 10x200 | 25 x CS 10x100 | 118.0 |
| K129 MAX | 290/80 | **VS** | 25 x CS 10x300 | 25 x CS 10x100 | 142.7 |
| Axial tension:  $F_{1,Rk} = 36.0$ kN | | | | | |
| Clip lock: $F_{3,Rk} = 18.0$ kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.   MAX = maximum screw cxn.

Min. timber cross-section: 120 x 320 mm
All design values are available on our website under the Planner Service tab.
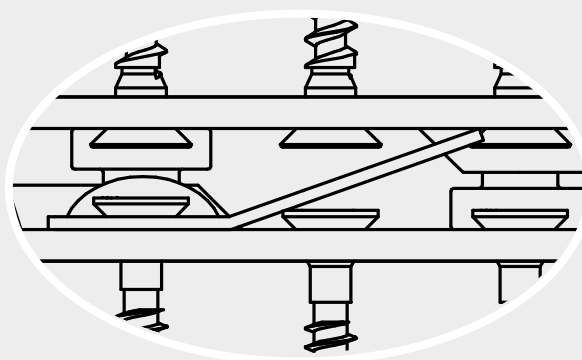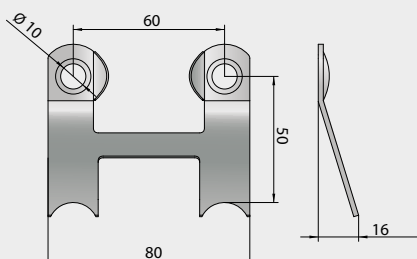
### Welded collar bolt



PRODUCT

# RICON®S locking clip

## RICON® S 80 locking clip (made of stainless spring steel)
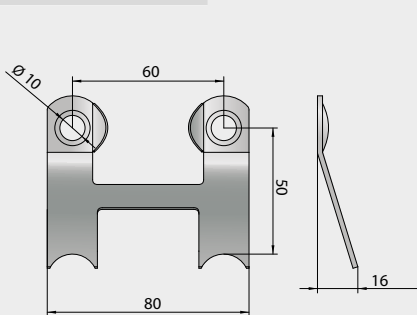
Art.-No.K158



**Application:** the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON® S 290/80 VS - Welded collar bolt post connection
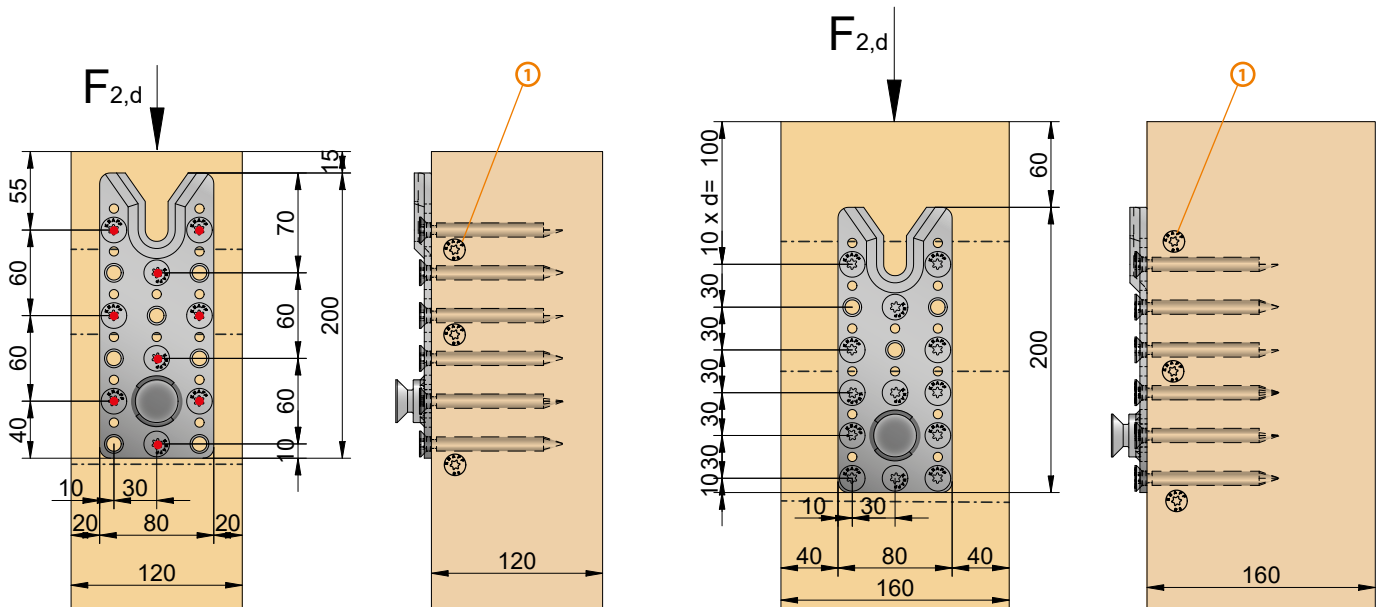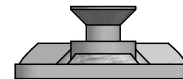
Art.-No.K129

(Dimensions in mm)    (Dimensions in mm)

| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Column | |
| K129 MIN ● | 290/80 | **VS** | 13 x CS 10x100 | 25 x CS 10x200 | 84.4 |
| K129 ST | 290/80 | **VS** | 20 x CS 10x100 | 25 x CS 10x200 | 108.5 |
| Axial tension: $F_{1,Rk}$ = 36.0 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.
Min. timber cross-section: MIN = 240x160 mm        ST = 240x160 mm
All design values are available on our website under the Planner Service tab.

### Welded collar bolt

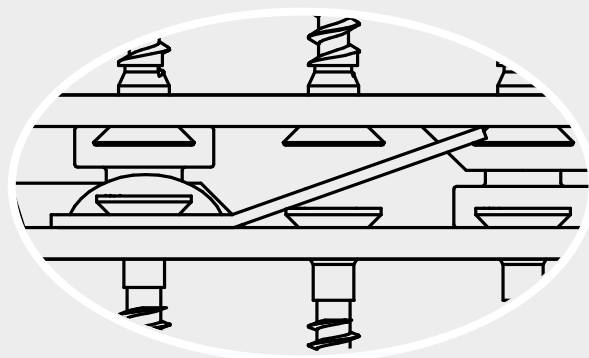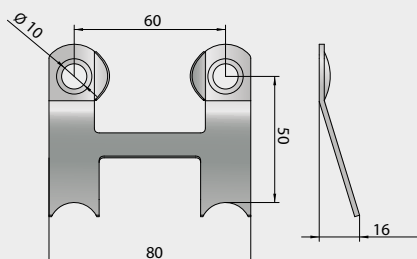MIN. screw connection in column

ST. screw connection in column

① Arrangement of fully threaded screws for transverse tensile reinforcement. According to the expert opinion (10.09.2021) of Prof. Dr. Blaß, the transverse tensile bolts should have the same screw diameter as the RICON®S screws used. These bolts should have the same length as the column cross-section width.

**PRODUCT**

# RICON®S locking clip

## RICON®S 80 locking clip (made of stainless spring steel)

Art.-No.K158

Ø 10    60    50    80    16

**Application**: the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

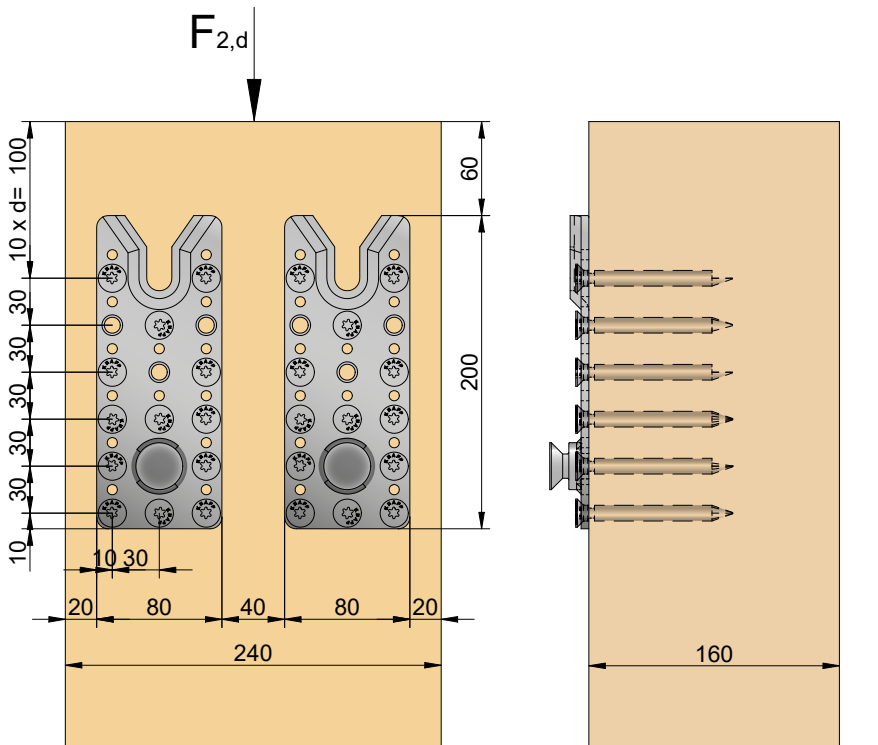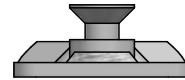## RICON® S 290/80 VS - Welded collar bolt double post connection

Art.-No. K129

| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Column | |
| K129 ST | 2x 290/80 | **VS** | 40 x CS 10x100 | 240x160 | 216.9 |
| Axial tension:  $F_{1,Rk} = 63$ kN | | | | | |
| 2 clip locks: $F_{3,Rk} = 36$ kN | | | | | |

ST = standard screw cxn.
Min. timber cross-section: ST = 240x160 mm
All design values are available on our website under the Planner Service tab.
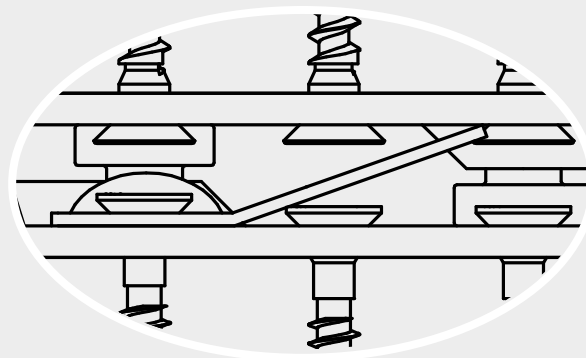
| Welded collar bolt |
|---|

$F_{2,d}$

10 x d = 100

30  30  30  30  30  30  30  30  10

60

290

10  30

20  80  40  80  20

240

160

**PRODUCT**

# RICON® S locking clip

## RICON® S 80 locking clip (made of stainless spring steel)

Art.-No. K158

Ø 10

60

50

80

16

**Application**: the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON®S 390/80 VS ZP - header-joint 30° screw connection

Art.-No.K191

(Dimensions in mm)
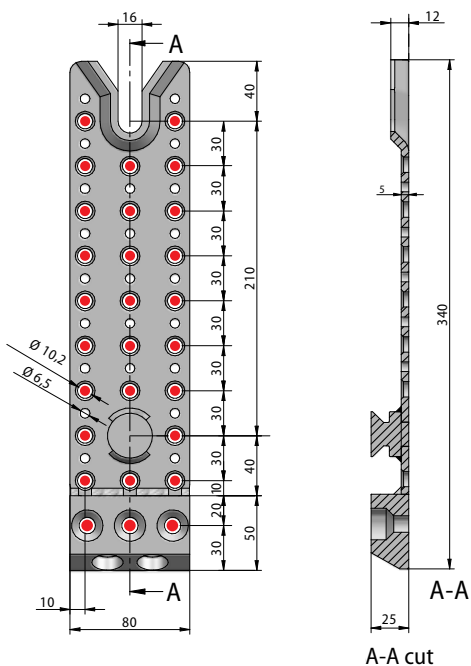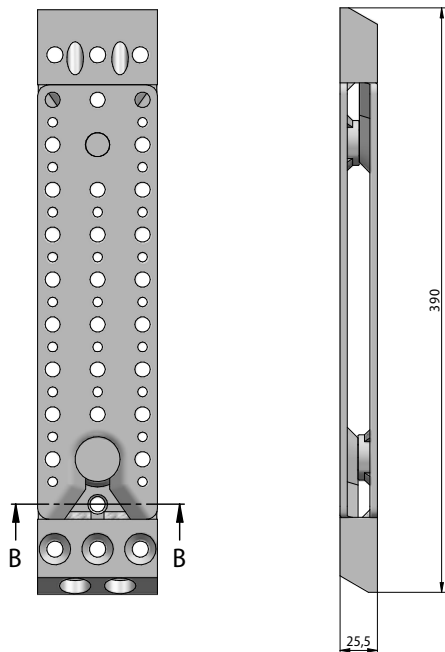
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Header | |
| K191 MIN ● | 390/80 | VS | 28 x CS 10x200 | 28 x CS 10x100 | 130.6 |
| K191 ST | 390/80 | VS | 28 x CS 10x200 | 28 x CS 10x100 | 170.6 |
| | | | 2 x CS 10x450 | 2 x CS 10x400 | |
| K191 MAX | 390/80 | VS | 28 x CS 10x300 | 28 x CS 10x100 | 195.3 |
| | | | 2 x CS 10x450 | 2 x CS 10x400 | |
| Axial tension: $F_{1,Rk} = 36.0$ kN | | | | | |
| Clip lock: $F_{3,Rk} = 18.0$ kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.   MAX = maximum screw cxn.

Min. timber cross-section: 120 x 720 mm   ou   160 x 520 mm
All design values are available on our website under the Planner Service tab.

### Welded collar bolt
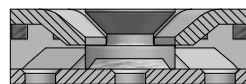
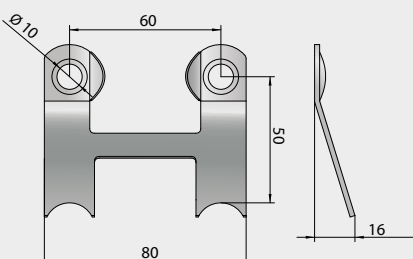B-B cut              View with additional plate

PRODUCT

# RICON®S locking clip

## RICON®S 80 locking clip (made of stainless spring steel)
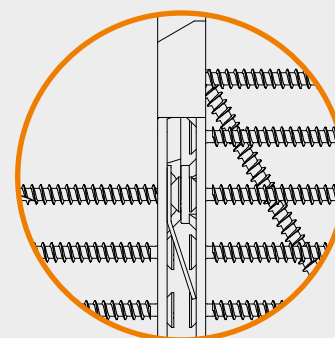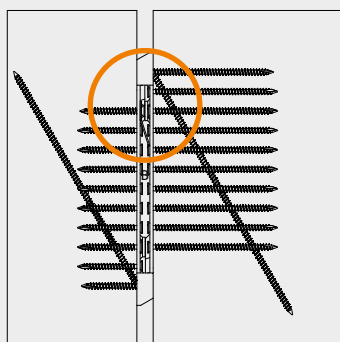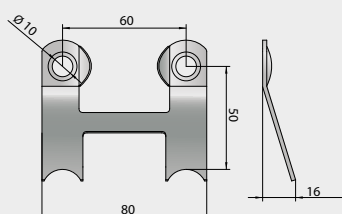
Art.-No.K158

**Application**: the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON® S390/80 VS - post 30° screw connection

Art.-No. K191

(Dimensions in mm)

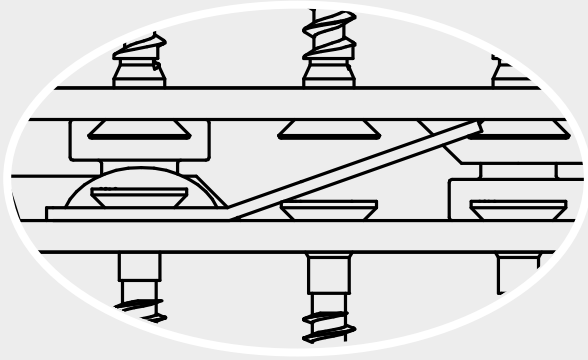| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Column | |
| K191 MIN ● | 390/80 | **VS** | 23 x CS 10x100 | 28 x CS 10x200 2 x CS 10x450 | 124.8 |
| K191 ST | 390/80 | **VS** | 23 x CS 10x100 2 x CS 10x400 | 28 x CS 10x200 2 x CS 10x450 | 164.8 |
| Axial tension: $F_{1,Rk}$ = 36.0 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

**Min. timber cross-section: 160 x 160 mm   ou   160 x 200 mm**
All design values are available on our website under the Planner Service tab.

**PRODUCT**

### Welded collar bolt



B-B cut          View with additional plate

$F_{2,d}$                    $F_{2,d}$



MIN. screw connection in column

ST. screw connection in column

① Arrangement of fully threaded screws for transverse tensile reinforcement. According to the expert opinion (10.09.2021) of Prof. Dr. Blaß, the transverse tensile bolts should have the same screw diameter as the RICON®S screws used. These bolts should have the same length as the column cross-section width.

# RICON® S locking clip
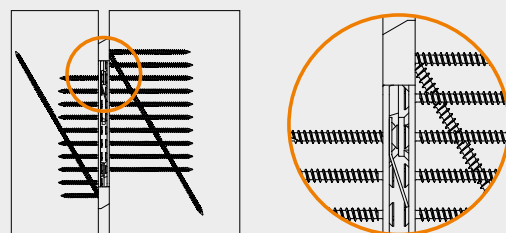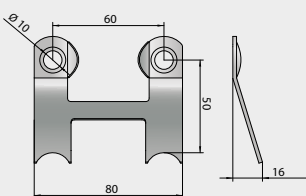
## RICON® S 80 locking clip (made of stainless spring steel)

Art.-No. K158



**Application:** the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON® S 390/80 VS ZP - post 30° screw double connection

Art.-No. K191

(Dimensions in mm)

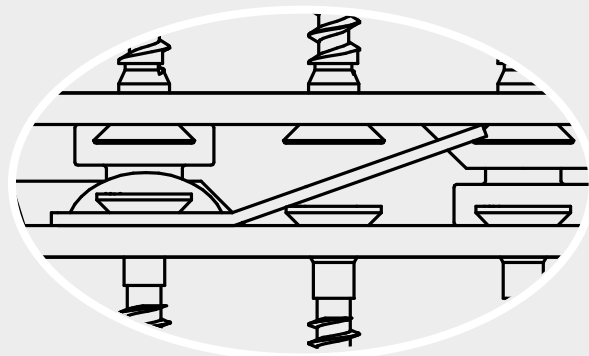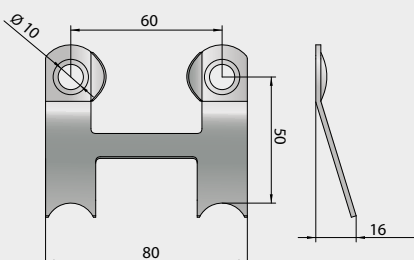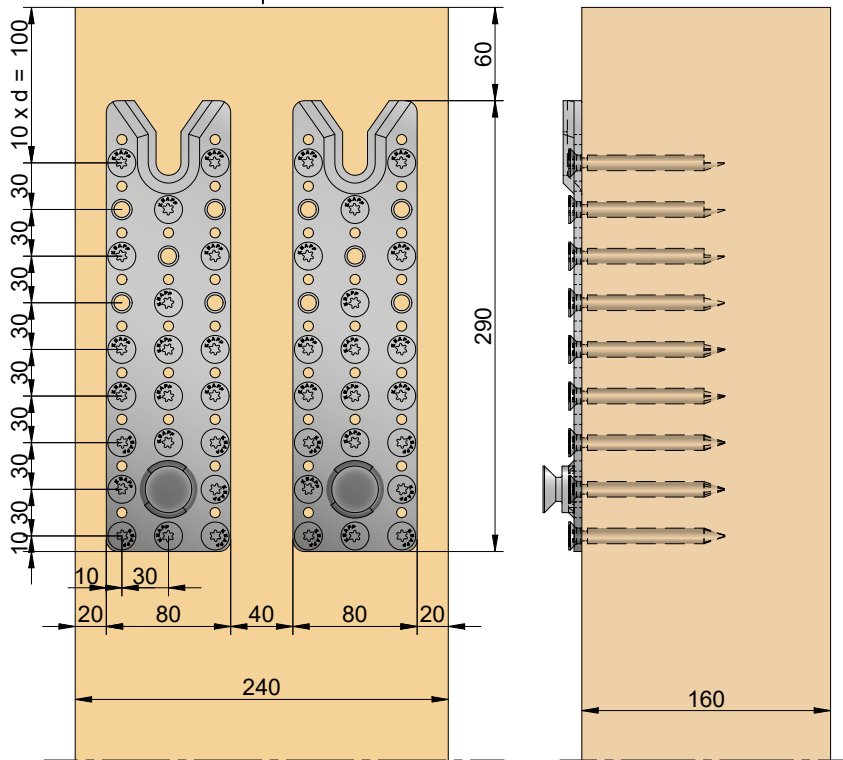| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|----------|----------|-------------|------------------|------|-------------------|
| | | | Joist | Column | |
| K191 MIN ● | 390/80 | VS | 46 x CS 10x100 | 56 x CS 10x200 | 249.8 |
| | | | | 4 x CS 10x450 | |
| K191 ST | 390/80 | VS | 46 x CS 10x100 | 58 x CS 10x200 | 164.8 |
| | | | 46 x CS 10x400 | 4 x CS 10x450 | |
| Axial tension: $F_{1,Rk}$ = 36.0 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.    ST = standard screw cxn.
Min. timber cross-section: 240 x 160 mm    ou   240 x 200 mm
All design values are available on our website under the Planner Service tab.

PRODUCT

### Welded collar bolt

B-B cut

View with additional plate

$F_{2,d}$

$12 \times d = 120$

MIN. screw connection
in column

$F_{2,d}$

$12 \times d = 120$

30°

ST. screw connection
in column
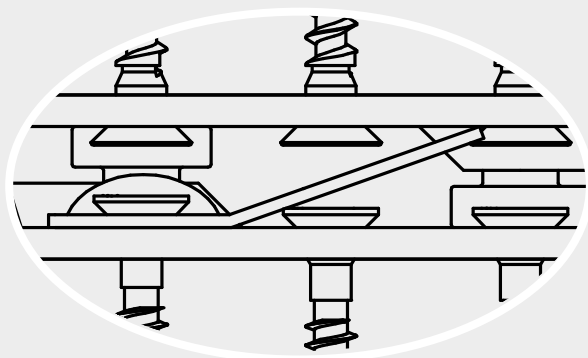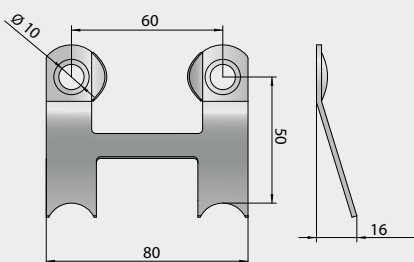
# RICON® S locking clip
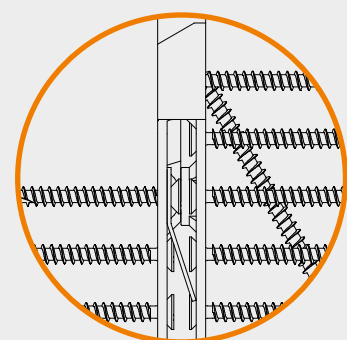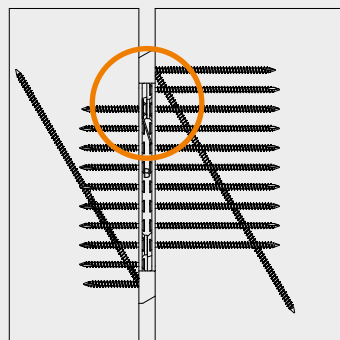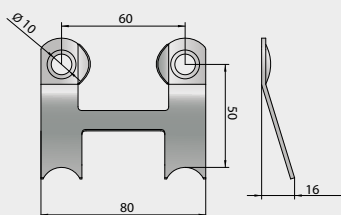
## RICON® S 80 locking clip (made of stainless spring steel)

Art.-No. K158

**Application**: the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

# RICON®S 60 EK

**RICON®S 140/60 EK - Adjustable collar bolt**

Art.-No.K146

(Dimensions in mm)

$25^{+5}$
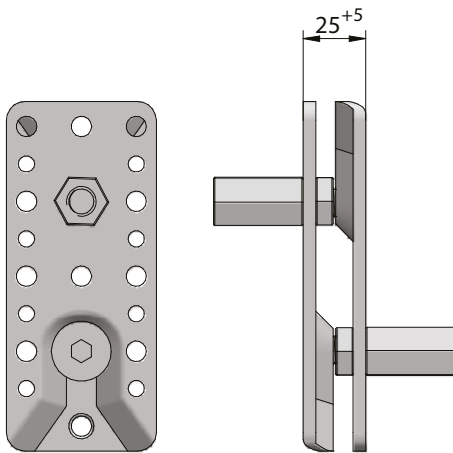
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|----------|----------|-------------|------------------|------|--------|
| | | | Joist | Header | |
| K146 MIN ● | 140/60 | **EK M12** | 7 x CS 8x160 | 7 x CS 8x80 | 26.9 |
| K146 ST | 140/60 | **EK M12** | 10 x CS 8x160 | 10 x CS 8x80 | 37.1 |
| K146 MAX | 140/60 | **EK M12** | 10 x CS 8x240 | 10 x CS 8x80 | 40.2 |
| Axial tension: $F_{1,Rk}$ = 31.5 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.   MAX = maximum screw cxn.
Min. timber cross-section: 100 x 160 mm
All design values are available on our website under the Planner Service tab.

| Adjustable collar bolt, for tolerance adjustment |
|---|
| +5 |

12

A

12

Ø 8,2
Ø 6,5

40
60
30
30
30
30
40
10

140

36

8

5

A

A-A

60

17-22   Retaining screw

PRODUCT

# RICON®S locking clip

**RICON®S locking clip 60 (made of stainless spring steel)**

Art.-No.K157

Ø 8

44

51

60

15,7

**Application:** the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

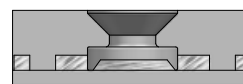## RICON® S 200/60 EK - Adjustable collar bolt

Art.-No. K148

(Dimensions in mm)

25 +5
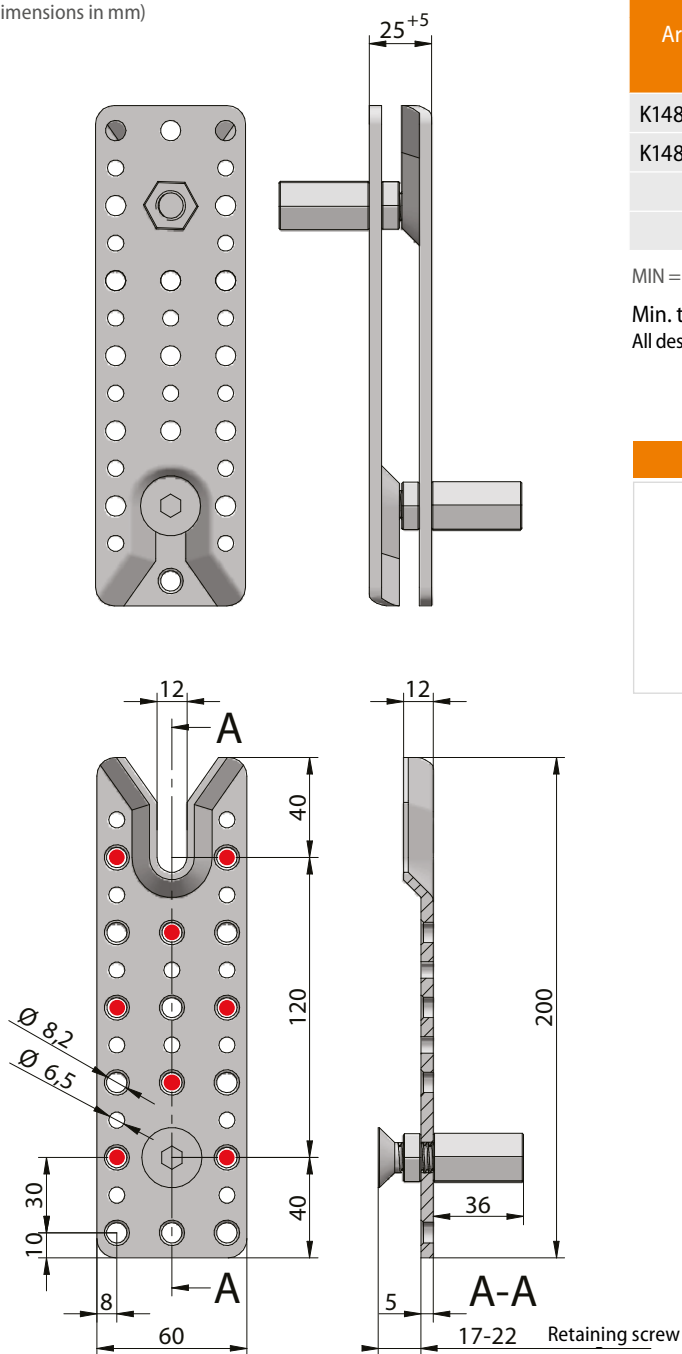
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Header | |
| K148 MIN ● | 200/60 | EK M12 | 8 x CS 8x160 | 8 x CS 8x80 | 30.4 |
| K148 ST | 200/60 | EK M12 | 16 x CS 8x160 | 16 x CS 8x80 | 44.2 |
| Axial tension: $F_{1,Rk}$ = 31.5 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

Min. timber cross-section: 100 x 220 mm
All design values are available on our website under the Planner Service tab.

### Adjustable collar bolt, for tolerance adjustment

+5

A

12

Ø 8,2
Ø 6,5

40
120
40
30
10
8
60

12

200

36

5
17-22   Retaining screw

A-A

**PRODUCT**

# RICON® S locking clip

## RICON® S locking clip 60 (made of stainless spring steel)

Art.-No. K157

Ø 8
44
51
60
15,7
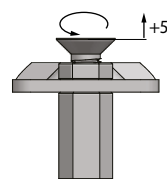
**Application:** the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.
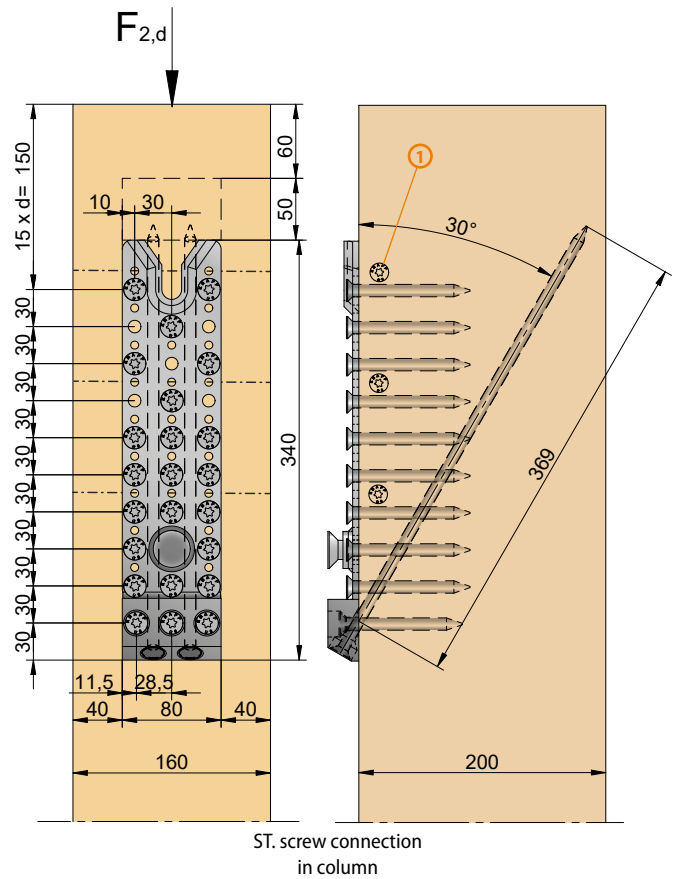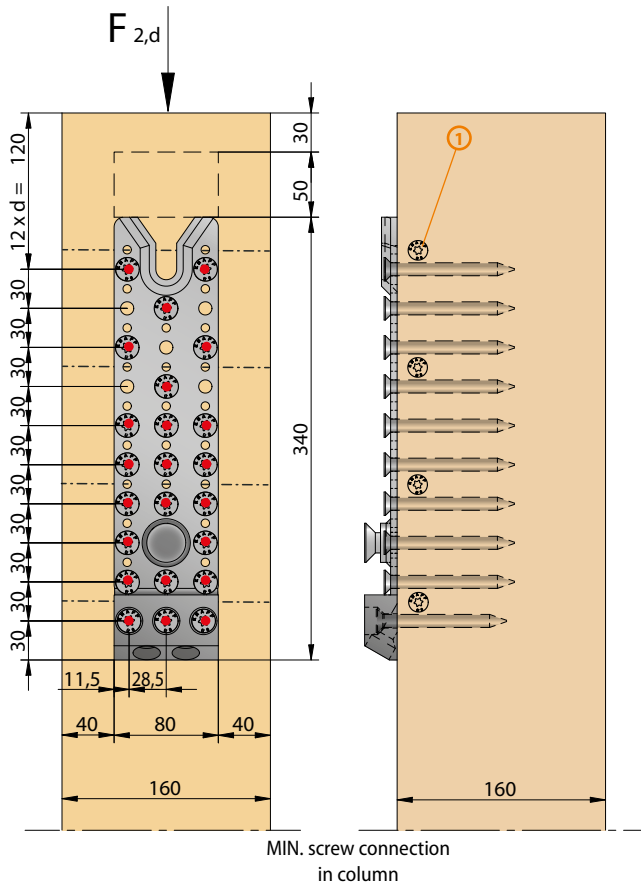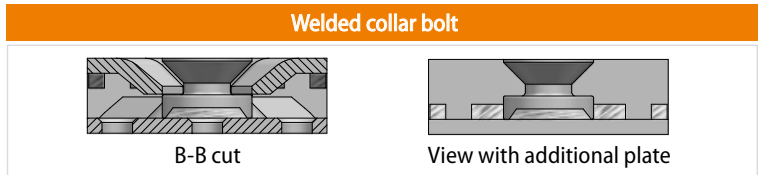
# RICON® S 80 EK

## RICON® S 200/80 EK - Adjustable collar bolt

Art.-No. K153

(Dimensions in mm)

$25^{+5}$
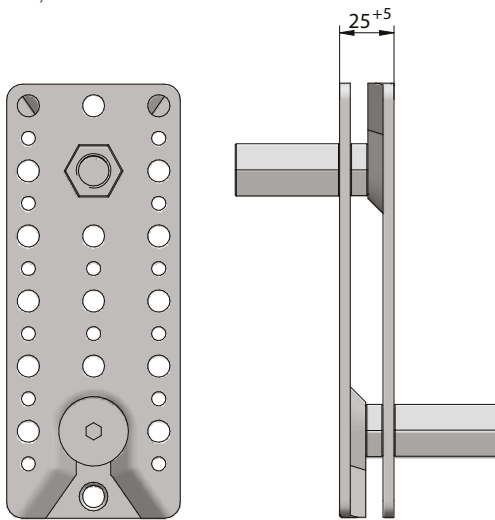
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Header | |
| K153 MIN ● | 200/80 | **EK M16** | 8 x CS 10x200 | 8 x CS 10x100 | 42.4 |
| K153 ST | 200/80 | **EK M16** | 16 x CS 10x200 | 16 x CS 10x100 | 65.0 |
| Axial tension: $F_{1,Rk}$ = 36.0 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

Min. timber cross-section: 120 x 230 mm
All design values are available on our website under the Planner Service tab.

### Adjustable collar bolt, for tolerance adjustment

+5

16

A

12

Ø 10.2
Ø 6.5

40
120
40
30
10
10

200

48

5

80
20-25    Retaining screw

A-A

**PRODUCT**

# RICON® S locking clip

## RICON® S locking clip 80 (made of stainless spring steel)

Art.-No. K158

Ø 10
60
50
80
16

**Application:** the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON® S 290/80 EK - Adjustable collar bolt

Art.-No.K156

(Dimensions in mm)
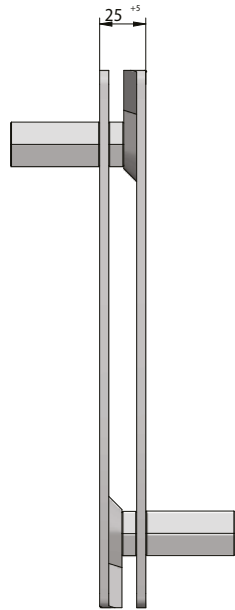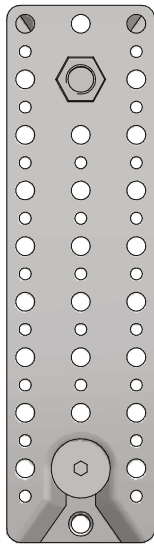
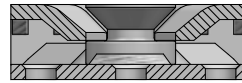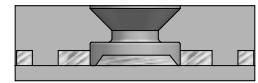| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Header | |
| K156 MIN ● | 290/80 | **EK M16** | 8 x CS 10x200 | 8 x CS 10x100 | 42.,4 |
| K156 ST | 290/80 | **EK M16** | 20 x CS 10x200 | 20 x CS 10x100 | 72.2 |
| | | Axial tension: $F_{1,Rk} = 36.0$ kN | | | |
| | | Clip lock: $F_{3,Rk} = 18.0$ kN | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

Min. timber cross-section: 120 x 320 mm
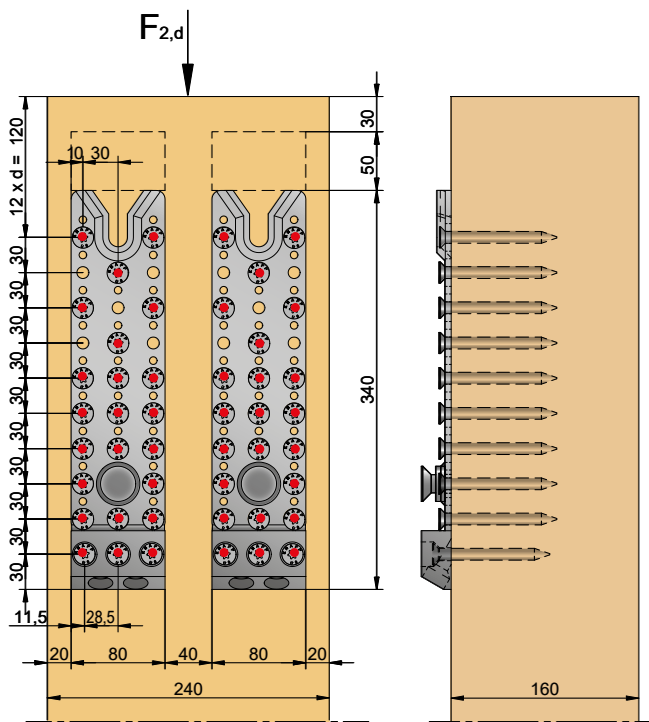All design values are available on our website under the Planner Service tab.

### Adjustable collar bolt, for tolerance adjustment

Retaining screw

**PRODUCT**

# RICON®S locking clip

## RICON®S locking clip 80 (made of stainless spring steel)

Art.-No.K158

**Application: t**he locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

# RICON®S 60 EK

**RICON® S 140/60 EK M12 - Adjustable collar bolt and insert screw**

Art.-No.K280

(Dimensions in mm)
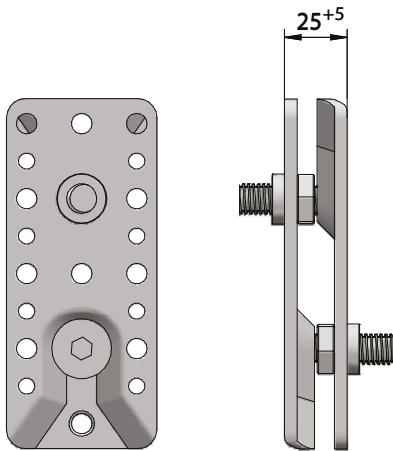
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Header | |
| K280 MIN ● | 140/60 | **EK M12** | 7 x CS 8x160 | 7 x CS 8x80 | 26.9 |
| K280 ST | 140/60 | **EK M12** | 10 x CS 8x160 | 10 x CS 8x80 | 37.1 |
| K280 MAX | 140/60 | **EK M12** | 10 x CS 8x240 | 10 x CS 8x80 | 40.2 |
| Axial tension:  $F_{1,Rk} = 31.5$ kN | | | | | |
| Clip lock: $F_{3,Rk} = 18.0$ kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.   MAX = maximum screw cxn.

Min. timber cross-section: 100 x 160 mm
All design values are available on our website under the Planner Service tab.

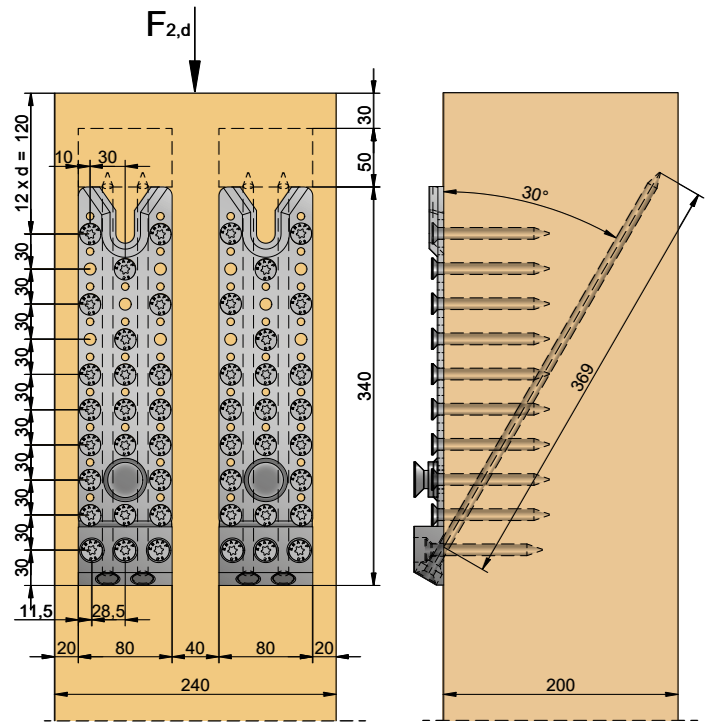**Adjustable collar bolt, and insert screw**



**PRODUCT**

Retaining screw

# RICON®S locking clip

**RICON®S locking clip 60 (made of stainless spring steel)**

Art.-No.K157



**Application:** the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.
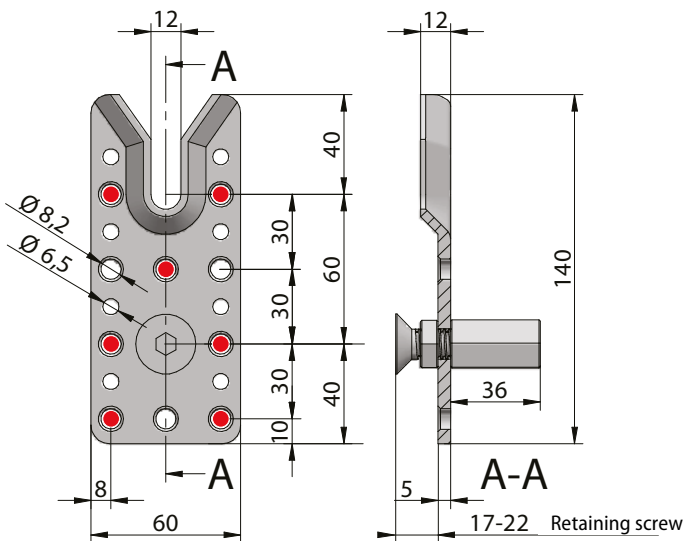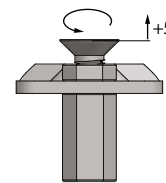
## RICON®S 200/60 EK M12 - Adjustable collar bolt and insert screw

Art.-No.K281

(Dimensions in mm)

25 +5
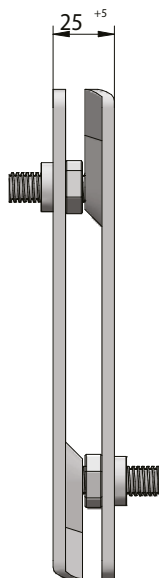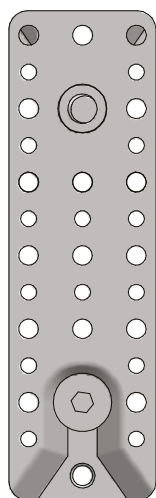
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Header | |
| K281 MIN ● | 200/60 | **EK M12** | 8 x CS 8x160 | 8 x CS 8x80 | 30.4 |
| K281 ST | 200/60 | **EK M12** | 16 x CS 8x160 | 16 x CS 8x80 | 44.2 |
| Axial tension:  $F_{1,Rk}$ = 31.5 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

Min. timber cross-section: 100 x 220 mm
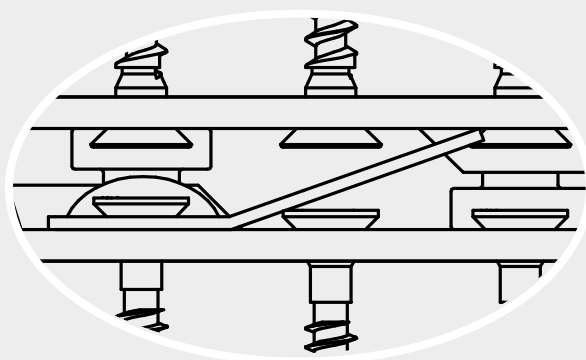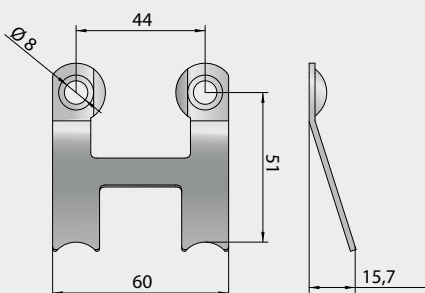All design values are available on our website under the Planner Service tab.

### Adjustable collar bolt and insert screw

+5

12   A

12

40

120

200

Ø 8,2
Ø 6,5

30

10

40

8

A

60

5

17-22   Retaining screw

A-A

**PRODUCT**

# RICON®S locking clip

## RICON®S locking clip 60 (made of stainless spring steel)

Art.-No.K157

Ø 8

44

51

60

15,7
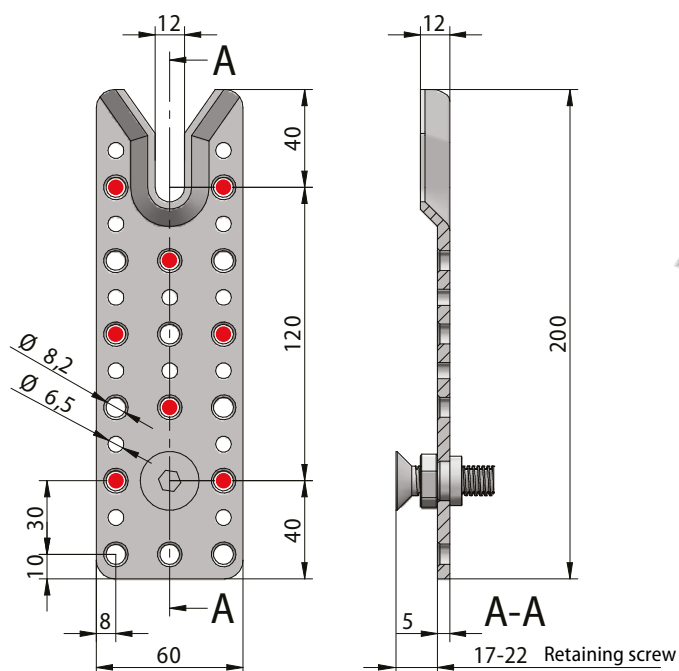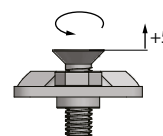
**Application: t**he locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

# RICON® S 80 EK

**RICON®S 200/80 EK M16 - Adjustable collar bolt and insert screw**

Art.-No.K282

(Dimensions in mm)
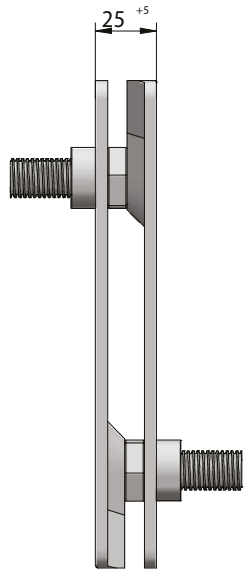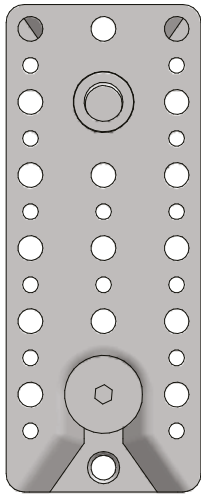
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Header | |
| K282 MIN ● | 200/80 | **EK M16** | 8 x CS 10x200 | 8 x CS 10x100 | 42.4 |
| K282 ST | 200/80 | **EK M16** | 16 x CS 10x200 | 16 x CS 10x100 | 65.0 |
| Axial tension:  $F_{1,Rk}$ = 36,0 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

Min. timber cross-section: 120 x 230 mm
All design values are available on our website under the Planner Service tab.

**Adjustable collar bolt and insert screw**

25 +5
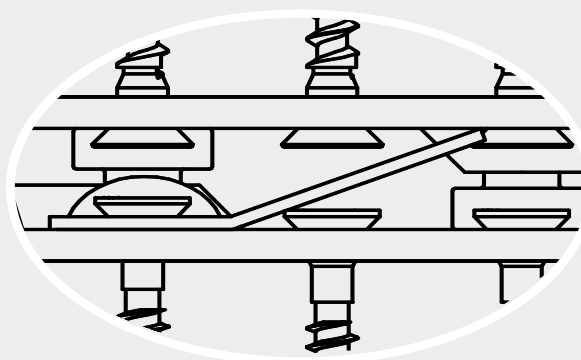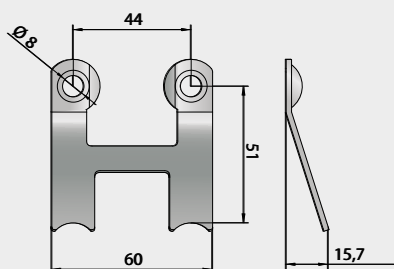
16

12

Ø 10,2
Ø 6,5

A-A

20-25  Retaining screw

PRODUCT

# RICON®S locking clip

**RICON®S locking clip 80 (made of stainless spring steel)**

Art.-No.K158

Ø 10    60
50
80    16

**Application:** the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON®S 290/80 EK M16 - Adjustable collar bolt and insert screw (available upon request)

Art.-No.K283

(Dimensions in mm)

25 +5
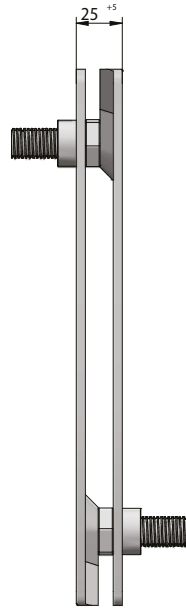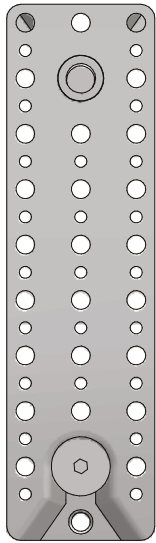
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Header | |
| K283 MIN ● | 290/80 | **EK M16** | 8 x CS 10x200 | 8 x CS 10x100 | 42.4 |
| K283 ST | 290/80 | **EK M16** | 20 x CS 10x200 | 20 x CS 10x100 | 72.2 |
| Axial tension:  $F_{1,Rk}$ = 36.0 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

Min. timber cross-section: 120 x 320 mm
All design values are available on our website under the Planner Service tab.

### Adjustable collar bolt, for tolerance adjustment

+5

16

A

40

210

Ø 10.2
Ø 6.5

30
10

40

10

A

80

12

290

5

A-A

20-25 Retaining screw

**PRODUCT**

# RICON®S locking clip

## RICON®S locking clip 80 (made of stainless spring steel)

Art.-No.K158

Ø 10

60

50

80

16

**Application: t**he locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

# RICON®S 60 VK

**RICON®S 140/60 VK - Screwed collar bolt**
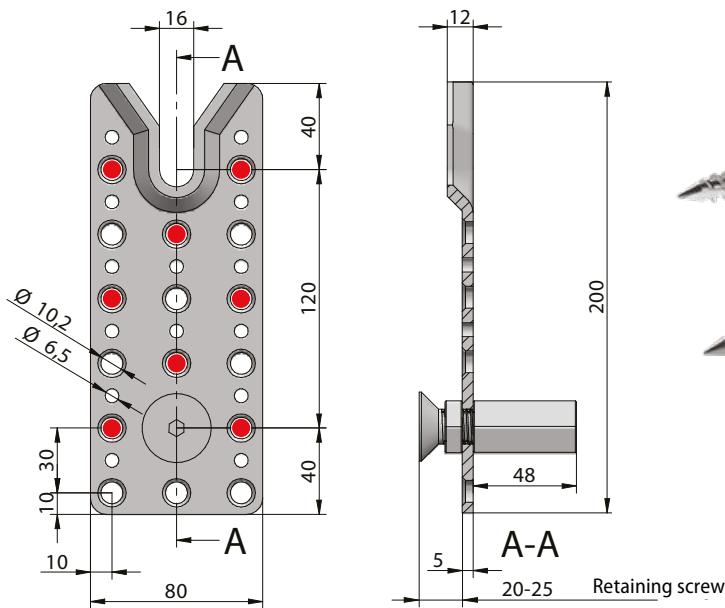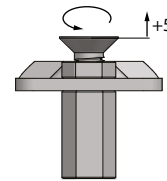
Art.-No.K130

(Dimensions in mm)
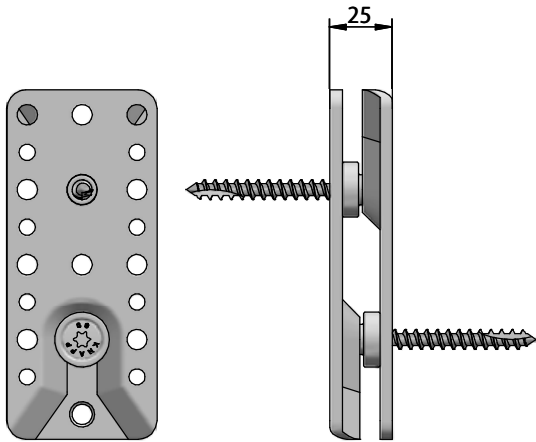
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
| --- | --- | --- | --- | --- | --- |
| | | | Joist | Header | |
| K130 ST | 140/60 | **VK** D12 | 8 x CS 8x160 | 8 x CS 8x80 | 31.5 |
| K130 MAX | 140/60 | **VK** D12 | 8 x CS 8x240 | 8 x CS 8x80 | 33.5 |
| Axial tension: $F_{1,Rk}$ = 13.0 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

Min. timber cross-section: 100 x 160 mm
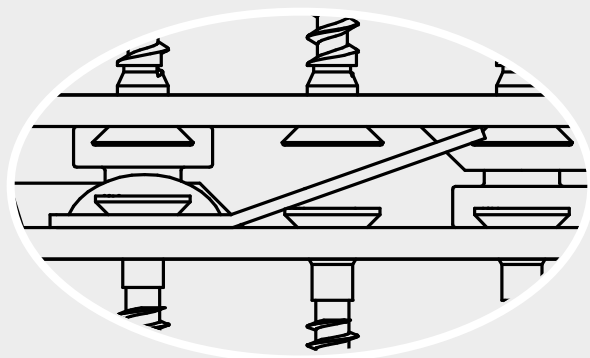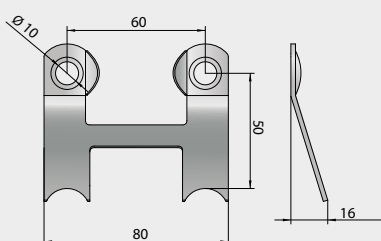All design values are available on our website under the Planner Service tab.

**Screwed collar bolt**

PRODUCT
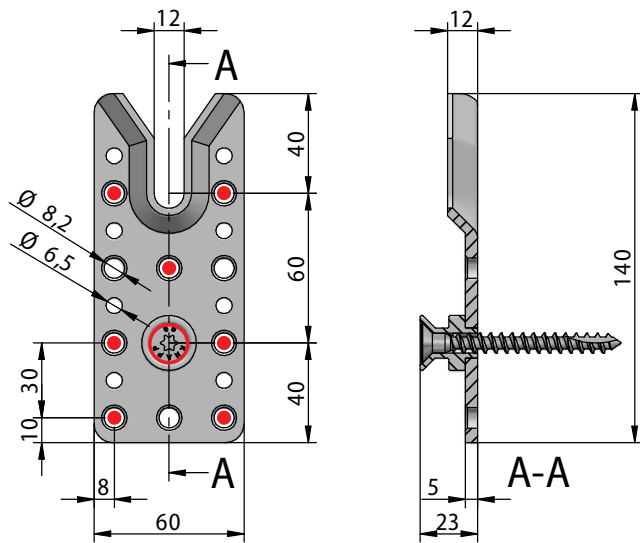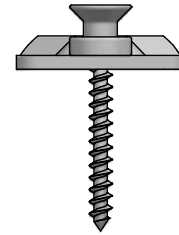
# RICON®S locking clip

**RICON®S locking clip 60 (made of stainless spring steel)**
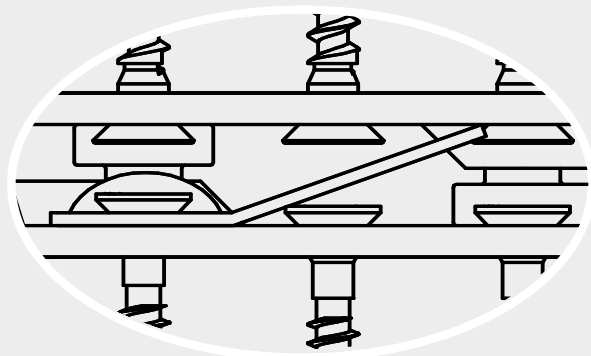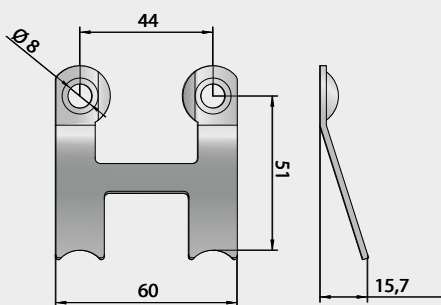
Art.-No.K157

**Application:** the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

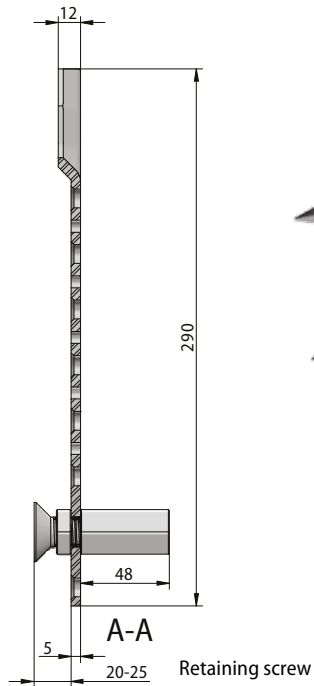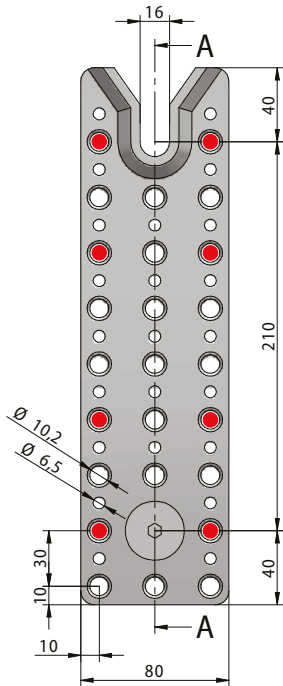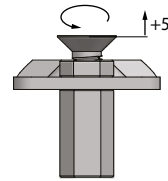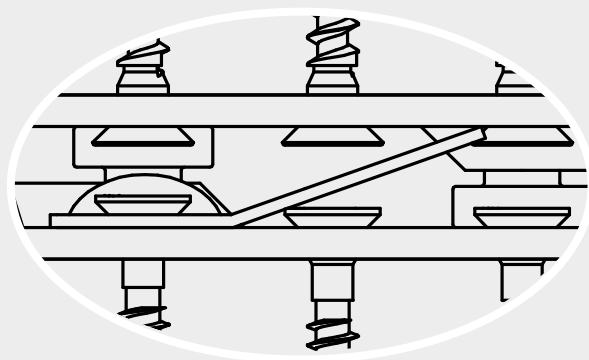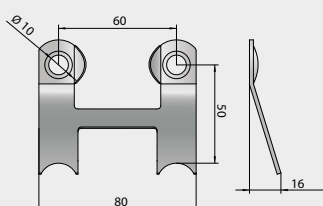## RICON®S 200/60 VK - Screwed collar bolt

Art.-No.K132

(Dimensions in mm)

25
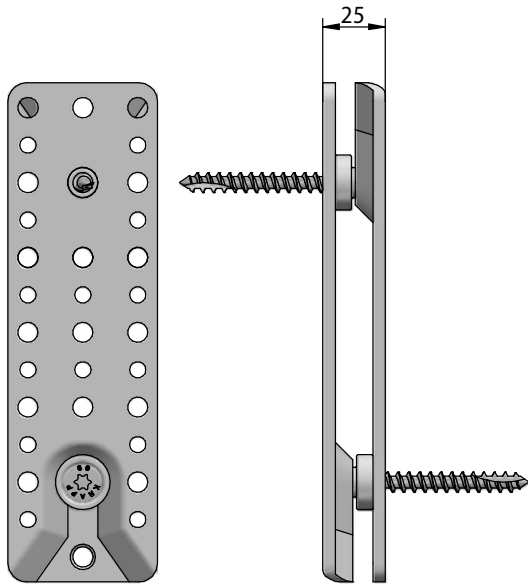
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Header | |
| K132 ST | 200/60 | **VK** D12 | 9 x CS 8x160 | 9 x CS 8x80 | 34.9 |
| K132 MAX | 200/60 | **VK** D12 | 9 x CS 8x240 | 9 x CS 8x80 | 41.4 |
| Axial tension:  $F_{1,Rk}$ = 13.0 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

Min. timber cross-section: 100 x 220 mm
All design values are available on our website under the Planner Service tab.

### Screwed collar bolt

12

A

12

40

120

200

Ø 8,2
Ø 6,5

30
10

40

8

5

60

23

A-A

PRODUCT

# RICON®S locking clip

## RICON®S locking clip 60 (made of stainless spring steel)

Art.-No.K157

Ø 8

44

51

60

15,7
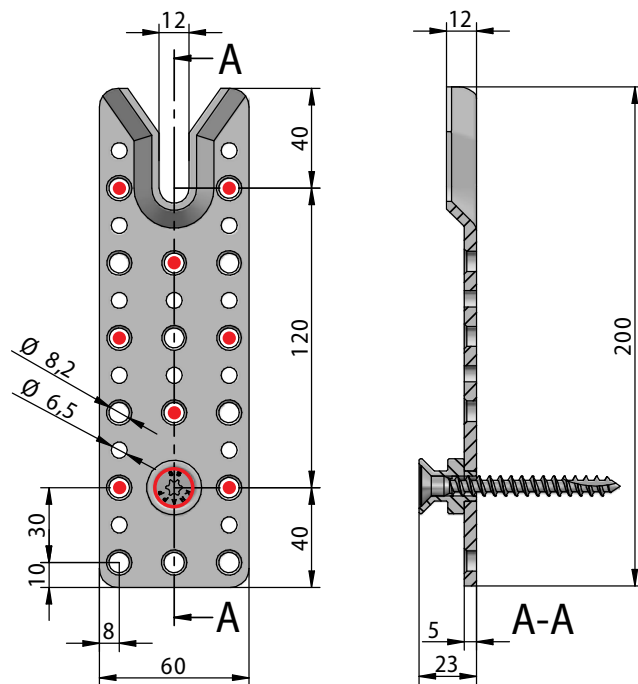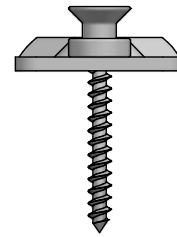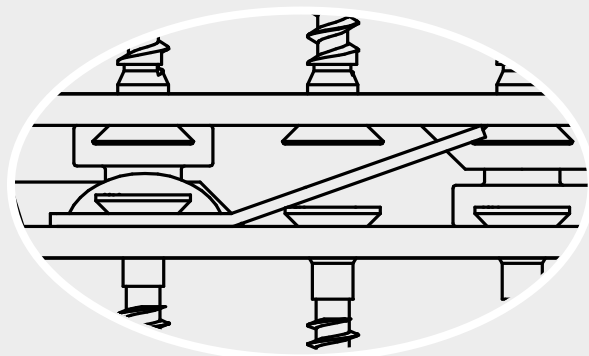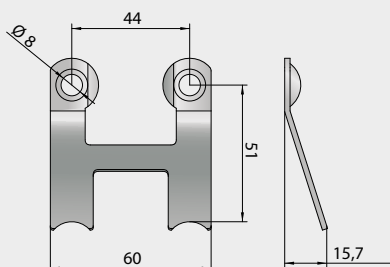
**Application: t**he locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

# RICON®S 80 VK

## RICON®S 200/80 VK - Screwed collar bolt

Art.-No.K138

(Dimensions in mm)

25
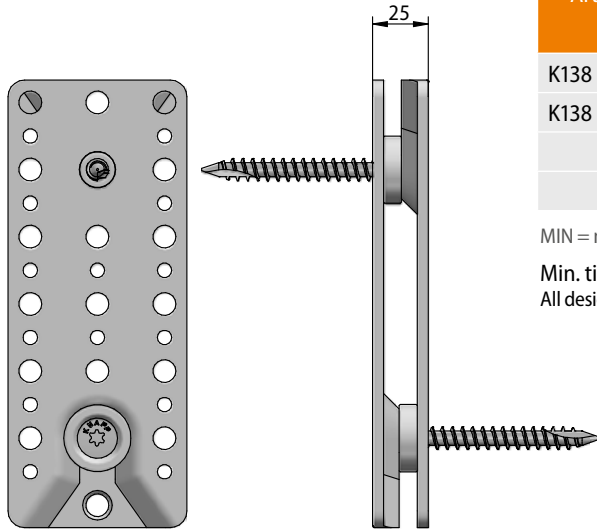
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Header | |
| K138 ST | 200/80 | **VK** D16 | 9 x CS 10x200 | 9 x CS 10x100 | 48.8 |
| K138 MAX | 200/80 | **VK** D16 | 9 x CS 10x300 | 9 x CS 10x100 | 58.4 |
| Axial tension: $F_{1,Rk}$ = 18.7 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

Min. timber cross-section: 120 x 230 mm
All design values are available on our website under the Planner Service tab.

### Screwed collar bolt

16
A
40
120
40
Ø 10,2
Ø 6,5
30
10
10
80
A

12
200
5
24,7
A-A

PRODUCT

# RICON®S locking clip

## RICON®S locking clip 80 (made of stainless spring steel)

Art.-No.K158

Ø 10
60
50
80
16
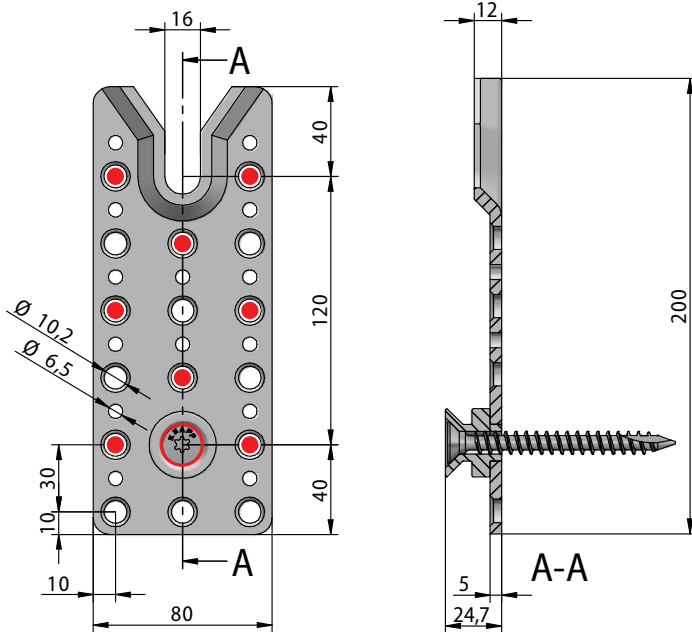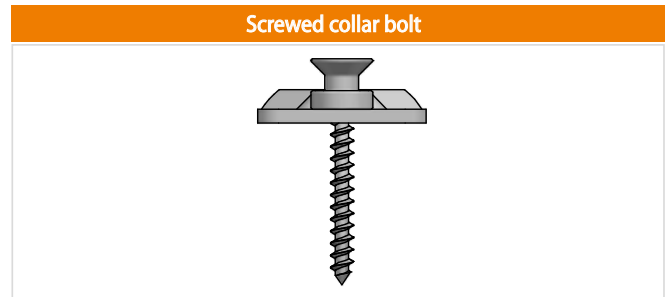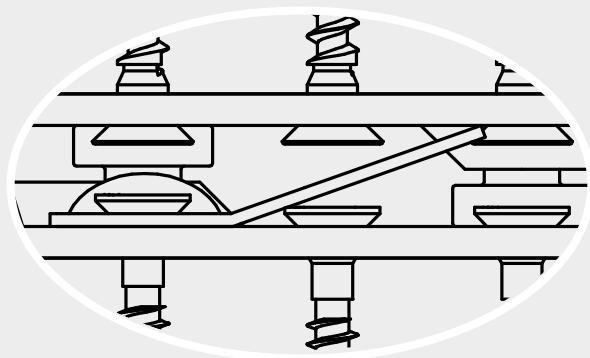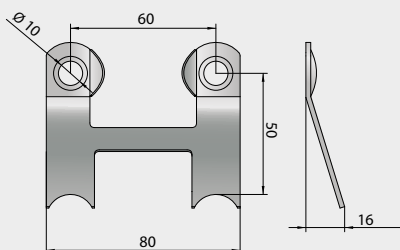
**Application: t**he locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON® S 290/80 VK - Screwed collar bolt

Art.-No. K141

(Dimensions in mm)
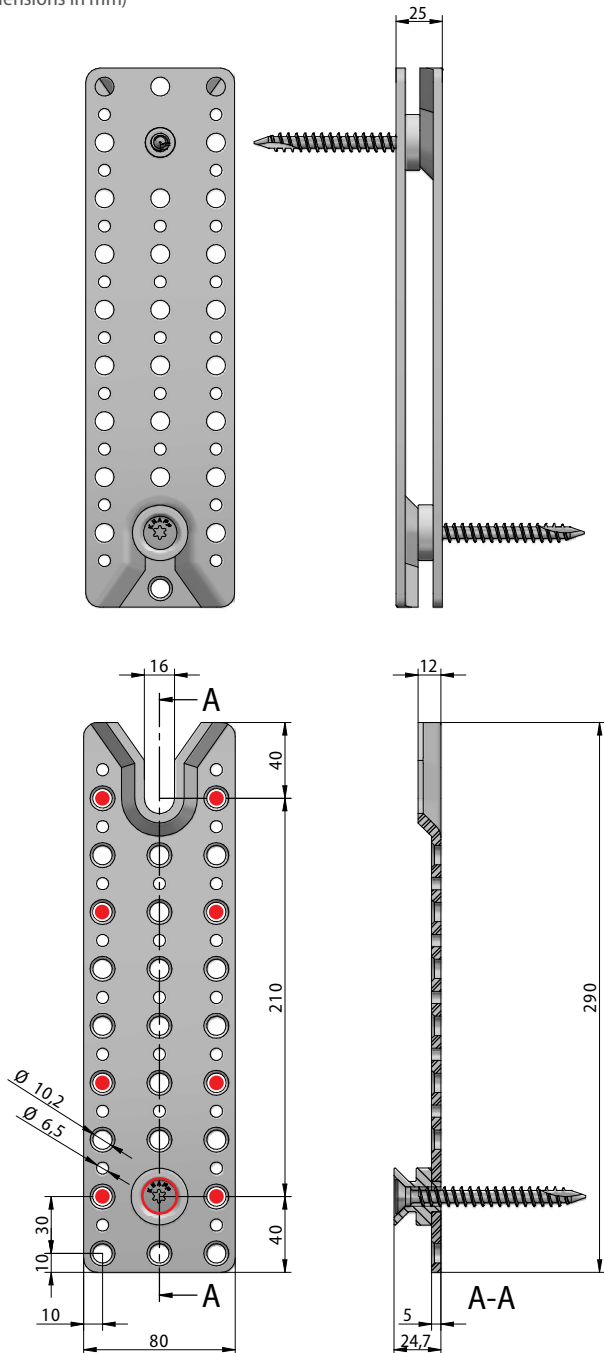
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Header | |
| K141 ST | 290/80 | **VK** D16 | 9 x CS 10x200 | 9 x CS 10x100 | 48.8 |
| K141 MAX | 290/80 | **VK** D16 | 9 x CS 10x300 | 9 x CS 10x100 | 59.7 |
| Axial tension: $F_{1,Rk}$ = 18.7 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

ST = standard screw cxn.   MAX = vissage maximum

Min. timber cross-section: 120 x 320 mm
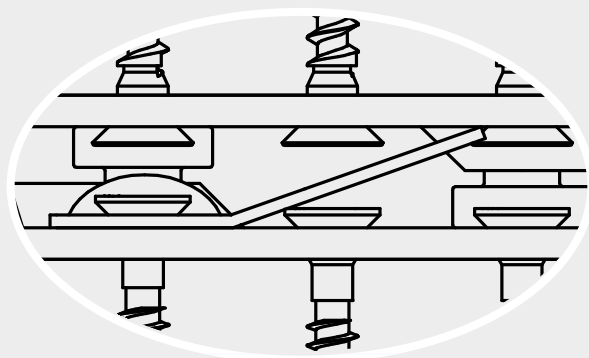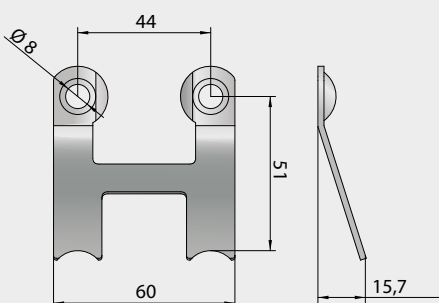All design values are available on our website under the Planner Service tab.

### Screwed collar bolt
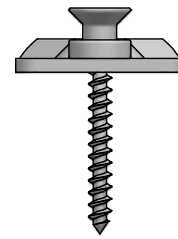
**PRODUCT**

# RICON® S locking clip

## RICON® S locking clip 80 (made of stainless spring steel)
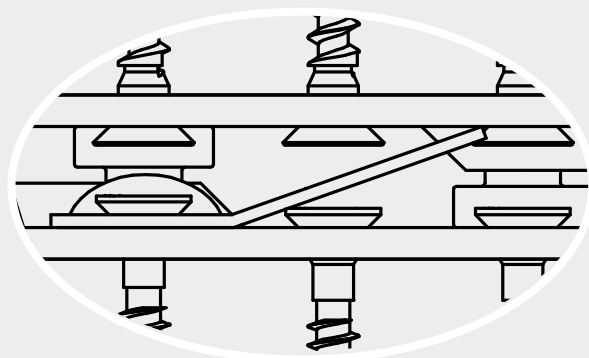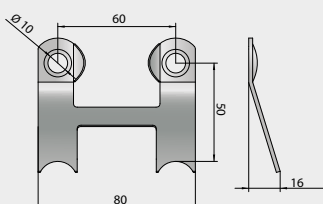
Art.-No. K158

**Application: t**he locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

# RICON®S 60 GK

## RICON®S 140/60 GK - Spring-loaded collar bolt

Art.-No.K134

(Dimensions in mm)
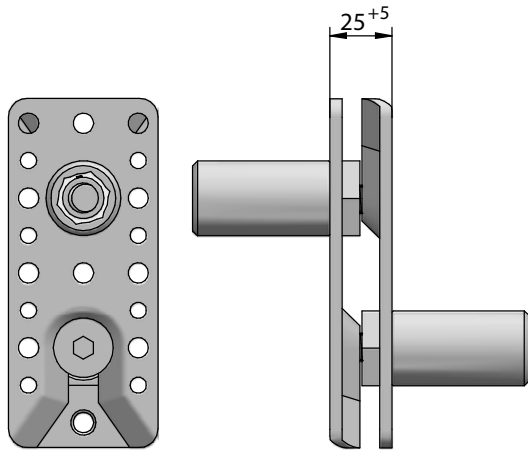
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|----------|----------|-------------|------------------|---|------------------------------------------|
| | | | Joist | Header | |
| K134 MIN ● | 140/60 | **GK D12** | 7 x CS 8x160 | 7 x CS 8x80 | 26.9 |
| K134 ST | 140/60 | **GK D12** | 10 x CS 8x160 | 10 x CS 8x80 | 37.1 |
| K134 MAX | 140/60 | **GK D12** | 10 x CS 8x240 | 10 x CS 8x80 | 40.2 |
| Axial tension: $F_{1,Rk}$ = 31.5 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.   MAX = maximum screw cxn.

Min. timber cross-section: 100 x 160 mm
All design values are available on our website under the Planner Service tab.

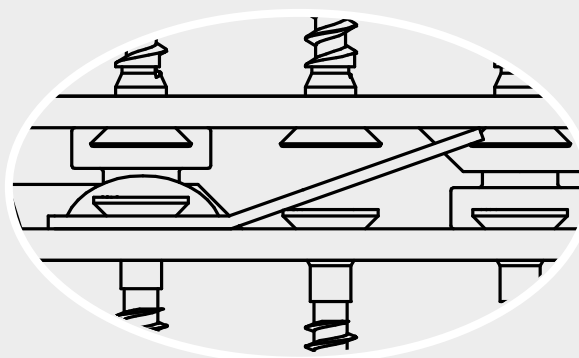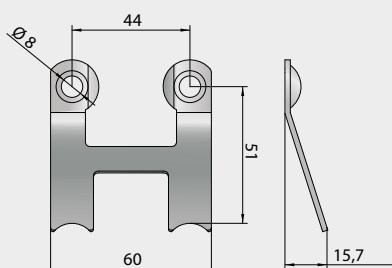### Spring-loaded collar bolt for special assembly requirements





PRODUCT
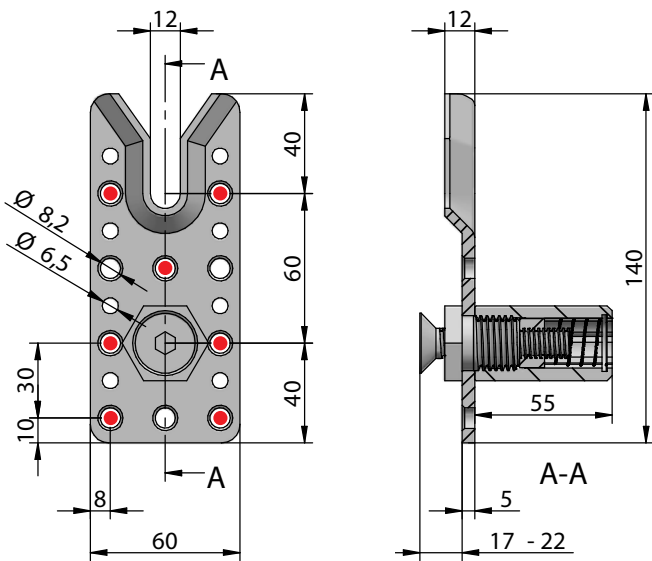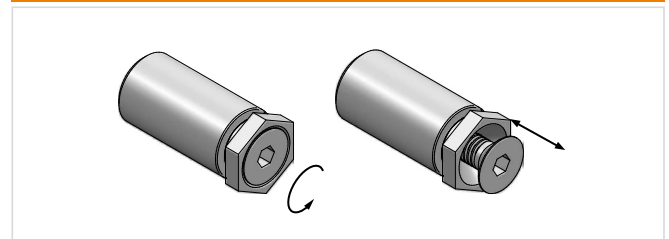
# RICON®S locking clip

## RICON®S locking clip 60 (made of stainless spring steel)

Art.-No.K157



**Application:** the locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON®S 200/60 GK - Spring-loaded collar bolt

Art.-No.K136

(Dimensions in mm)

25 $^{+5}$
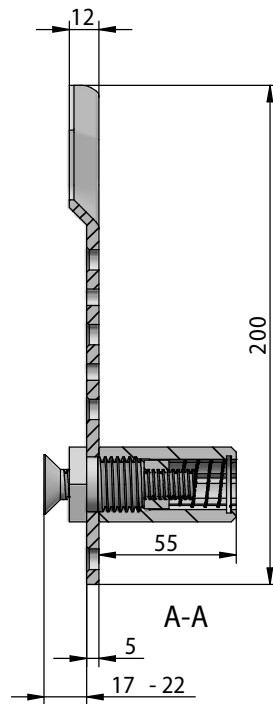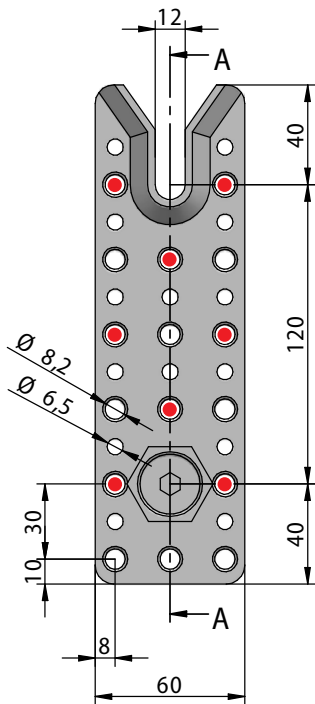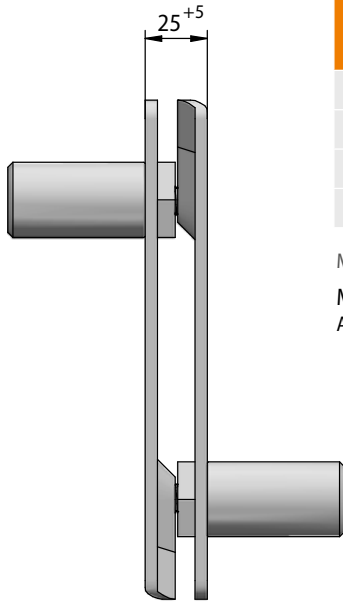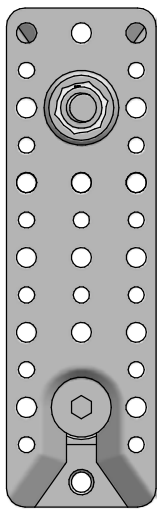
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|----------|----------|-------------|------------------|----------|-------------------------------------------|
| | | | Joist | Header | |
| K136 MIN ● | 200/60 | **GK D12** | 8 x CS 8x160 | 8 x CS 8x80 | 30.4 |
| K136 ST | 200/60 | **GK D12** | 16 x CS 8x160 | 16 x CS 8x80 | 44.2 |
| Axial tension: $F_{1,Rk}$ = 31.5 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

Min. timber cross-section: 100 x 220 mm
All design values are available on our website under the Planner Service tab.

### Spring-loaded collar bolt for special assembly requirements



Ø 8,2
Ø 6,5

12    A
40
120
40
30
10
8
60
A
A-A
12
200
55
5
17 - 22



**PRODUCT**

# RICON®S locking clip

## RICON®S locking clip 60 (made of stainless spring steel)

Art.-No.K157

Ø 8
44
51
60
15,7
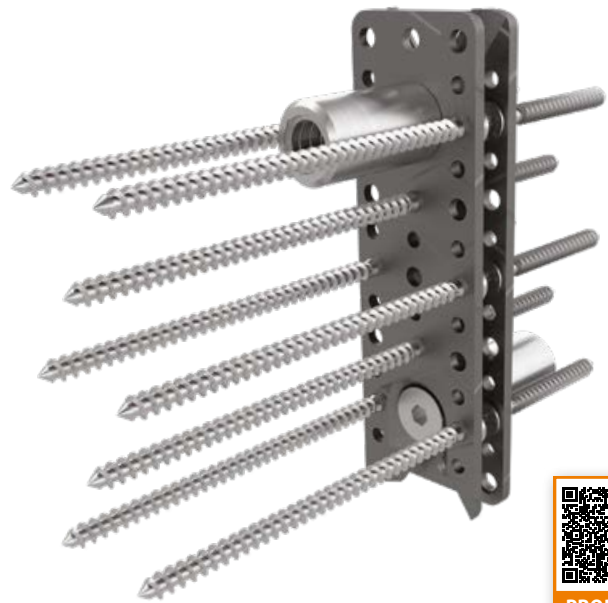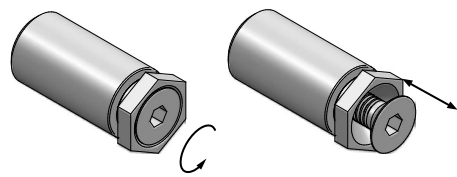


**Application: t**he locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

# RICON®S 80 GK

## RICON®S 200/80 GK - Spring-loaded collar bolt

Art.-No.K142

(Dimensions in mm)

$25^{+5}$
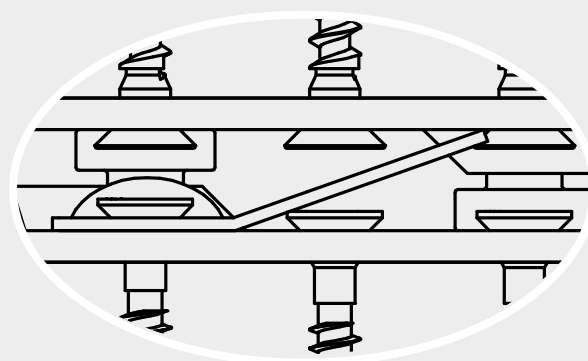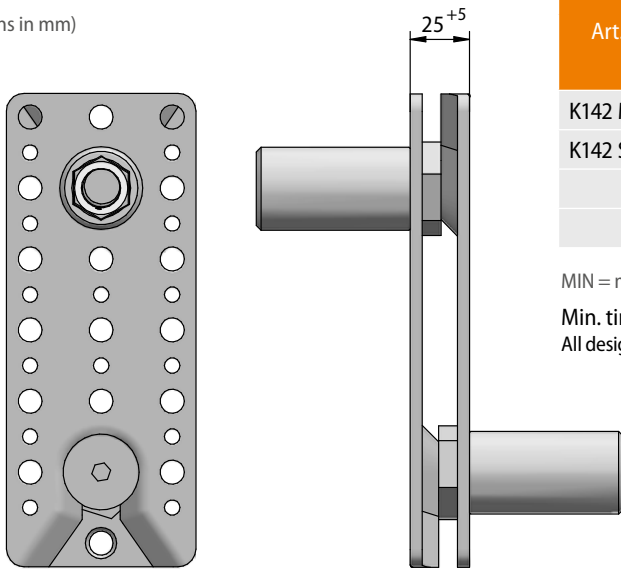
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|---|---|---|---|---|---|
| | | | Joist | Header | |
| K142 MIN ● | 200/80 | **GK D16** | 8 x CS 10x200 | 8 x CS 10x100 | 42.4 |
| K142 ST | 200/80 | **GK D16** | 16 x CS 10x200 | 16 x CS 10x100 | 65.0 |
| Axial tension: $F_{1,Rk}$ = 36.0 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

Min. timber cross-section: 120 x 230 mm
All design values are available on our website under the Planner Service tab.
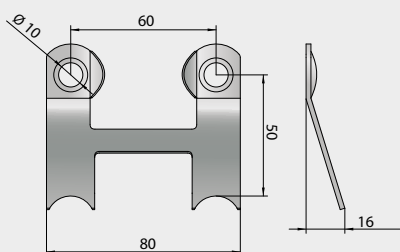
### Spring-loaded collar bolt for special assembly requirements

16

A

40

12

Ø 10,2
Ø 6,5

120

200

30
10

40

10

A

80

65

A-A

5

20  - 25

**PRODUCT**

# RICON®S locking clip

## RICON®S locking clip 80 (made of stainless spring steel)

Art.-No.K158

Ø 10    60

50

80

16
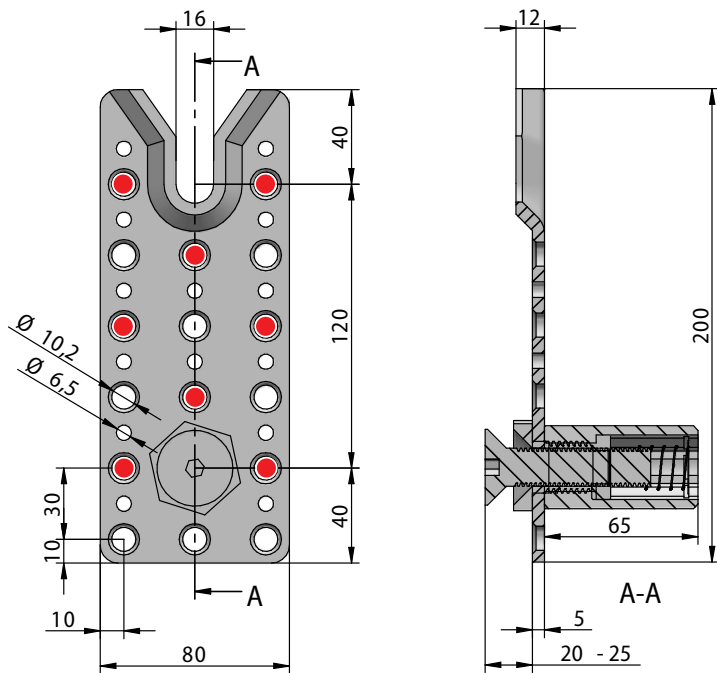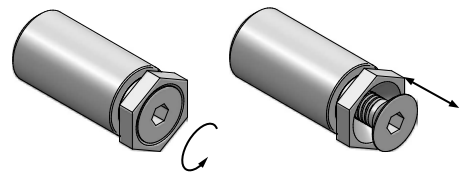
**Application: t**he locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

## RICON®S 290/80 GK - Spring-loaded collar bolt

Art.-No.K145

(Dimensions in mm)



25 +5
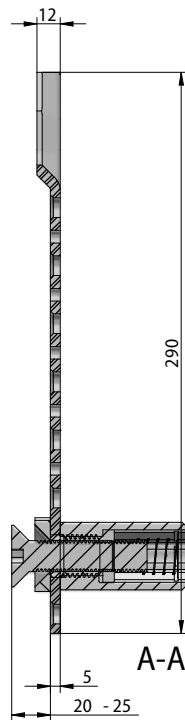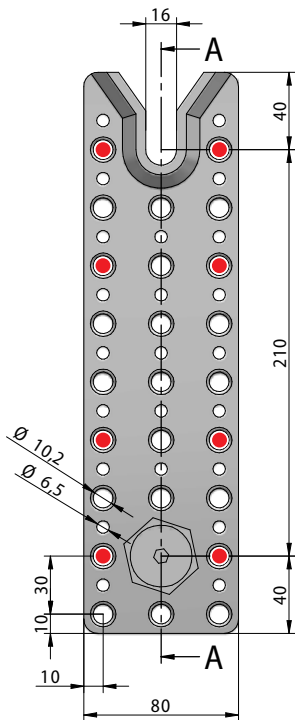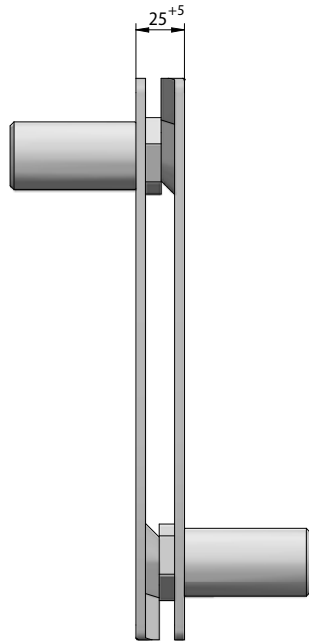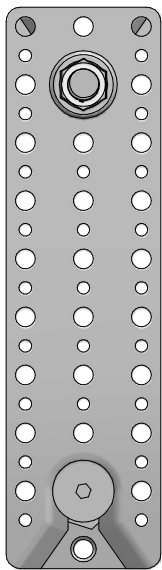
| Art.-No. | RICON® S | Collar bolt | Screw connection | | Charact. values [GL24h] $F_{2,Rk}$ [kN] |
|----------|----------|-------------|------------------|--------|----------|
| | | | Joist | Header | |
| K145 MIN ● | 290/80 | **GK D16** | 8 x CS 10x200 | 8 x CS 10x100 | 42.4 |
| K145 ST | 290/80 | **GK D16** | 20 x CS 10x200 | 20 x CS 10x100 | 72.2 |
| Axial tension: $F_{1,Rk}$ = 36.0 kN | | | | | |
| Clip lock: $F_{3,Rk}$ = 18.0 kN | | | | | |

MIN = minimum screw cxn.   ST = standard screw cxn.

Min. timber cross-section: 120 x 320 mm
All design values are available on our website under the Planner Service tab.

### Spring-loaded collar bolt for special assembly requirements
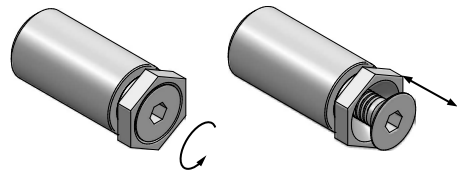




**PRODUIT**

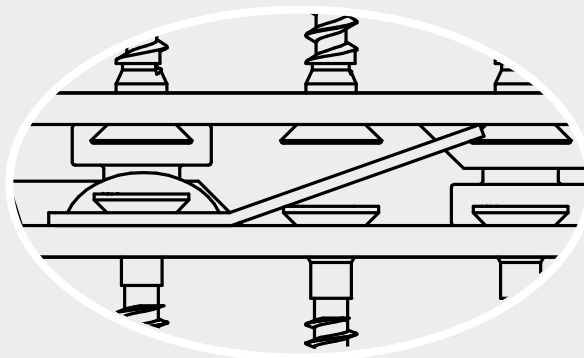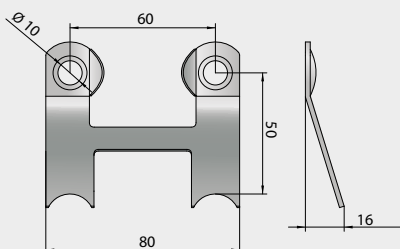# RICON®S locking clip
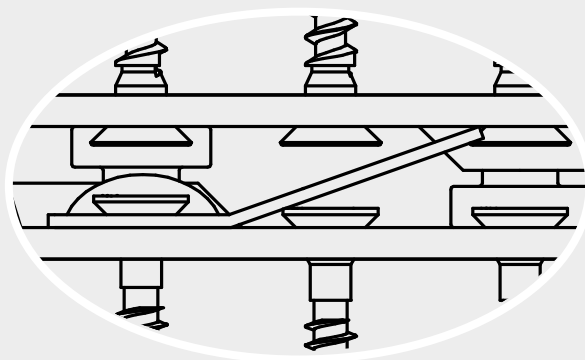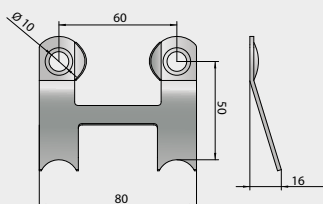
## RICON®S locking clip 80 (made of stainless spring steel)

Art.-No.K158





**Application: t**he locking clip locks the connection against slide-in direction and is used for stress against slide-in direction or wind suction.

# RICON®S screws

## Self-tapping CS-screws RICON® S60 (RICON® S supplied with the respective CS-screws)

| | |
|---|---|
| Art.-No.Z580 | Self-tapping CS-screw 8x80 |
| Art.-No.Z581 | Self-tapping CS-screw 8x160 |
| Art.-No.Z530 | Self-tapping CS-screw 8x240 |

**Application:** to screw the RICON®S into the main beam (mullion) or secondary beam (transom).

## CS-screws RICON® S80 with cut point (RICON® S supplied with the respective CS-screws)

| | |
|---|---|
| Art.-No.Z582 | Self-tapping CS-screw 10xx100 |
| Art.-No.Z583 | Self-tapping CS-screw 10xx200 |
| Art.-No.Z651 | Self-tapping CS-screw 10xx300 |

**Application:** to screw the RICON®S into the main beam (mullion) or secondary beam (transom).

# RICON®S accessories

## Routing-jig for RICON® S 60 / S 80

| | |
|---|---|
| Art.-No.K510 | Routing-jig MULTI F60 (plywood) for all RICON® S60 sizes |
| Art.-No.K511 | Routing-jig MULTI F80 (plywood) for all RICON® S80 sizes |
| | Tip: The MULTI F routing-jig is suitable for a Ø 30 mm guide bushing (for plunge router) and Ø 15 mm TCT straight router bit. MULTI F is adjustable depending on wood sizes. |

**Application:** or milling with concealed mounting.

## TCT slotting cutter

| | |
|---|---|
| Art.-No.Z068 | TCT slotting cutter Ø15, Length of 40 mm and Ø12 mm shaft |

**Application:** to recess the rebate for RICON® S.

## Full threaded CS-screws with cut-point

Header

Full-thread, self-tapping screws for lateral compression reinforcements of main and/or secondary beam.

F

Joist

Th.
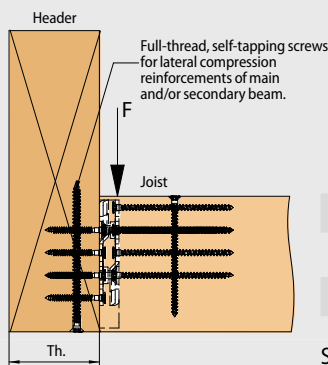
| Diameter (d1) | Length (mm) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø 8 mm | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 350 | 400 | 450 | 500 | 550 | 600 |
| Ø 10 mm | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 350 | 400 | 450 | 500 | 550 | 600 |

Sizes available upon request.

**Application:** full threaded countersunk screws for lateral compression reinforcements of header and/or joist.

# RICON®S steel to timber connection

**Beam connections to steel pillar**

❚ **F-Load direction**
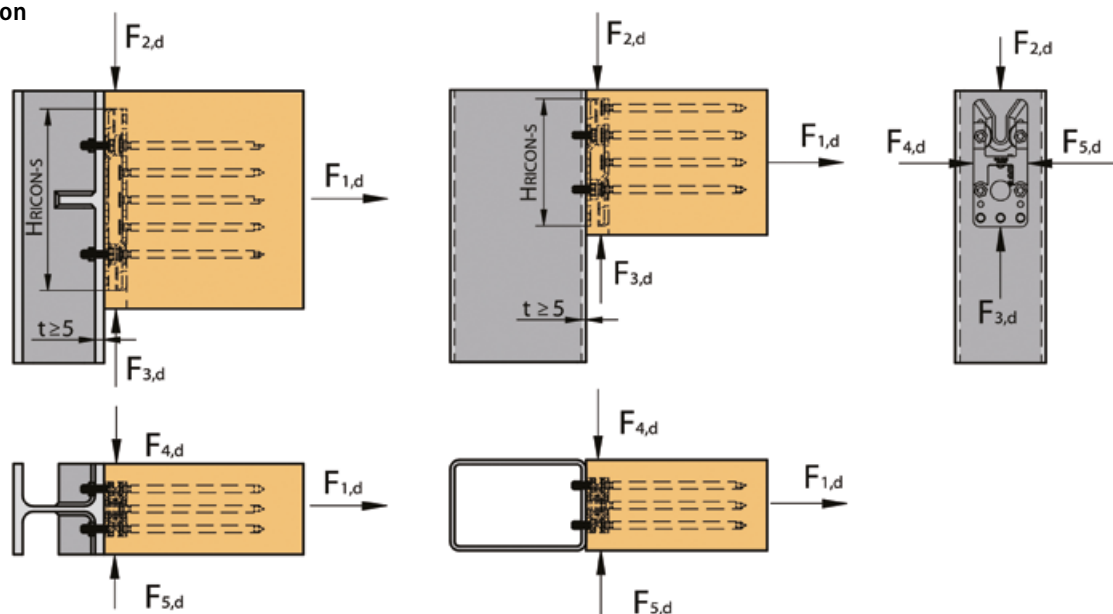


**Wood to steel connection in slide-in direction $F_2$**

**Load bearing capacities in the direction of insertion**

| KNAPP® Connectors | Tensile force in secondary beam | | Shear force | |
|---|---|---|---|---|
| | $F_{t,Rk}$ [kN]* on 5 mm steel | $F_{1,Rk}$ [kN]* on glulam GL24h | $F_{v,Rk}$ [kN]* on 5 mm steel | $F_{2,Rk}$ [kN]* on glulam GL24h |
| **RICON® S 140x60 EK* /VS** 4 screws M8x20 10 CS 8x160 | 72.4 | 31.5 | 42.2 | 37.1 |
| **RICON® S 200x60 EK*/VS** 6 screws M8x20 16 CS 8x160 | 108.6 | 31.5 | 63.4 | EK: 44.2 VS: 56.7 |
| **RICON® S 200x80 EK* /VS** 4 screws M10x20 16 CS 10x200 | 90.5 | 36.0 | 111.4 | EK: 65.0 VS: 79.1 |
| **RICON® S 290x80 EK*/VS** 6 screws M10x20 25 CS 10x200 | 135.7 | 36.0 | 167.0 | EK: 72.2 VS: 118.2 |
| **RICON® S 390x80 VS+ZP** 6 vis M10x20 28 CS 10x200 2 CS 10x450 | 135.7 | 36.0 | 167.0 | 170.9 |
| Sizing value calculation | $\gamma_{M,2} = 1.25$ | $\gamma_M = 1.3$ $k_{mod} = 0.8$ KLED medium $k_{mod} = 0.9$ KLED short | $\gamma_{M,2} = 1.25$ | $\gamma_M = 1.3$ $k_{mod} = 0.8$ KLED medium $k_{mod} = 0.9$ KLED short |

\* The indicated values are applicable to the RICON® S EK version (retaining screw collar bolt with insert screw).

**Notes about pages 85 to 87.**

The fischer anchors for KNAPP® wood-concrete connections were defined with the dimensions shown on the drawings and a concrete strength class of C20/25. The calculations were made with the C-FIX design tool and verified by fischer. All other configurations must be checked. This can be done by KNAPP®, fischer or a professional (engineer or competent technician). KNAPP® accepts no liability for the inappropriate use of the value tables given in this catalogue. The condition of the concrete element (concrete strength class and surface) must be checked by a specialist. KNAPP® accepts no liability in this respect. KNAPP® products and connectors must be installed according to the installation instructions manuals. KNAPP® - fischer wood-concrete joints must be made in accordance with their respective ETA technical evaluations.

# RICON®S timber to concrete connection

**Timber Engineering**

(Dimensions in mm)

### Fixed on concrete

300
260
60
120
290
90
110 80 110
300

Concrete pillar
300x300
C25/30

RICON® S 290x80 VS
Concrete: 6GS M10x170
M10 flat nut

### Fixed on header

Header 120x720
GL24h

260
290
170
20 80 20
120

RICON® S 290x80 VS
Header: 25 CS 10x200

**Bonding : fischer
Superbond-System
FIS SB 390 S**

$F_{2,d} = 60$ kN

Ø12
Ø10
155
165
260
290
720
170
25
300
300
20
80
120
20
25

Header 120x720 GL24h
RICON® S 290x80 VS
Header: 25 CS 10x200
Concrete: 6GS M10x170
M10 flat nut

Block
80x25x80

Concrete pillar
300x300
C25/30

Header 120x720 GL24h

# RICON®S

**Timber Engineering**

(Dimensions in mm)

### Fixed on concrete

100
55 60 55
75
115
200
120
450
90
200
60
60
25
56.5 57 56.5
25 120 25
800
170
275

Steel plate 170x450x15
6 threaded rods
M16x165 + M16 Nut
RICON® S 390x80 VS+ZP
6 hex screws M10x20
2 CS M10x30

Concrete support
300x300
C25/30

### Fixation on glued laminated cross frame

150
600
340
110
60 80 60
200

Cross frame
200x600, GL28c

RICON® S 390x80 VS+ZP
28 CS 10x200
2 CS 10x450

**Bonding : fischer
Superbond-System
FIS SB 390 S**

$F_{2,d} = 101$ kN

75
Ø16
50
100
130
Ø18
450
145
390
600
275
15 25
40
800
300

Concrete support 300x300 C25/30

28 CS 10x200
2 CS 10x450

Cross frame
200x600, GL28c

RICON® S 390x80 VS+ZP
on cross frame:
28 CS 10x200
on steel plate:
6 hex screws M10x20
2 CS M10x30

15
170
130
60
60
15
Ø16
200

Cross frame
200x600, GL28c
Concrete support 300x300 C25/30

# RICON® S 60 and 80 VS timber to concrete connection

## Beam to concrete connection

(Dimensions in mm)



Concrete C20/25

| Distance | Distances for RICON® S Version VS concrete connection | | | |
|---|---|---|---|---|
| | 140x60 [mm] | 200x60 [mm] | 200x80 [mm] | 290x80 [mm] |
| Spacing $a_c$ | 60 | 120 | 120 | 210 |
| Spacing $a_1$ | 60 | 60 | 60 | 120 |
| Spacing $a_2$ | 0 | 60 | 60 | 90 |
| Spacing $a_3$ | 44 | 44 | 60 | 60 |
| Drill hole diameter $d_0$ | 10 | 10 | 12 | 12 |
| Anchorage depth $h_{ef}$ | 140 | 140 | 160 | 160 |
| Diameter threaded rod $d_{GS}$ | M8 | M8 | M10 | M10 |
| Length threaded rod $L_{GS}$ | 150 | 150 | 170 | 170 |
| Minimal edge distance $c_{1,min}$ | ∞ | ∞ | ∞ | ∞ |
| Minimal edge distance $c_{2,min}$ | 100 | 100 | 100 | 135 |
| Minimal concrete thickness $h_{min}$ | 170 | 170 | 190 | 190 |

fischer Approval: ETA-12/0258 (fischer)

## fischer Superbond-System FIS SB 390 S

❚ RICON®S 60: threaded rod M8x150 with M8, 8.8 nut



Threaded rod M8x150 with M8, 8.8 nut
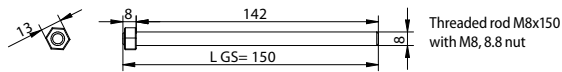
## fischer Superbond-System FIS SB 390 S

❚ RICON®S 80: threaded rod M10x170 with M10, 8.8 nut



Threaded rod M10x170 with M10, 8.8 nut

## $F_2$ Load direction in the direction of insertion

| KNAPP® Connectors | Concrete connection | | Timber connection | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | $F_{2,Rd,concrete}$ | Distances | Wood material | | $F_{2,Rd,timber}$ | | | | |
| | Shear force $F_{2,Rd,concrete}$ [kN] | Bending moment with e = 0,025 m $M_{v,Rd,concrete}$ [kNm] | Wood type | Char. density $\rho_k$ [kg/m³] | Charact. values [kN] | | Design values $F_{2,Rd}$, $\gamma_M$ = 1,3 [kN] | | |
| | | | | | $F_{2,KCC,Rk}$ , $\gamma_M$ =1,0 | $F_{2,Rk}$ | $k_{mod}$ = 0,6 | $k_{mod}$ = 0,8 | $k_{mod}$ = 0,9 |
| RICON® S 140/60 VS ST Concrete: 4 threaded rods M8x150 | 34,00 | 0,85 | C24 | 350 | 60 | 34,9 | 16,1 | 21,5 | 24,2 |
| | | | GL24h | 385 | | 37,1 | 17,1 | 22,8 | 25,7 |
| RICON® S 140/60 VS MAX Concrete: 4 threaded rods M8x150 | 34,00 | 0,85 | C24 | 350 | 60 | 37,8 | 17,4 | 23,3 | 26,2 |
| | | | GL24h | 385 | | 40,2 | 18,6 | 24,7 | 27,8 |
| RICON® S 200/60 VS ST Concrete: 6 threaded rods M8x150 | 50,00 | 1,25 | C24 | 350 | 60 | 53,3 | 24,6 | 32,8 | 36,9 |
| | | | GL24h | 385 | | 56,7 | 26,2 | 34,9 | 39,3 |
| RICON® S 200/60 VS MAX Concrete: 6 threaded rods M8x150 | 50,00 | 1,25 | C24 | 350 | 60 | 62,7 | 28,9 | 38,6 | 43,4 |
| | | | GL24h | 385 | | 66,5 | 30,7 | 40,9 | 46,0 |
| RICON® S 200/80 VS ST Concrete: 6 threaded rods M10x170 | 68,00 | 1,70 | C24 | 350 | 99 | 74,7 | 34,5 | 46,0 | 51,7 |
| | | | GL24h | 385 | | 79,1 | 36,5 | 48,7 | 54,8 |
| RICON® S 200/80 VS MAX Concrete: 6 threaded rods M10x170 | 68,00 | 1,70 | C24 | 350 | 99 | 87,1 | 40,2 | 53,6 | 60,3 |
| | | | GL24h | 385 | | 92,4 | 42,6 | 56,9 | 64,0 |
| RICON® S 290/80 VS ST Concrete: 6 threaded rods M10x170 | 95,00 | 2,38 | C24 | 350 | 99 | 111,2 | 51,3 | 68,4 | 77,0 |
| | | | GL24h | 385 | | 118,2 | 54,6 | 72,7 | 81,8 |
| RICON® S 290/80 VS MAX Concrete: 6 threaded rods M10x170 | 95,00 | 2,38 | C24 | 350 | 99 | 134,7 | 62,2 | 82,9 | 93,3 |
| | | | GL24h | 385 | | 142,7 | 65,9 | 87,8 | 98,8 |
| RICON® S 390/80 VS ST Concrete: 6 threaded rods M10x170 | 110,00 | 2,75 | C24 | 350 | 180 | 162,8 | 75,2 | 100,2 | 112,7 |
| | | | GL24h | 385 | | 170,6 | 78,7 | 105,0 | 118,1 |
| RICON® S 390/80 VS MAX Concrete: 6 threaded rods M10x170 | 110,00 | 2,75 | C24 | 350 | 180 | 187,5 | 86,1 | 114,7 | 129,1 |
| | | | GL24h | 385 | | 195,3 | 90,1 | 120,2 | 135,2 |

Number of screws in joist are given on pages 52 to 66.

Service class timber: 1-2

$\gamma_{M,timber}$ = 1,3

**Calculation of $F_{2,Rd}$ for timber-concrete connection:**

$$F_{2,Rd} = \min \begin{cases} \min F_{2,Rd,\,timber} \\ \min F_{2,Rd,\,béton} \end{cases}$$

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

# Fixation RICON® S 60 and 80 VS timber to concrete connection

## Beam to concrete connection

(Dimensions in mm)

| Distance | Distances for RICON® S Version VS concrete connection | | | |
|---|---|---|---|---|
| | 140x60 [mm] | 200x60 [mm] | 200x80 [mm] | 290x80 [mm] |
| Spacing $a_c$ | 60 | 120 | 120 | 210 |
| Spacing $a_1$ | 60 | 60 | 60 | 90 |
| Spacing $a_2$ | 30 | 60 | 60 | 120 |
| Spacing $a_3$ | 44 | 44 | 60 | 60 |
| Drill hole diameter $d_0$ | 12 | 12 | 15 | 15 |
| Anchorage depth $h_{ef}$ | 85 | 85 | 95 | 95 |
| Diameter threaded rod $d_{GS}$ | M8x20 | M8x20 | M10x20 | M10x20 |
| Minimal edge distance $c_{1,min}$ | ∞ | ∞ | ∞ | ∞ |
| Minimal edge distance $c_{2,min}$ | 100 | 100 | 120 | 120 |
| Minimal concrete thickness $h_{min}$ | 125 | 125 | 150 | 150 |

**fischer Approval: ETA-07/0025 and ENSO**

RICON S 140x60 VS

RICON S 200x60 VS

RICON S 140x60 VS

RICON S 290x80 VS

▌ RICON®S 60:
fischer high performance anchor FH II 12/ M8 I (8.8)
with hexagon screw M8x20
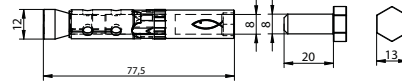
▌ RICON®S 80:
fischer High performance anchor FH II 15/ M10 I (8.8)
with hexagon screw M10x20

## $F_2$  Load direction in the direction of insertion

| KNAPP® Connectors | Concrete connection | | Timber connection | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | $F_{2,Rd,concrete}$ | Distances | Wood material | | $F_{2,Rd,timber}$ | | | | |
| | Shear force $F_{2,Rd,concrete}$ [kN] | Bending moment with e = 0,025 m $M_{v,Rd,concrete}$ [kNm] | Wood type | Char. density $\rho_k$ [kg/m³] | Charact. values [kN] | | Design values $F_{2,Rd}$, $\gamma_M$ = 1,3 [kN] | | |
| | | | | | $F_{2,KCC,Rk}$ , $\gamma_M$ =1,0 | $F_{2,Rk}$ | $k_{mod}$ = 0,6 | $k_{mod}$ = 0,8 | $k_{mod}$ = 0,9 |
| RICON® S 140/60 VS ST Concrete: 4 FH II 12/M8 I | 22,00 | 0,55 | C24 | 350 | 60 | 34,9 | 16,1 | 21,5 | 24,2 |
| | | | GL24h | 385 | | 37,1 | 17,1 | 22,8 | 25,7 |
| RICON® S 140/60 VS MAX Concrete: 4 FH II 12/M8 I | 22,00 | 0,55 | C24 | 350 | 60 | 37,8 | 17,4 | 23,3 | 26,2 |
| | | | GL24h | 385 | | 40,2 | 18,6 | 24,7 | 27,8 |
| RICON® S 200/60 VS ST Concrete: 6 FH II 12/M8 I | 35,00 | 0,88 | C24 | 350 | 60 | 53,3 | 24,6 | 32,8 | 36,9 |
| | | | GL24h | 385 | | 56,7 | 26,2 | 34,9 | 39,3 |
| RICON® S 200/60 VS MAX Concrete: 6 FH II 12/M8 I | 35,00 | 0,88 | C24 | 350 | 60 | 62,7 | 28,9 | 38,6 | 43,4 |
| | | | GL24h | 385 | | 66,5 | 30,7 | 40,9 | 46,0 |
| RICON® S 200/80 VS ST Concrete: 6 FH II 15/M10 I | 44,00 | 1,10 | C24 | 350 | 99 | 74,7 | 34,5 | 46,0 | 51,7 |
| | | | GL24h | 385 | | 79,1 | 36,5 | 48,7 | 54,8 |
| RICON® S 200/80 VS MAX Concrete: 6 FH II 15/M10 I | 44,00 | 1,10 | C24 | 350 | 99 | 87,1 | 40,2 | 53,6 | 60,3 |
| | | | GL24h | 385 | | 92,4 | 42,6 | 56,9 | 64,0 |
| RICON® S 290/80 VS ST Concrete: 6 FH II 15/M10 I | 60,00 | 1,50 | C24 | 350 | 99 | 111,2 | 51,3 | 68,4 | 77,0 |
| | | | GL24h | 385 | | 118,2 | 54,6 | 72,7 | 81,8 |
| RICON® S 290/80 VS MAX Concrete: 6 FH II 15/M10 I | 60,00 | 1,50 | C24 | 350 | 99 | 134,7 | 62,2 | 82,9 | 93,3 |
| | | | GL24h | 385 | | 142,7 | 65,9 | 87,8 | 98,8 |

Number of screws in joist are given on pages 52 to 66.

Service class timber: 1-2

$\gamma_{M,timber}$ = 1,3

**Calculation of $F_{2,Rd}$ for timber-concrete connection:**

$$F_{2,Rk} = \min \begin{cases} \min F_{2,Rd,\,timber} \\ \min F_{2,Rd,\,concrete} \end{cases}$$

$$F_{2,Rk,\,bois} = \min \begin{cases} \min F_{2,KCC,\,Rk} / \gamma_M \\ \dfrac{\min F_{2,Rk} \cdot k_{mod}}{\gamma_{M,\,timber}} \end{cases}$$

# RICON®S

## Fabrication

❚ Routing machine with KNAPP® routing-jig.

❚ Fabrication with CNC joinery machine possible – all data for the standard CNC joinery machine programs are included.



CNC joinery machine



The milling template and router make a 60 mm or 80 mm wide and 25 mm deep cutout on the secondary beam (length according to the assembly instructions).

| Min. routing dimensions for RICON® S60 / S80 | | |
|---|---|---|
| Width | Length | Depth (VS, VK, EK, GK) |
| 60 mm / 80 mm | variable | 25 mm |

## Installation RICON® S VK



Position the plate and the screws



Screw on RICON®S on Header



Screw on RICON®S counter part on joist

## RICON®S wood to seel connection



RICON®S 290/80 - timber to steel connection
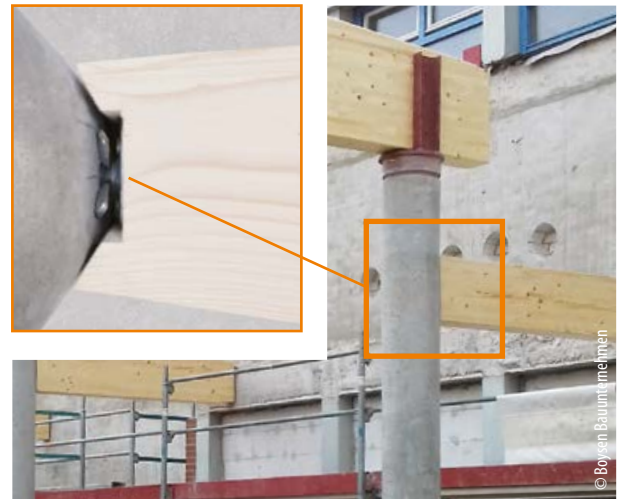


RICON®S - timber to concrete connection

# The heavy-duty system for timber construction engineering

## Connecting main beam to secondary beam up to 768 kN*

I Wood width up from 100 mm
I Invisible - finition d'assemblage impeccable
I Démontage and remontage sans dommage
I Préfabrication très avancée de la production
I Montage possible dans tous les sens sans coincement
I Reprend des efforts sur tous les axes
I Accroche facile and rapide, distance d'emboitement seulement 20 mm
I Résistant au feu (EN 1995-1-2)

## MEGANT®

### Available in 11 sizes.

The values only apply when used with original KNAPP®
screws! Design values are available on our website
under Planner Service.

* Characteristic value F2,Rk  in slide-in direction according to ETA ETA-15/0667
  (2023/08/16),  for glulam GL24.

**KNAPP®**
connectors.com

House of Sydney © Lendlease



Hasslacher © Thompson

# MEGANT®

❚ **Applications: concealed main-secondary beam connections**
❚ **Connection: wood to wood and wood to concrete and steel**
❚ **Areas of application: timber engineering, multi-storey timber construction**
❚ **Service class 1 and 2**

Installation example with MEGANT®:
No weakening of the main beam.
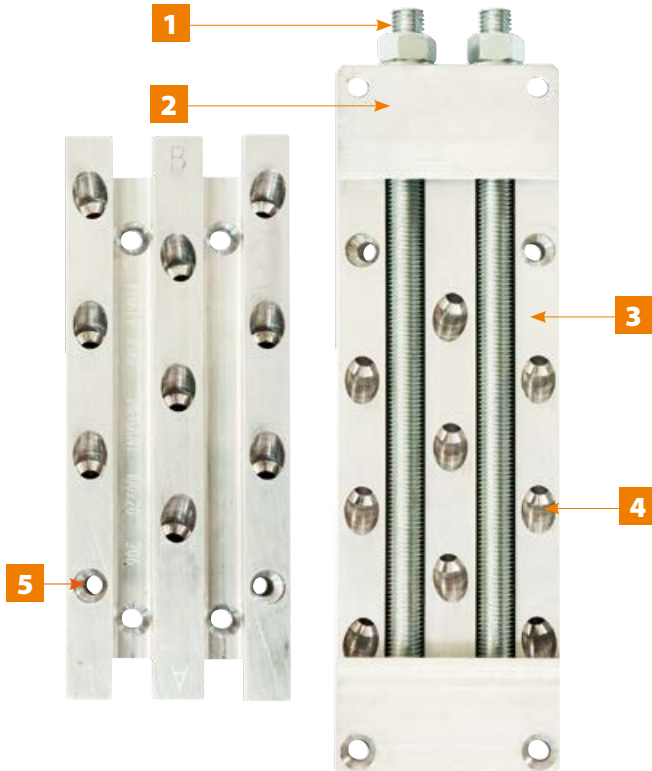


**1** Threaded rod with washers and hexagonal nuts transmit the tensile forces.

**2** Tapered aluminium clamping jaws transfer the vertical and tensile forces from the secondary beam to the main beam and form a tight joint between the two connector plates. In addition, the clamping jaws can be used to rest the beam the during assembly.

**3** Connector plates made of high-strength aluminium with fastening holes for fully threaded screws at 45° and 90° angle.

**4** Biaxially inclined screw pattern to avoid splitting of the main beam or column.

**5** Horizontal screws for transferring the tensile forces from the clamping moment.

Fire protection: fire resistance (EN 1995-1-2) through 3-4 sided concealed, tight-joint mounting (R30 ≥ 28 mm, R60 ≥ 49 mm)

ETA   ETA-15/0667 (2023/08/16)   CE   MEGANT

# MEGANT®

## MEGANT® standard dimensions



Height (mm)

1030
730
610
550
430
310

Width (mm)

| 60 | 100 | 150 |
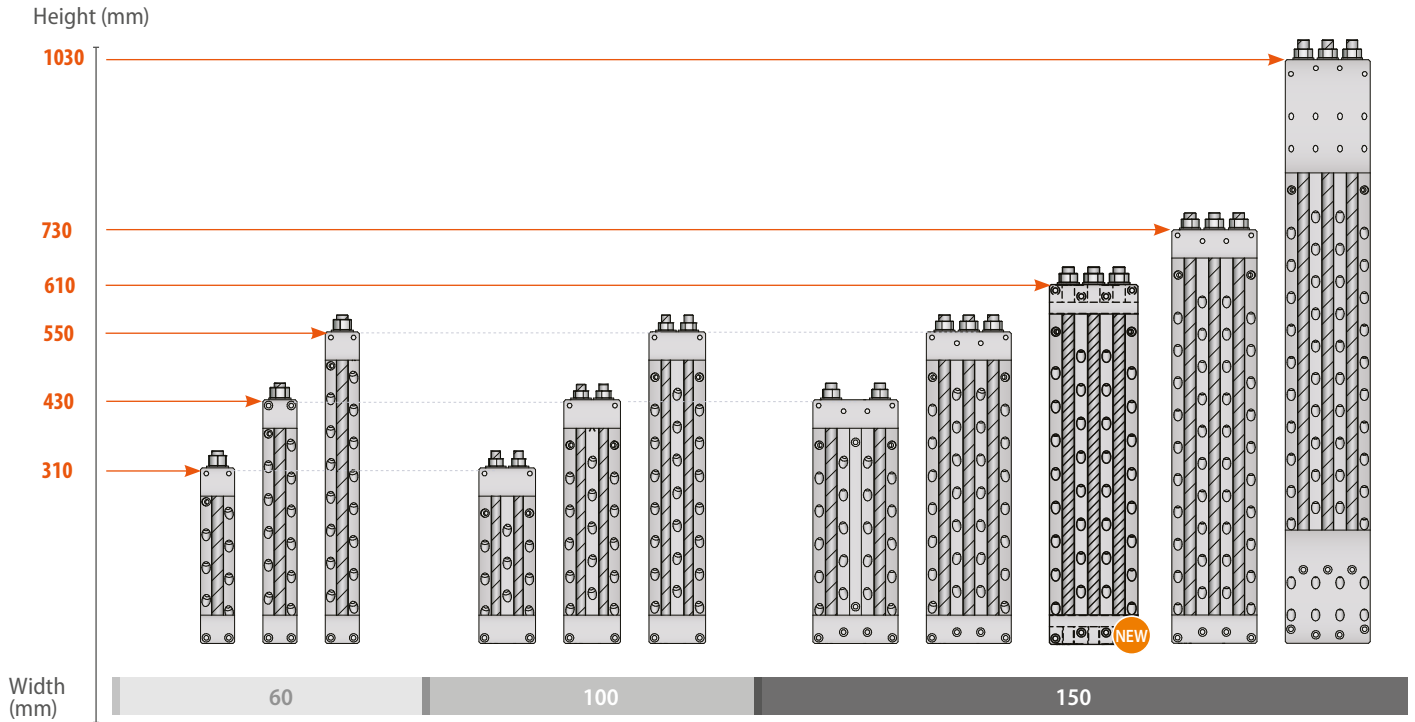
## Connector components

| Position | Description |
|----------|-------------|
| 1 | Hexagonal nut |
| 2 | Washers |
| 3 | Clamping jaw (without thread) |
| 4 | Threaded rod |
| 5 | Connector plate x 2 |
| 6 | Bottom clamping jaw (with thread) |
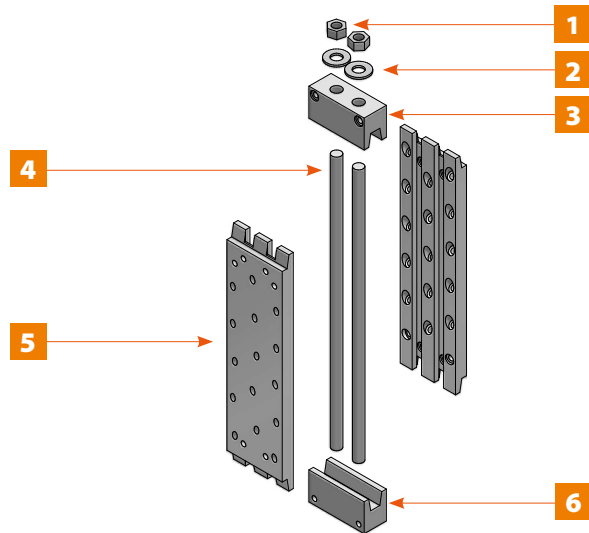


# Vis MEGANT®

## MEGANT® self-tapping CS-screw (corresponding CS-screws are included with MEGANT®)
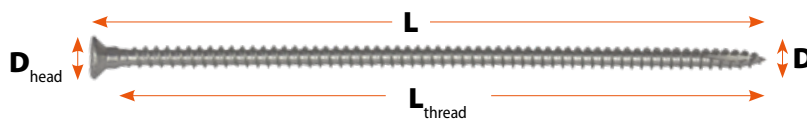


| Art.-No. | Type | $D_{head}$ | | L | | $L_{tread}$ | | D | | Bits |
|----------|------|-----|------|-----|------|-----|------|-----|------|------|
| | | mm | [in] | mm | [in] | mm | [in] | mm | [in] | |
| Z581 | Self-tapping CS-screw | 15 | 0.59 | 160 | 6.30 | 145 | 5.70 | 8 | 0.31 | Torx 40 |
| Z530 | Self-tapping CS-screw | 15 | 0.59 | 240 | 9.45 | 225 | 8.86 | 8 | 0.31 | Torx 40 |
| Z670/Z675 | Self-tapping CS-screw | 15 | 0.59 | 120 | 9.45 | 105 | 4.13 | 8 | 0.31 | Torx 40 |

**Application:** for positioning screws and diagonal screws as well as assembling the clamping jaw of the MEGANT®.

# MEGANT®

## Application examples and connection details

With only 2 cm of hooking way, an installation in recesses of concrete walls can be done.

© Photo: Hess Bois

Three-sided concealed assembly by milling into the secondary beam. MEGANT® is fixed to the main beam with no need for milling.

MEGANT

MEGANT® angled connection.

$F_{2,d}$

**MEGANT® on wood**

560
95
310
480
30
41
160

Secondary beam
160/480; GL24h
MEGANT® 310x100

Main beam 160x560

MEGANT® steel connection.

$F_{2,d}$

**MEGANT® on steel**

95
310
480
30
41
160
160

Poutre secondaire
160/480; GL24h
MEGANT® 310x100

Poteau acier HEB 160
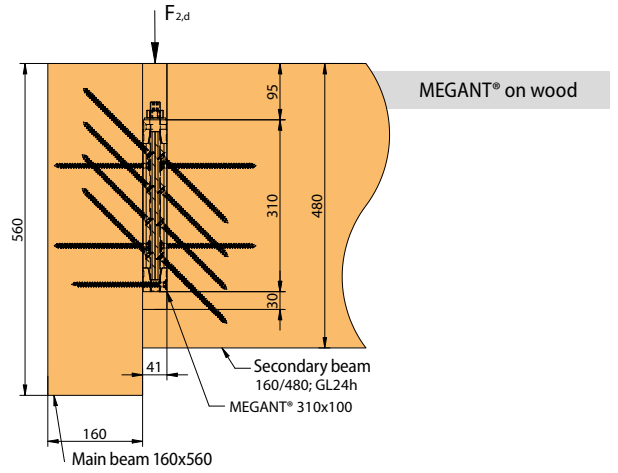
Top flush double-sided main and secondary beam MEGANT® connection.

**Double-sided beam column connection with MEGANT®**

Tieback with inclined screws and threaded rods

MEGANT®
1030x150x50 SL

Main beam
1240x240

Column 240x600

Main beam
1240x240
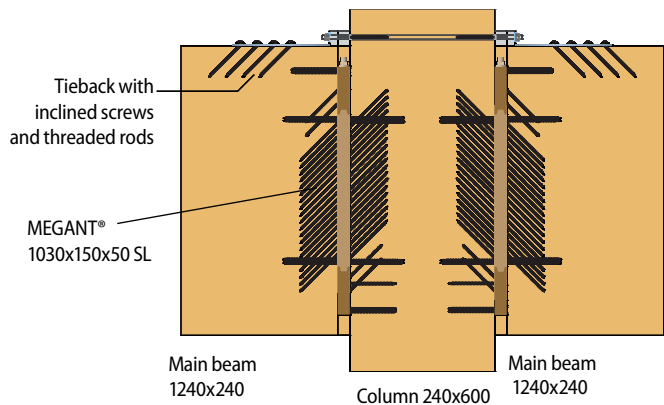
# MEGANT®

**Wood to concrete and steel connection**

## Example of a sloped beam/concrete connection with MEGANT®

▌Screwed-on MEGANT® connector plate with CS-screws 8x160

▌Screwed-on MEGANT® top jaw with 4 CS-screws 8x160

▌Leveled and welded steel plate 550x150x20 mm

▌MEGANT® connector plate with 15 CS-screws M10x40

▌MEGANT® 550x150x50 mm wood-steel connector

Panne

70    152

Mur béton

Panne

▌Milled groove, e.g. 152x70 mm for 3-sided concealed MEGANT® connection

▌Concrete anchored steel plate e.g. 240x980x20 mm

▌Screwed-on MEGANT® bottom jaw with 4 CS-screws M8x80

▌Wooden block for covering 4th side of 3-sided concealed MEGANT® connection

## Examples of anchor plate concrete connection

MEGANT® concrete connection.

Adhesive:
fischer Superbond-System
FIS SB 390 S
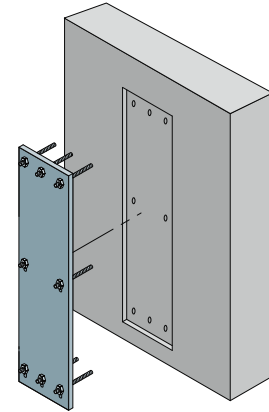
▌Concrete connection with glued-in threaded rods for levelling the fischer steel plate - optionally set in recessed concrete. Bonded with fischer Superbond System: FIS SB 390 S **www.fischer-international.com/en/**
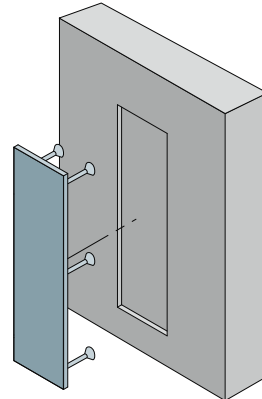
▌SBKL anchor plate from Peikko (DE) Steel plate embedded in concrete. **www.peikko.de**
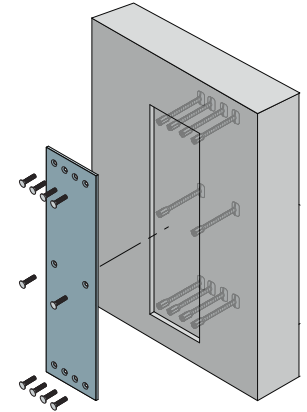
▌Halfen HSC-B steel construction connection with CS screw connection set in recessed concrete. **www.halfen.com**
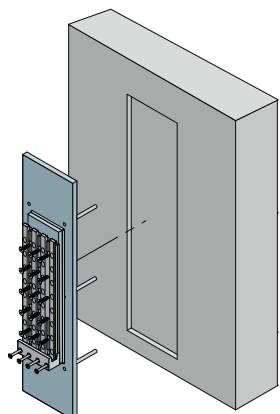
▌Sloped beam attached to concrete. The welded steel plate gives additional support as well as a surface for connecting the MEGANT® with screws.

The anchoring of the anchor steel plate can be done e.g. with HALFEN HSC-B steel construction connection according to approval Z-1.8-1974, or with fischer Superbond FIS SB 390 S glued-in threaded rods. The required structural analysis for this concrete connection must be carried out by a structural engineer on site.

In the case of a steel plate levelled and installed precisely in the concrete structure, this steel plate can serve as an anchor plate for the concrete connection and thus a complex welding on site can be avoided. This means that the MEGANT® connector only has to be screwed onto the levelled anchor plate.

# MEGANT®

**Load bearing capacity values for MEGANT installed on softwood, according to  ETA-15/0667 (16.08.2023)**

## MEGANT® 60 series – Aluminium EN AW 6082

| MEGANT®<br>mm | Softwood material | Characteristic load bearing capacity and stiffness in softwood<br>with KNAPP® screws 8 x 160 mm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $F_{1,KCC,Rk}$<br>kN | $F_{1,Rk}$<br>kN | $F_{2,KCC,Rk}$<br>kN | $F_{2,Rk}$<br>kN | $F_{3,Rk}$<br>kN | $F_{4KCC,Rk}$<br>kN | $F_{4,Rk}$<br>kN | $M_{tor,Rk}$<br>kNm | $K_{tor,ser}$<br>kNm/rad |
| 310x60x40 | C24 | 36,6 | 18,9 | 150,4 [1]<br>130,1 · $f_{R2}$ [2] | 89,7 | 28,0 | 36,9 | 32,0 | 2,5 | 200 |
| | GL24h | | 20,4 | | 96,8 | 29,1 | | 33,6 | 2,7 | 227 |
| 430x60x40 | C24 | | 18,9 | | 141,0 | 37,1 | 40,6 | 50,4 | 5,5 | 639 |
| | GL24h | | 20,4 | | 152,1 | 38,7 | | 52,8 | 5,8 | 723 |
| 550x60x40 | C24 | | 18,9 | | 192,2 | 46,3 | 44,3 | 68,7 | 9,6 | 1 569 |
| | GL24h | | 20,4 | | 207,4 | 48,3 | | 72,0 | 10,2 | 1 775 |

$F_{1,KCC,Rk}$/$F_{1,Rk}$   Characteristic load bearing capacity (aluminium failure/wood failure) in direction of secondary beam
$F_{2,KCC,Rk}$/$F_{2,Rk}$   Characteristic load bearing capacity (aluminium failure/wood failure) in direction of insertion
$F_{3,Rk}$         Characteristic load bearing capacity (wood failure) against direction of insertion
$F_{4,KCC,Rk}$/$F_{4,Rk}$   Characteristic load bearing capacity (aluminium failure/wood failure) perpendicular to direction of insertion
$M_{tor}$         Characteristic rotation moment

## MEGANT® 100 series – Aluminium EN AW 6082

| MEGANT®<br>mm | Softwood material | Characteristic load bearing capacity and stiffness in softwood<br>with KNAPP® screws 8 x 160 mm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $F_{1,KCC,Rk}$<br>kN | $F_{1,Rk}$<br>kN | $F_{2,KCC,Rk}$<br>kN | $F_{2,Rk}$<br>kN | $F_{3,Rk}$<br>kN | $F_{4KCC,Rk}$<br>kN | $F_{4,Rk}$<br>kN | $M_{tor,Rk}$<br>kNm | $K_{tor,ser}$<br>kNm/rad |
| 310x100x40 | C24 | 55,3 | 29,4 | 224,2 [1]*<br>206,6 · $f_{R2}$ [2]* | 115,3 | 44,5 | 62,4 | 41,2 | 4,2 | 346 |
| | GL24h | | 31,7 | | 124,5 | 46,2 | | 43,2 | 4,4 | 391 |
| 430x100x40 | C24 | | 29,4 | | 192,2 | 58,2 | 68,6 | 68,7 | 8,6 | 1 066 |
| | GL24h | | 31,7 | | 207,4 | 60,6 | | 72,0 | 9,2 | 1 206 |
| 550x100x40 | C24 | | 29,4 | | 269,1* | 72,0 | 74,9 | 96,1 | 14,9 | 2 443 |
| | GL24h | | 31,7 | | 290,4* | 75,0 | | 100,8 | 15,9 | 2 764 |

[1] $F_{2,KCC,Rk}$          for torsional fixed header
[2] $F_{2,KCC,Rk}$ · $f_{R2}$   for not torsional fixed header and $f_{R2}$ according to page44 ETA-15/0667 (16.08.2023)
*  $F_{t,Rk}$        = 226,1 KN (For MEGANT 550x100x40, the tensile strength of the threaded rods is critical!)

## MEGANT® 150 series– Aluminium EN AW 6082

| MEGANT®<br>mm | Material | Characteristic load bearing capacity and stiffness in softwood<br>with KNAPP® screws 8 x 160 mm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $F_{1,KCC,Rk}$<br>kN | $F_{1,Rk}$<br>kN | $F_{2,KCC,Rk}$<br>kN | $F_{2,Rk}$<br>kN | $F_{3,Rk}$<br>kN | $F_{4KCC,Rk}$<br>kN | $F_{4,Rk}$<br>kN | $M_{tor,Rk}$<br>kNm | $K_{tor,ser}$<br>kNm/rad |
| 310x150x50 | C24 | 74,3 | 39,8 | 375,0 [1]<br>366,5 · $f_{R2}$ [2] | 145 | 58,4 | 68,0 | 54,9 | 3,9 | 304 |
| | GL24h | | 43,0 | | 156 | 61,6 | | 57,6 | 4,2 | 344 |
| 430x150x50 | C24 | | 39,8 | | 241 | 76,7 | 74,8 | 91,6 | 12,5 | 1 594 |
| | GL24h | | 43,0 | | 260 | 80,8 | | 96,0 | 13,3 | 1 803 |
| 550x150x50 | C24 | | 39,8 | | 337 | 95,0 | 81,6 | 128,2 | 20,9 | 3 488 |
| | GL24h | | 43,0 | | 364 | 100,0 | | 134,4 | 22,3 | 3 946 |
| 610x150x50 | C24 | | 39,8 | | 385 | 95,0 | | 128,2 | 20,9 | 3 488 |
| | GL24h | | 43,0 | | 416 | 100,0 | | 134,4 | 22,3 | 3 946 |
| 730x150x50 | C24 | | 39,8 | | 482 | 95,0 | | 128,2 | 20,9 | 3 488 |
| | GL24h | | 43,0 | | 520 | 100,0 | | 134,4 | 22,3 | 3 946 |
| 1030x150x50<br>SL | C24 | | 39,8 | 650 | 559 | 95,0 | | 128,2 | 20,9 | 3 488 |
| | GL24h | | 43,0 | | 604 | 100,0 | | 134,4 | 22,3 | 3 946 |

**Possibility of using longer screws (8x240 mm), in end wood to increase the increase load capacity.**
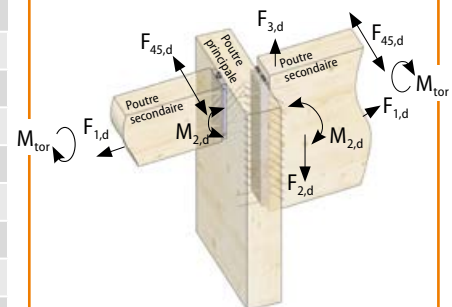
# MEGANT®

**Load bearing capacity values for MEGANT installed on hardwood, according to ETA-15/0667 (16.08.2023)**

## MEGANT® 60 series – Aluminium EN AW 6082

| MEGANT®<br>mm | Hardwood material | $F_{1,KCC,Rk}$<br>kN | $F_{1,Rk}$<br>kN | $F_{2,KCC,Rk}$<br>kN | $F_{2,Rk}$<br>kN | $F_{3,Rk}$<br>kN | $F_{4KCC,Rk}$<br>kN | $F_{4,Rk}$<br>kN | $M_{tor,Rk}$<br>kNm | $K_{tor,ser}$<br>kNm/rad |
|---|---|---|---|---|---|---|---|---|---|---|
| 310x60x40 | $\rho_k$ = 530 kg/m³ | 36,6 | 15,6 | 150,4 [1]<br>130,1 · $f_{R2}$ [2] | 96,3 | 43,3 | 36,9 | 33,0 | 3,5 | 374 |
| | $\rho_k$ = 590 kg/m³ | | 17,0 | | 104,9 | 45,9 | | 35,1 | 3,9 | 439 |
| 430x60x40 | $\rho_k$ = 530 kg/m³ | | 15,6 | | 151,3 | 59,1 | 40,6 | 51,9 | 7,5 | 1 241 |
| | $\rho_k$ = 590 kg/m³ | | 17,0 | | 164,9 | 62,5 | | 55,2 | 8,5 | 1 457 |
| 550x60x40 | $\rho_k$ = 530 kg/m³ | | 15,6 | | 206,3 | 74,9 | 44,3 | 70,8 | 13,2 | 2 924 |
| | $\rho_k$ = 590 kg/m³ | | 17,0 | | 224,8 | 79,2 | | 75,3 | 14,9 | 3 434 |

$F_{1,KCC,Rk}$/$F_{1,Rk}$    Characteristic load bearing capacity (aluminium failure/wood failure) in direction of secondary beam
$F_{2,KCC,Rk}$/$F_{2,Rk}$    Characteristic load bearing capacity (aluminium failure/wood failure) in direction of insertion
$F_{3,Rk}$    Characteristic load bearing capacity (wood failure) against direction of insertion
$F_{4,KCC,Rk}$/$F_{4,Rk}$    Characteristic load bearing capacity (aluminium failure/wood failure) perpendicular to direction of insertion
$M_{tor}$    Characteristic rotation moment

## MEGANT® 100 series – Aluminium EN AW 6082

| MEGANT®<br>mm | Hardwood material | $F_{1,KCC,Rk}$<br>kN | $F_{1,Rk}$<br>kN | $F_{2,KCC,Rk}$<br>kN | $F_{2,Rk}$<br>kN | $F_{3,Rk}$<br>kN | $F_{4KCC,Rk}$<br>kN | $F_{4,Rk}$<br>kN | $M_{tor,Rk}$<br>kNm | $K_{tor,ser}$<br>kNm/rad |
|---|---|---|---|---|---|---|---|---|---|---|
| 310x100x40 | $\rho_k$ = 530 kg/m³ | 55,3 | 24,2 | 224,2 [1]*<br>206,6 · $f_{R2}$ [2]* | 123,8 | 67,0 | 62,4 | 42,5 | 5,7 | 644 |
| | $\rho_k$ = 590 kg/m³ | | 26,4 | | 134,9 | 70,9 | | 45,2 | 6,4 | 757 |
| 430x100x40 | $\rho_k$ = 530 kg/m³ | | 24,2 | | 206,3 | 90,6 | 68,6 | 70,8 | 11,9 | 1 986 |
| | $\rho_k$ = 590 kg/m³ | | 26,4 | | 224,8 | 95,9 | | 75,3 | 13,3 | 2 333 |
| 550x100x40 | $\rho_k$ = 530 kg/m³ | | 24,2 | | 288,9* | 114,3 | 74,9 | 99,1 | 20,5 | 4 553 |
| | $\rho_k$ = 590 kg/m³ | | 26,4 | | 314,8* | 120,9 | | 105,4 | 23,0 | 5 348 |

[1] $F_{2,KCC,Rk}$      for torsional fixed header
[2] $F_{2,KCC,Rk}$ · $f_{R2}$    for not torsional fixed header and $f_{R2}$ according to page 44 ETA-15/0667 (16.08.2023)
* $F_{t,Rk}$      = 226,1 KN (For MEGANT 550x100x40, the tensile strength of the threaded rods is critical!)

## MEGANT® 150 series – Aluminium EN AW 6082

| MEGANT®<br>mm | Hardwood material | $F_{1,KCC,Rk}$<br>kN | $F_{1,Rk}$<br>kN | $F_{2,KCC,Rk}$<br>kN | $F_{2,Rk}$<br>kN | $F_{3,Rk}$<br>kN | $F_{4KCC,Rk}$<br>kN | $F_{4,Rk}$<br>kN | $M_{tor,Rk}$<br>kNm | $K_{tor,ser}$<br>kNm/rad |
|---|---|---|---|---|---|---|---|---|---|---|
| 310x150x50 | $\rho_k$ = 530 kg/m³ | 74,3 | 32,8 | 375,0 [1]<br>366,5 · $f_{R2}$ [2] | 165,1 | 89,3 | 68,0 | 56,6 | 5,4 | 567 |
| | $\rho_k$ = 590 kg/m³ | | 35,8 | | 179,9 | 94,6 | | 60,2 | 6,1 | 666 |
| 430x150x50 | $\rho_k$ = 530 kg/m³ | | 32,8 | | 275,1 | 120,9 | 74,8 | 94,4 | 17,1 | 2 970 |
| | $\rho_k$ = 590 kg/m³ | | 35,8 | | 299,8 | 127,9 | | 100,4 | 19,2 | 3 489 |
| 550x150x50 | $\rho_k$ = 530 kg/m³ | | 32,8 | | 385,2 | 152,4 | | 132,1 | 28,7 | 6 500 |
| | $\rho_k$ = 590 kg/m³ | | 35,8 | | 419,7 | 161,2 | | 140,5 | 32,3 | 7 634 |
| 610x150x50 | $\rho_k$ = 530 kg/m³ | | 32,8 | | 440,2 | 152,4 | 81,6 | 132,1 | 28,7 | 6 500 |
| | $\rho_k$ = 590 kg/m³ | | 35,8 | | 479,6 | 161,2 | | 140,5 | 32,3 | 7 634 |
| 730x150x50 | $\rho_k$ = 530 kg/m³ | | 32,8 | | 550,3 | 152,4 | | 132,1 | 28,7 | 6 500 |
| | $\rho_k$ = 590 kg/m³ | | 35,8 | | 599,6 | 161,2 | | 140,5 | 32,3 | 7 634 |
| 1030x150x50 SL | $\rho_k$ = 530 kg/m³ | | 32,8 | 650 | 645,7 | 152,4 | | 132,1 | 28,7 | 6 500 |
| | $\rho_k$ = 590 kg/m³ | | 35,8 | | 703,5 | 161,2 | | 140,5 | 32,3 | 7 634 |

A combination review of the different load directions shall be carried out in accordance with ETA-15/0667 (2023). In addition, consideration of the clamping moments $M_{2,Rd}$ resulting from the torsion spring stiffness $K_{2,\varphi}$, f must be calculated in the design of the connection.
For this purpose, instructions with the corresponding formula can be found in the European Technical Assessment ETA.

# MEGANT®

## Assembly procedure

**13:00** | After lifting and aligning the laminated beam, MEGANT® is put into position.

**13:05** | Snap-fit: For threading and dropping, MEGANT® requires only 2 cm.

**13:08** | Threaded rods inserted and screwed into the bottom jaw.

**13:09** | Tighten hexagonal nuts.

**13:11** | Connection completed.

# MEGANT®

## Fire protection

▮ Due to the concealed installation of the connectors on three or four sides, appropriate fire protection can be achieved via the corresponding timber cover.

▮ No additional covers or fire protection strips are required. According to EN 1995-1-2 point 3.4.3.1, but the joint can not exceed a maximum of 2 mm.

▮ If, due to manufacturing tolerances or for installation reasons, larger joints are required required (2 - 10 mm), PROMASEAL intumescent sealant can be used. PROMASEAL®-PL* intumescent sealant can be used for protection. The flexible sealing strip is placed around the connector, expands and fills the gap in the event of fire, thus in the event of fire, thus protecting the connector.

▮ According to EN 1995-1-2, 28 mm wood cover is required for fire rating of 30 mm., 49 mm for 60 min., 70 mm for 90 min., and 120 minutes for 91 mm (see calculation example on page 35).

▮ In special situations (e.g. due to non-compliance with the timber cover), the connector can be additionally protected against heat with a can be reduced with Promat PROMADUR®** clear fireproof paint. In the event of fire, the material expands and forms a protective insulating foam that delays combustion by 6 to 17 min (depending on the thickness of the paint) and allows smaller sections of wood to be used.

\* \* For more information on the use and specification of fire protection materials please contact our research and development service.
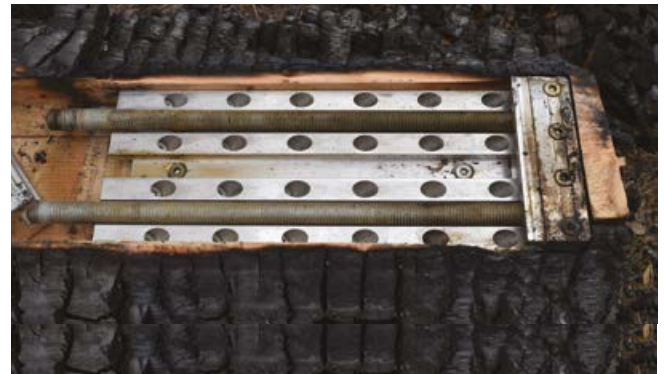
Fire test results after more than one hour. The section of wood is charred all around the connector. It guaranteed its integrity and its ability to withstand the force exerted.

## PLANNER SERVICE

### You have a project and want to use KNAPP® connectors?

**Take advantage of our customized planning service.**

KNAPP® offers a comprehensive planning and calculation service for all structural engineers, architects, and project managers.

We provide three benefits: an interactive load table, a dimensioning tool, and our calculation service by our in-house engineers.

\* Our service does not replace an approval by a certified structural engineer in the country where the project is being carried out.

Strips of self-adhesive intumescent joint are laid around the connector and then stapled.
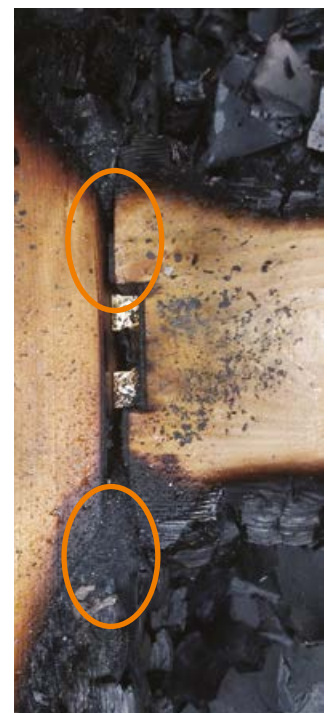
The 10 mm joint is closed by swelling intumescent seal, allowing the which allows the connector to be protected even after 120 min of fire.

# MEGANT® 310/60/40

## Technical details

Art.-No.K242

(Dimensions in mm)

**MEGANT® 60 - load capacities with 8x160 screws, timber quality GL24h**

| MEGANT® | Min. secondary beam height [mm] | Characteristic values [kN] | | | |
|---|---|---|---|---|---|
| | | max $F_{1,Rk}$ | max $F_{2,Rk}$ | max $F_{3,Rk}$ | max $F_{45,Rk}$ |
| L x L x H 310x60x40 | L x H 100x440 | 20,4 | 96,8 | 29,1 | 33,6 |

The full range of resistance values can be found online on our website.
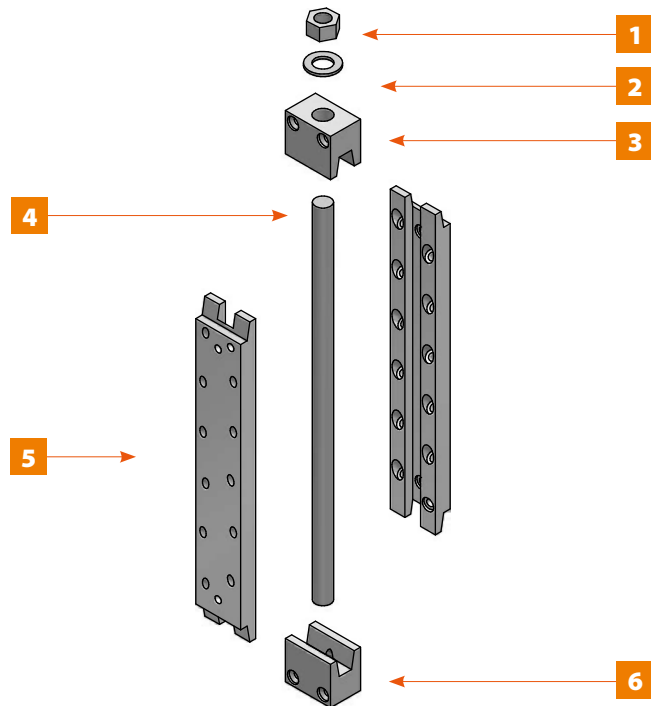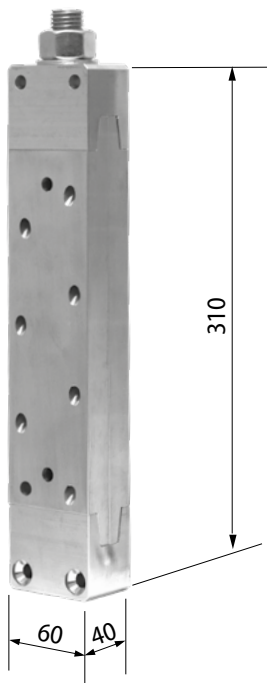


| Pos. | Description | Pos. | Description |
|---|---|---|---|
| 1 | 1 hexagonal nut M20 | 4 | 1 threaded rod M20x340 |
| 2 | 1 washer M20 | 5 | 2 connector plates 250x60x20 |
| 3 | 1 top clamping jaw (without thread) 60x50x40 | 6 | 1 bottom clamping jaw (with thread) 60x50x40 |

## Vis MEGANT®

**MEGANT® self-tapping CS-screw (corresponding CS-screws are included with MEGANT®)**
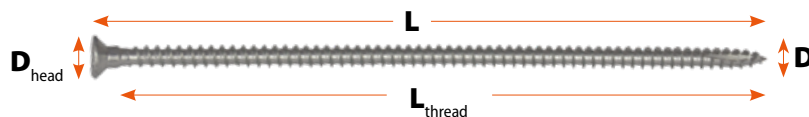


| Art.-No. | Quantity | Type | $D_{head}$ | | L | | $L_{thread}$ | | D | | Bits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | mm | [inch] | mm | [inch] | mm | [inch] | mm | [inch] | |
| Z581 | 14 | Angled CS screw | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| Z530 | 5 | CS horizontal screws | 15 | 0.59 | **240** | 9.45 | 225 | 8.86 | **8** | 0.31 | Torx 40 |
| Z581 | 5 | CS horizontal screws | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| **Screw connection on hardwood** | | | | | | | | | | | |
| Z670/Z675 | 24 | ASSY CS screws for hardwoods | 15 | 0.59 | **160** | 9.45 | 141 | 5.55 | **8** | 0.31 | Torx 40 |

**Application:** for positioning screws and diagonal screws as well as assembling the clamping jaw of the MEGANT®.

# MEGANT® 430/60/40

**MEGANT® 60** - **load capacities with 8x160 screws, timber quality GL24h**

| MEGANT® | Min. secondary beam height [mm] | Characteristic values [kN] | | | |
|---|---|---|---|---|---|
| | | max $F_{1,Rk}$ | max $F_{2,Rk}$ | max $F_{3,Rk}$ | max $F_{45,Rk}$ |
| 430x60x40 | 100x520 | 20,4 | 152,1 | 38,7 | 40,6 |

The full range of resistance values can be found online on our website.
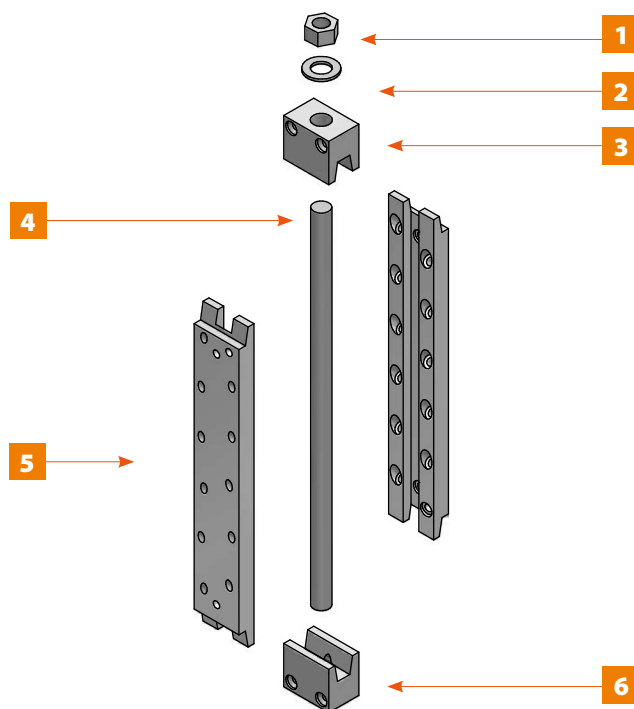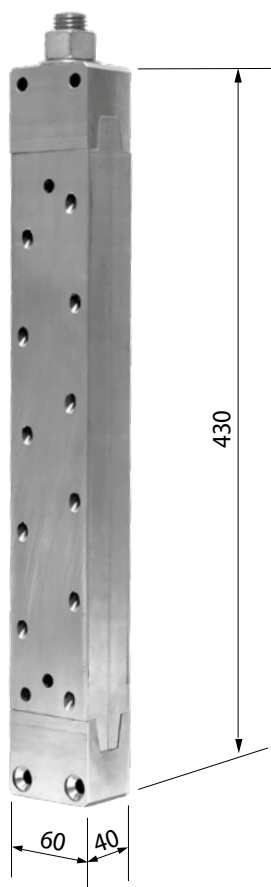


| Pos. | Description | Pos. | Description |
|---|---|---|---|
| 1 | 1 hexagonal nut M20 | 4 | 1 threaded rod M20x340 |
| 2 | 1 washer M20 | 5 | 2 connector plates 370x60x20 |
| 3 | 1 top clamping jaw (without thread) 60x50x40 | 6 | 1 bottom clamping jaw (with thread) 60x50x40 |

# Vis MEGANT®

**MEGANT® self-tapping CS-screw (corresponding CS-screws are included with MEGANT®)**
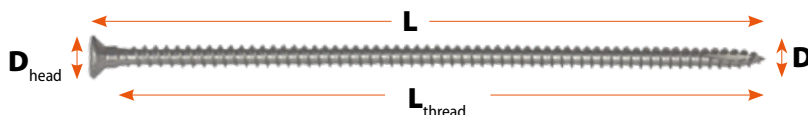


| Art.-No. | Quantity | Type | $D_{head}$ | | L | | $L_{thread}$ | | D | | Bits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | mm | [inch] | mm | [inch] | mm | [inch] | mm | [inch] | |
| Z581 | 22 | Angled CS screw | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| Z530 | 5 | CS horizontal screws | 15 | 0.59 | **240** | 9.45 | 225 | 8.86 | **8** | 0.31 | Torx 40 |
| Z581 | 5 | CS horizontal screws | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| **Screw connection on hardwood** | | | | | | | | | | | |
| Z670/Z675 | 32 | ASSY CS screws for hardwoods | 15 | 0.59 | **160** | 9.45 | 141 | 5.55 | **8** | 0.31 | Torx 40 |

**Application:** for positioning screws and diagonal screws as well as assembling the clamping jaw of the MEGANT®.

# MEGANT® 550/60/40

**MEGANT® 60 - load capacities with 8x160 screws, timber quality GL24h**

| MEGANT® | Min. secondary beam height [mm] | Characteristic values [kN] | | | |
|---|---|---|---|---|---|
| | | max F$_{1,Rk}$ | max F$_{2,Rk}$ | max F$_{3,Rk}$ | max F$_{45,Rk}$ |
| 550x60x40 | 100x640 | 20,4 | 177,7 | 48,3 | 44,3 |

The full range of resistance values can be found online on our website.

550

60  40
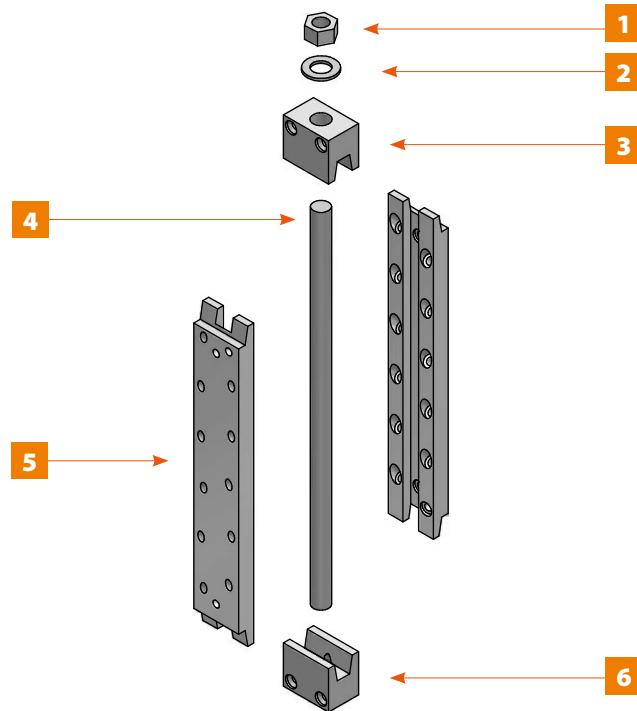


| Pos. | Description | Pos. | Description |
|---|---|---|---|
| 1 | 1 hexagonal nut M20 | 4 | 1 threaded rod M20x580 |
| 2 | 1 washer M20 | 5 | 2 connector plates 490x60x20 |
| 3 | 1 top clamping jaw (without thread) 60x50x40 | 6 | 1 bottom clamping jaw (with thread) 60x50x40 |

# Vis MEGANT®

**MEGANT® self-tapping CS-screw (corresponding CS-screws are included with MEGANT®)**

L

D$_{head}$

D

L$_{thread}$

| Art.-No. | Quantity | Type | D$_{head}$ | | L | | L$_{thread}$ | | D | | Bits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | mm | [inch] | mm | [inch] | mm | [inch] | mm | [inch] | |
| Z581 | 30 | Angled CS screw | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| Z530 | 5 | CS horizontal screws | 15 | 0.59 | **240** | 9.45 | 225 | 8.86 | **8** | 0.31 | Torx 40 |
| Z581 | 5 | CS horizontal screws | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| **Screw connection on hardwood** | | | | | | | | | | | |
| Z670/Z675 | 40 | ASSY CS screws for hardwoods | 15 | 0.59 | **160** | 9.45 | 141 | 5.55 | **8** | 0.31 | Torx 40 |

**Application:** for positioning screws and diagonal screws as well as assembling the clamping jaw of the MEGANT®.

# MEGANT® 310/100/40

## Technical details

Art.-No.K239

(Dimensions in mm)

**MEGANT® 100 - load capacities with 8x160 screws, timber quality GL24h**

| MEGANT® | Min. secondary beam height [mm] | Characteristic values [kN] | | | |
|---|---|---|---|---|---|
| | | max $F_{1,Rk}$ | max $F_{2,Rk}$ | max $F_{3,Rk}$ | max $F_{45,Rk}$ |
| 310x100x40 | 140x440 | 31,7 | 124,5 | 46,2 | 43,2 |

The full range of resistance values can be found online on our website.
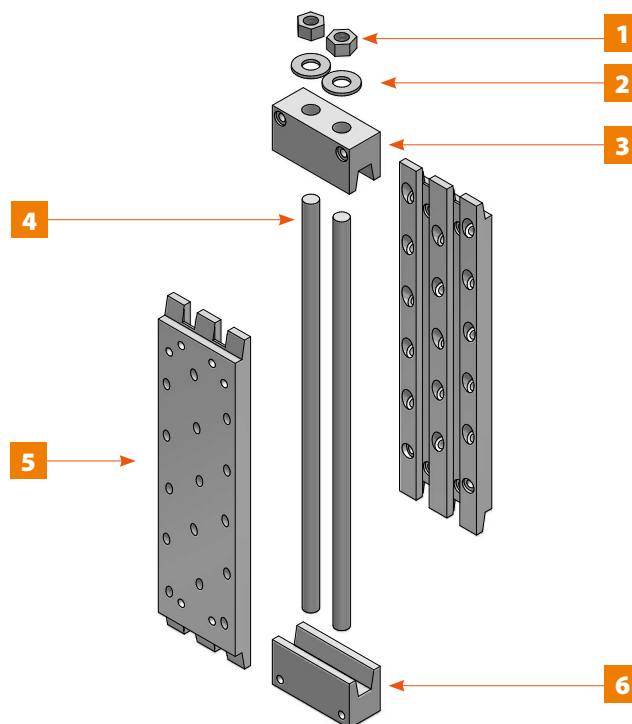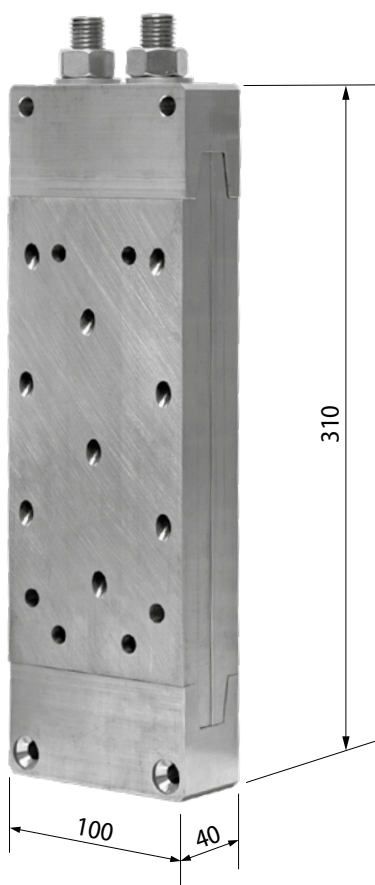


| Pos. | Description | Pos. | Description |
|---|---|---|---|
| 1 | 2 hexagonal nuts M16 | 4 | 2 threaded rods M16x340 |
| 2 | 2 washers M16 | 5 | 2 connector plates 250x100x20 |
| 3 | 1 top clamping jaw (without thread) 100x50x40 | 6 | 1 bottom clamping jaw (with thread) 100x50x40 |

# Vis MEGANT®

## MEGANT® self-tapping CS-screw (corresponding CS-screws are included with MEGANT®)
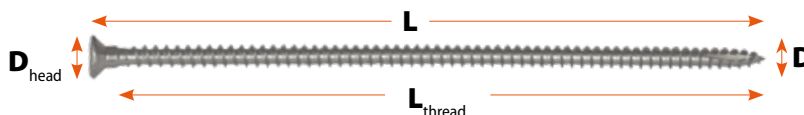


| Art.-No. | Quantity | Type | $D_{head}$ | | L | | $L_{thread}$ | | D | | Bits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | mm | [inch] | mm | [inch] | mm | [inch] | mm | [inch] | |
| Z581 | 18 | Angled CS screw | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| Z530 | 6 | CS horizontal screws | 15 | 0.59 | **240** | 9.45 | 225 | 8.86 | **8** | 0.31 | Torx 40 |
| Z581 | 10 | CS horizontal screws | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| **Screw connection on hardwood** | | | | | | | | | | | |
| Z670/Z675 | 34 | ASSY CS screws for hardwoods | 15 | 0.59 | **160** | 9.45 | 141 | 5.55 | **8** | 0.31 | Torx 40 |

**Application:** for positioning screws and diagonal screws as well as assembling the clamping jaw of the MEGANT®.
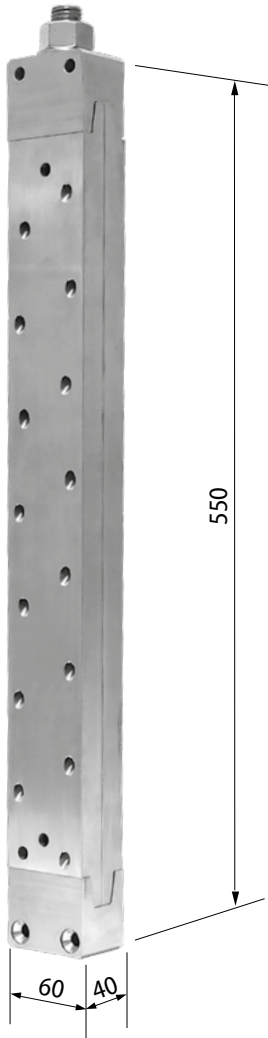
# MEGANT® 430/100/40

## Technical details

Art.-No.K240

(Dimensions in mm)
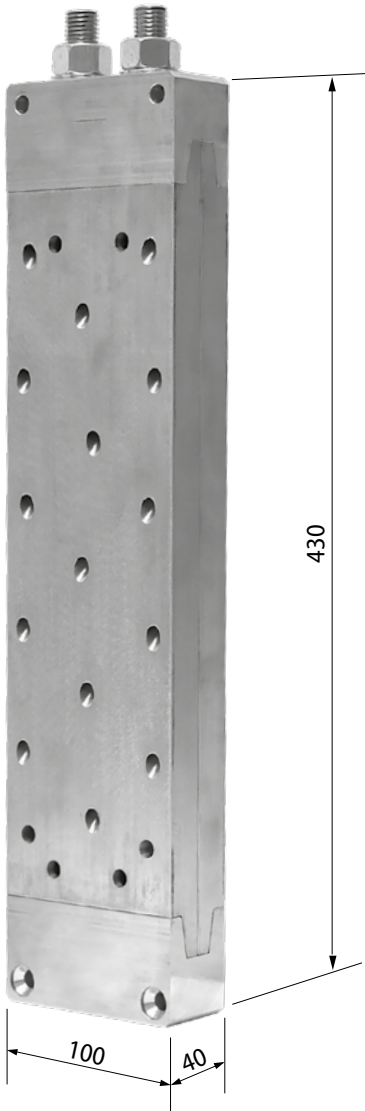
**MEGANT® 100 - load capacities with 8x160 screws, timber quality GL24h**

| MEGANT® | Min. secondary beam height [mm] | Characteristic values [kN] | | | |
|---|---|---|---|---|---|
| | | max $F_{1,Rk}$ | max $F_{2,Rk}$ | max $F_{3,Rk}$ | max $F_{45,Rk}$ |
| 430x100x40 | 140x520 | 31,7 | 207,4 | 60,6 | 68,6 |

The full range of resistance values can be found online on our website.
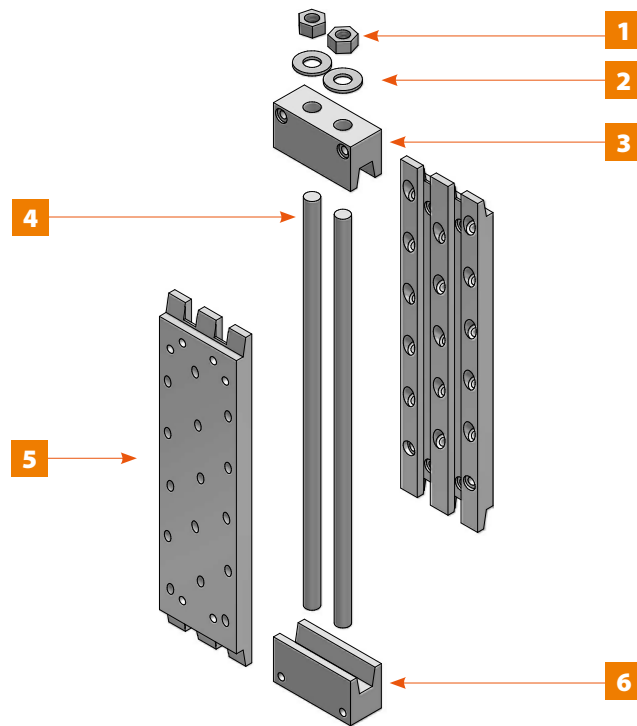
| Pos. | Description | Pos. | Description |
|---|---|---|---|
| 1 | 2 hexagonal nuts M16 | 4 | 2 threaded rods M16x460 |
| 2 | 2 washers M16 | 5 | 2 connector plates 370x100x20 |
| 3 | 1 top clamping jaw (without thread) 100x50x40 | 6 | 1 bottom clamping jaw (with thread) 100x50x40 |

# Vis MEGANT®

## MEGANT® self-tapping CS-screw (corresponding CS-screws are included with MEGANT®)

| Art.-No. | Quantity | Type | $D_{head}$ | | L | | $L_{thread}$ | | D | | Bits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | mm | [inch] | mm | [inch] | mm | [inch] | mm | [inch] | |
| Z581 | 30 | Angled CS screw | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| Z530 | 6 | CS horizontal screws | 15 | 0.59 | **240** | 9.45 | 225 | 8.86 | **8** | 0.31 | Torx 40 |
| Z581 | 10 | CS horizontal screws | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| **Screw connection on hardwood** | | | | | | | | | | | |
| Z670/Z675 | 46 | ASSY CS screws for hardwoods | 15 | 0.59 | **160** | 9.45 | 141 | 5.55 | **8** | 0.31 | Torx 40 |

**Application:** for positioning screws and diagonal screws as well as assembling the clamping jaw of the MEGANT®.

# MEGANT® 550/100/40

**Technical details**

Art.-No.K241

(Dimensions in mm)
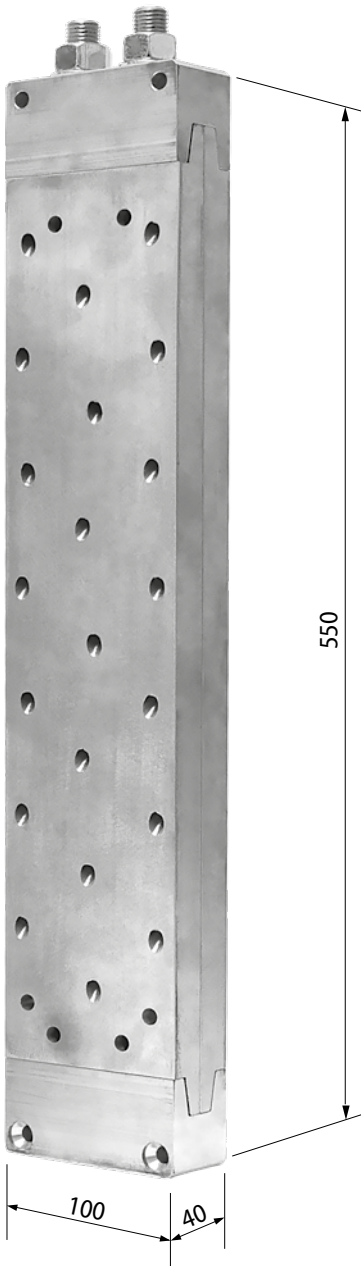
**MEGANT® 100 - load capacities with 8x160 screws, timber quality GL24h**

| MEGANT® | Min. secondary beam height [mm] | Characteristic values [kN] | | | |
|---|---|---|---|---|---|
| | | max F$_{1,Rk}$ | max F$_{2,Rk}$ | max F$_{3,Rk}$ | max F$_{45,Rk}$ |
| 550x100x40 | 140x640 | 31,7 | 235,2 | 75,0 | 74,9 |

The full range of resistance values can be found online on our website.

550

100   40
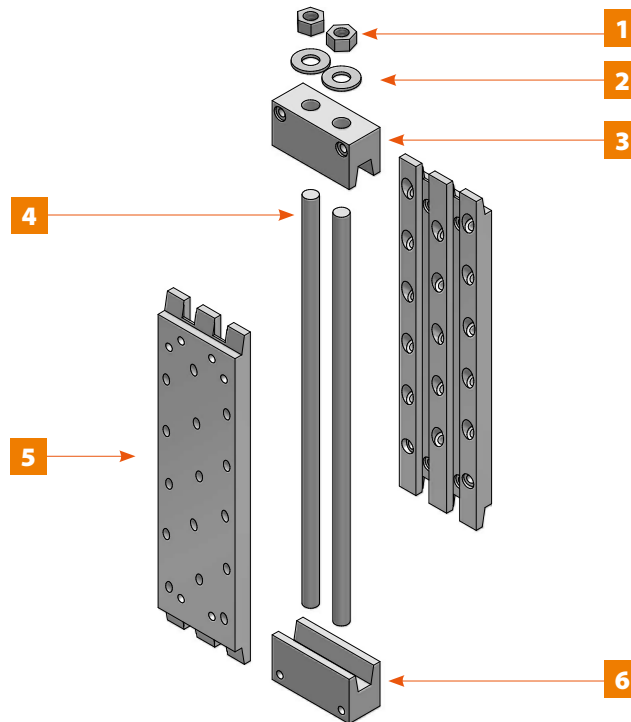


| Pos. | Description | Pos. | Description |
|---|---|---|---|
| 1 | 2 hexagonal nuts M16 | 4 | 2 threaded rods M16x580 |
| 2 | 2 washers M16 | 5 | 2 connector plates 490x100x20 |
| 3 | 1 top clamping jaw (without thread) 100x50x40 | 6 | 1 bottom clamping jaw (with thread) 100x50x40 |

# Vis MEGANT®

**MEGANT® self-tapping CS-screw (corresponding CS-screws are included with MEGANT®)**

L
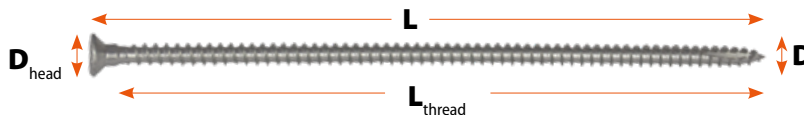
D$_{head}$   D

L$_{thread}$

| Art.-No. | Quantity | Type | D$_{head}$ | | L | | L$_{thread}$ | | D | | Bits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | mm | [inch] | mm | [inch] | mm | [inch] | mm | [inch] | |
| Z581 | 42 | Angled CS screw | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| Z530 | 6 | CS horizontal screws | 15 | 0.59 | **240** | 9.45 | 225 | 8.86 | **8** | 0.31 | Torx 40 |
| Z581 | 10 | CS horizontal screws | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| **Screw connection on hardwood** | | | | | | | | | | | |
| Z670/Z675 | 58 | ASSY CS screws for hardwoods | 15 | 0.59 | **160** | 9.45 | 141 | 5.55 | **8** | 0.31 | Torx 40 |

**Application:** for positioning screws and diagonal screws as well as assembling the clamping jaw of the MEGANT®.

# MEGANT® 310/150/50

## Technical details

Art.-No.K197

(Dimensions in mm)

### MEGANT® 150 - load capacities with 8x160 screws, timber quality GL24h

| MEGANT® | Min. secondary beam height [mm] | Characteristic values [kN] | | | |
|---|---|---|---|---|---|
| | | max $F_{1,Rk}$ | max $F_{2,Rk}$ | max $F_{3,Rk}$ | max $F_{45,Rk}$ |
| 310x150x50 | 190x440 | 43,0 | 156,0 | 61,6 | 57,6 |

The full range of resistance values can be found online on our website.
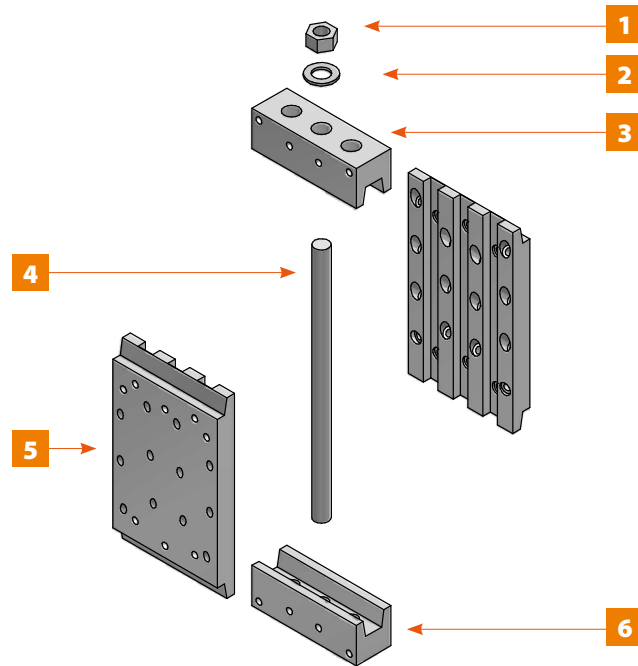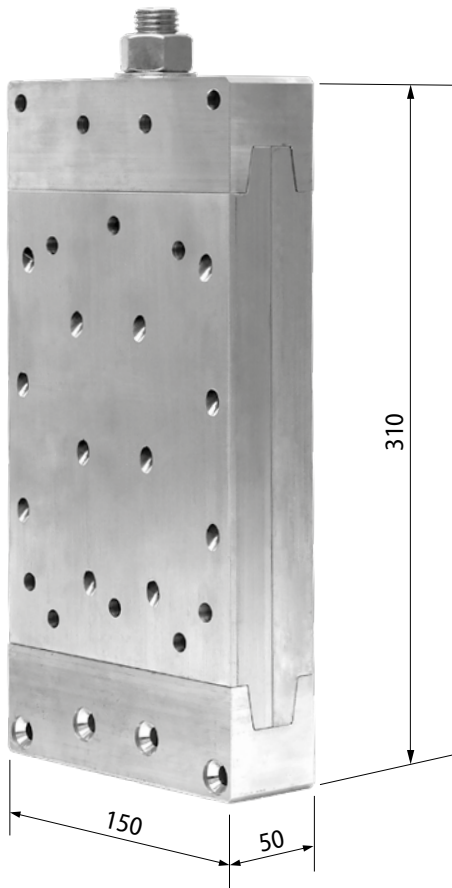


| Pos. | Description | Pos. | Description |
|---|---|---|---|
| 1 | 1-2 hexagonal nut(s) M20 | 4 | 1-2 threaded rods M20x340 |
| 2 | 1-2 washers M20 | 5 | 2 connector plates 250x150x25 |
| 3 | 1 top clamping jaw (without thread) 150x50x50 | 6 | 1 bottom clamping jaw (with thread) 150x50x50 |

# Vis MEGANT®

## MEGANT® self-tapping CS-screw (corresponding CS-screws are included with MEGANT®)
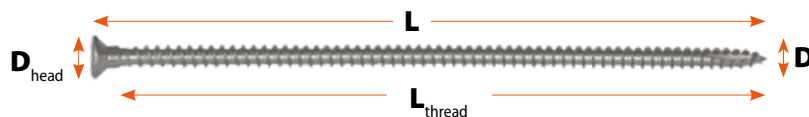


| Art.-No. | Quantity | Type | $D_{head}$ | | L | | $L_{thread}$ | | D | | Bits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | mm | [inch] | mm | [inch] | mm | [inch] | mm | [inch] | |
| Z581 | 24 | Angled CS screw | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| Z530 | 12 | CS horizontal screws | 15 | 0.59 | **240** | 9.45 | 225 | 8.86 | **8** | 0.31 | Torx 40 |
| Z581 | 12 | CS horizontal screws | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| **Screw connection on hardwood** | | | | | | | | | | | |
| Z670/Z675 | 48 | ASSY CS screws for hardwoods | 15 | 0.59 | **160** | 9.45 | 141 | 5.55 | **8** | 0.31 | Torx 40 |

**Application:** for positioning screws and diagonal screws as well as assembling the clamping jaw of the MEGANT®.

# MEGANT® 430/150/50

## Technical details

Art.-No.K220

(Dimensions in mm)

**MEGANT® 150 - load capacities with 8x160 screws, timber quality GL24h**

| MEGANT® | Min. secondary beam height [mm] | Characteristic values [kN] | | | |
|---|---|---|---|---|---|
| | | max $F_{1,Rk}$ | max $F_{2,Rk}$ | max $F_{3,Rk}$ | max $F_{45,Rk}$ |
| 430x150x50 | 190x520 | 43,0 | 260,0 | 80,8 | 74,8 |

The full range of resistance values can be found online on our website.
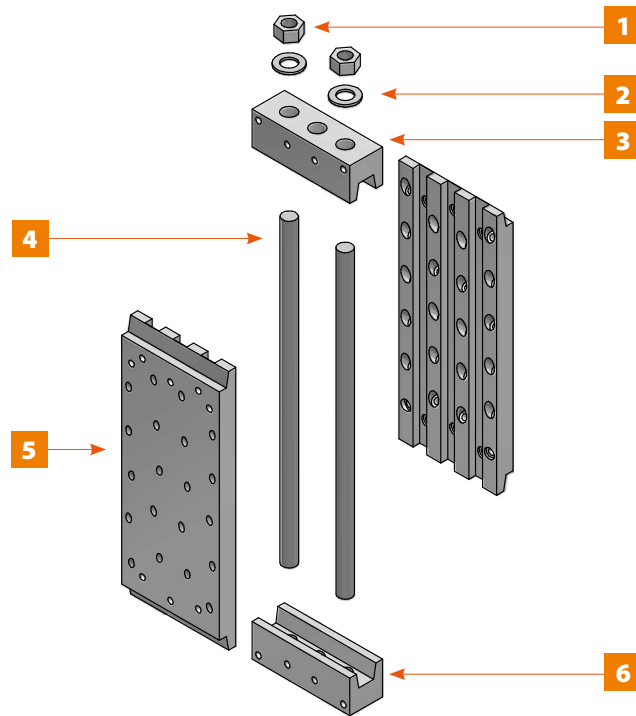


| Pos. | Description | Pos. | Description |
|---|---|---|---|
| 1 | 2-3 hexagonal nuts M20 | 4 | 2-3 threaded rods M20x460 |
| 2 | 2-3 washers M20 | 5 | 2 connector plates 370x150x25 |
| 3 | 1 top clamping jaw (without thread) 150x50x50 | 6 | 1 bottom clamping jaw (with thread) 150x50x50 |

# Vis MEGANT®

## MEGANT® self-tapping CS-screw (corresponding CS-screws are included with MEGANT®)
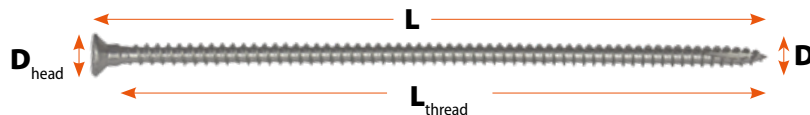


| Art.-No. | Quantity | Type | $D_{head}$ | | L | | $L_{thread}$ | | D | | Bits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | mm | [inch] | mm | [inch] | mm | [inch] | mm | [inch] | |
| Z581 | 40 | Angled CS screw | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| Z530 | 12 | CS horizontal screws | 15 | 0.59 | **240** | 9.45 | 225 | 8.86 | **8** | 0.31 | Torx 40 |
| Z581 | 12 | CS horizontal screws | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| **Screw connection on hardwood** | | | | | | | | | | | |
| Z670/Z675 | 64 | ASSY CS screws for hardwoods | 15 | 0.59 | **160** | 9.45 | 141 | 5.55 | **8** | 0.31 | Torx 40 |

**Application:** for positioning screws and diagonal screws as well as assembling the clamping jaw of the MEGANT®.

# MEGANT® 550/150/50

Art.-No.K221

(Dimensions in mm)
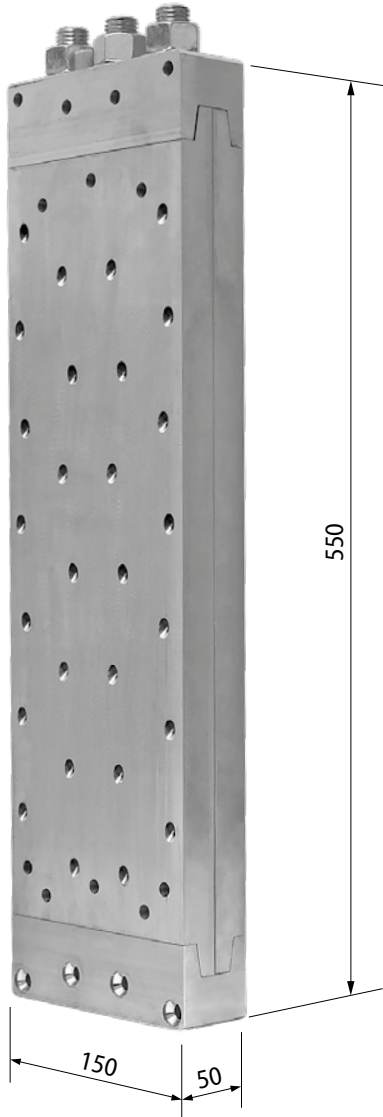
**MEGANT® 150 - load capacities with 8x160 screws, timber quality GL24h**

| MEGANT® | Min. secondary beam height [mm] | Characteristic values [kN] | | | |
|---|---|---|---|---|---|
| | | max $F_{1,Rk}$ | max $F_{2,Rk}$ | max $F_{3,Rk}$ | max $F_{45,Rk}$ |
| 550x150x50 | 190x640 | 43,0 | 364,0 | 100,0 | 81,6 |

The full range of resistance values can be found online on our website.
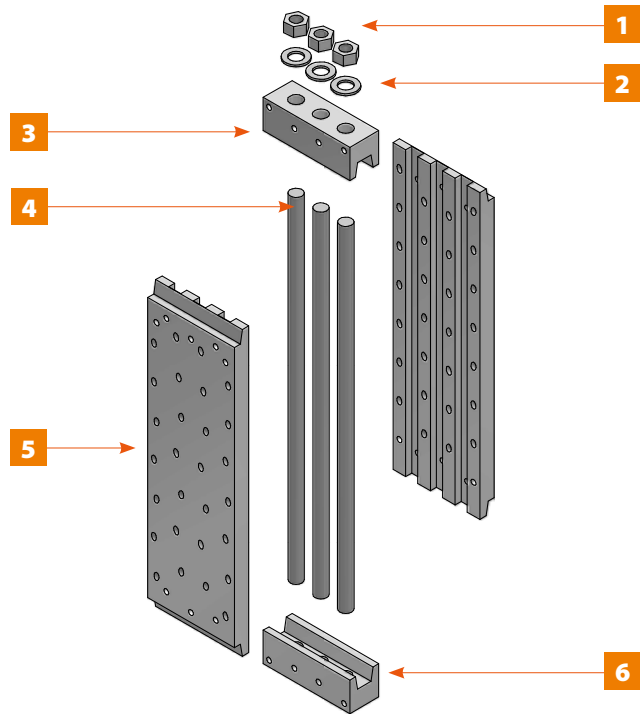


| Pos. | Description | Pos. | Description |
|---|---|---|---|
| 1 | 3 hexagonal nuts M20 | 4 | 3 threaded rods M20x580 |
| 2 | 3 washers M20 | 5 | 2 connector plates 490x150x25 |
| 3 | 1 top clamping jaw (without thread) 150x50x50 | 6 | 1 bottom clamping jaw (with thread) 150x50x50 |

# Vis MEGANT®

**MEGANT® self-tapping CS-screw (corresponding CS-screws are included with MEGANT®)**
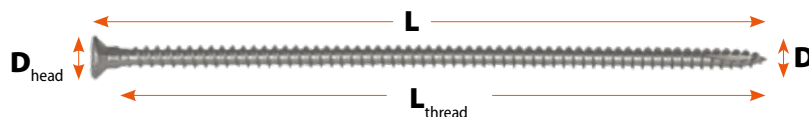


| Art.-No. | Quantity | Type | $D_{head}$ | | L | | $L_{thread}$ | | D | | Bits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | mm | [inch] | mm | [inch] | mm | [inch] | mm | [inch] | |
| Z581 | 56 | Angled CS screw | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| Z530 | 12 | CS horizontal screws | 15 | 0.59 | **240** | 9.45 | 225 | 8.86 | **8** | 0.31 | Torx 40 |
| Z581 | 12 | CS horizontal screws | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| **Screw connection on hardwood** | | | | | | | | | | | |
| Z670/Z675 | 80 | ASSY CS screws for hardwoods | 15 | 0.59 | **160** | 9.45 | 141 | 5.55 | **8** | 0.31 | Torx 40 |

**Application:** for positioning screws and diagonal screws as well as assembling the clamping jaw of the MEGANT®.
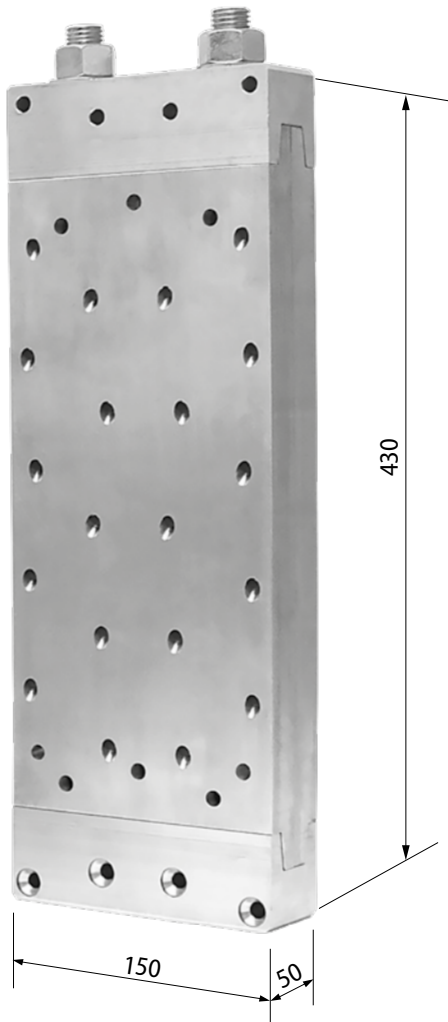
# MEGANT® 610/150/50

## Technical details

Art.-No. K180

(Dimensions in mm)

**MEGANT® 150** load capacities with **8x160** screws, timber quality **GL24h**

| MEGANT® | Min. secondary beam height [mm] | Characteristic values [kN] | | | |
|---|---|---|---|---|---|
| | | max $F_{1,Rk}$ | max $F_{2,Rk}$ | max $F_{3,Rk}$ | max $F_{45,Rk}$ |
| 610x150x50 | 190x710 | 43,0 | 416 | 100,0 | 81,6 |

The full range of resistance values can be found online on our website.

610

150     50
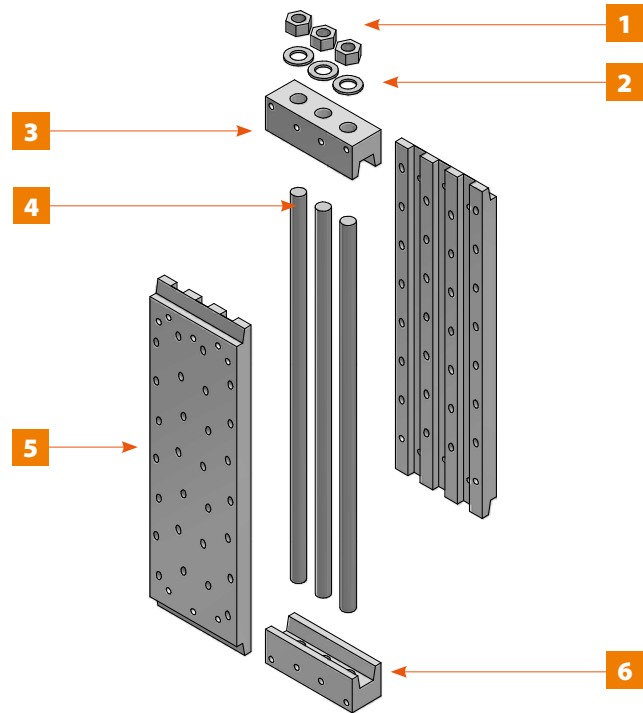
| Pos. | Description | Pos. | Description |
|---|---|---|---|
| 1 | 3 hexagonal nuts M20 | 4 | 3 threaded rods M20x640 |
| 2 | 3 washers M 20 | 5 | 2 connector plates 550x150x25 |
| 3 | 1 top clamping jaw (without thread) 150x50x50 | 6 | 1 bottom clamping jaw (with thread) 150x50x50 |

# MEGANT® screws

## MEGANT® self-tapping CS-screw (corresponding CS-screws are included with MEGANT®)
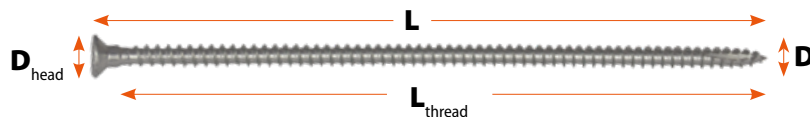
$L$     $D_{head}$     $D$     $L_{thread}$

| Art.-No. | Quantity | Type | $D_{head}$ | | L | | $L_{thread}$ | | D | | Bits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | mm | [inch] | mm | [inch] | mm | [inch] | mm | [inch] | |
| Z581 | 64 | Angled CS screw | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| Z530 | 12 | CS horizontal screws | 15 | 0.59 | **240** | 9.45 | 225 | 8.86 | **8** | 0.31 | Torx 40 |
| Z581 | 12 | CS horizontal screws | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| **Screw connection on hardwood** | | | | | | | | | | | |
| Z670/Z675 | 88 | ASSY CS screws for hardwoods | 15 | 0.59 | **160** | 6.30 | 141 | 5.55 | **8** | 0.31 | Torx 40 |

**Application:** for positioning screws and diagonal screws as well as assembling the clamping jaw of the MEGANT®.

# MEGANT® 730/150/50

## Technical details

Art.-No.K251

(Dimensions in mm)
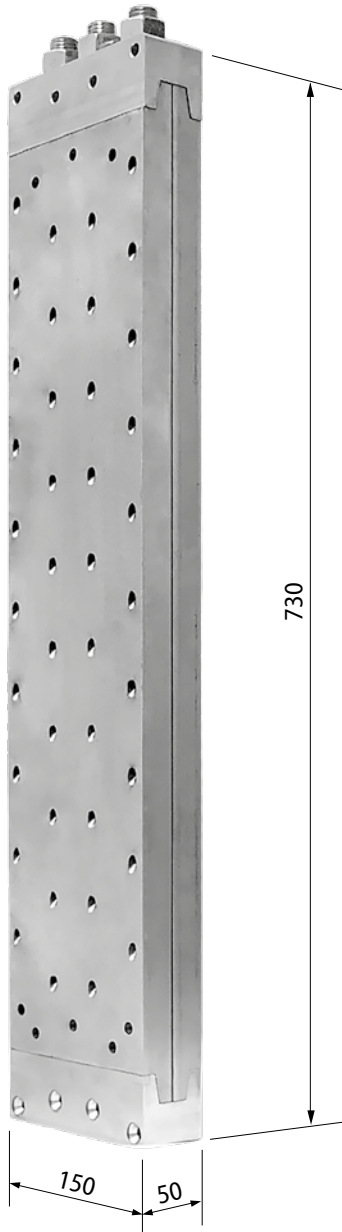
**MEGANT® 150 - load capacities with 8x160 screws, timber quality GL24h**

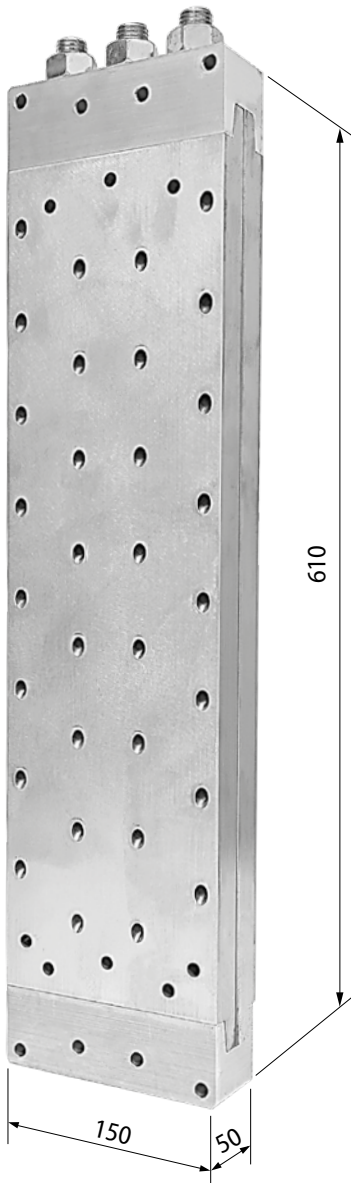| MEGANT® | Min. secondary beam height [mm] | Characteristic values [kN] | | | |
|---|---|---|---|---|---|
| | | max $F_{1,Rk}$ | max $F_{2,Rk}$ | max $F_{3,Rk}$ | max $F_{45,Rk}$ |
| 730x150x50 | 190x830 | 43,0 | 443,2 | 100,0 | 81,6 |

The full range of resistance values can be found online on our website.
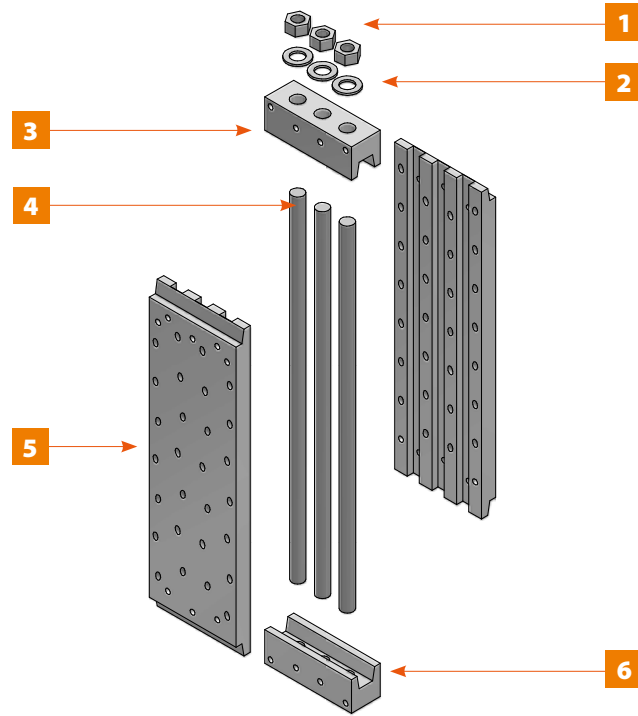


| Pos. | Description | Pos. | Description |
|---|---|---|---|
| 1 | 3 hexagonal nuts M20 | 4 | 3 threaded rods M20x760 |
| 2 | 3 washers M20 | 5 | 2 connector plates 670x150x25 |
| 3 | 1 top clamping jaw (without thread) 150x50x50 | 6 | 1 bottom clamping jaw (with thread) 150x50x50 |

# Vis MEGANT®

**MEGANT® self-tapping CS-screw (corresponding CS-screws are included with MEGANT®)**
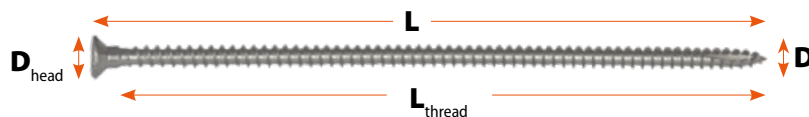


| Art.-No. | Quantity | Type | $D_{head}$ | | L | | $L_{thread}$ | | D | | Bits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | mm | [inch] | mm | [inch] | mm | [inch] | mm | [inch] | |
| Z581 | 80 | Angled CS screw | 15 | 0.59 | 160 | 6.30 | 145 | 5.70 | 8 | 0.31 | Torx 40 |
| Z530 | 12 | CS horizontal screws | 15 | 0.59 | 240 | 9.45 | 225 | 8.86 | 8 | 0.31 | Torx 40 |
| Z581 | 12 | CS horizontal screws | 15 | 0.59 | 160 | 6.30 | 145 | 5.70 | 8 | 0.31 | Torx 40 |
| **Screw connection on hardwood** | | | | | | | | | | | |
| Z670/Z675 | 104 | ASSY CS screws for hardwoods | 15 | 0.59 | 160 | 9.45 | 141 | 5.55 | 8 | 0.31 | Torx 40 |

**Application:** for positioning screws and diagonal screws as well as assembling the clamping jaw of the MEGANT®.

# MEGANT® 1030/150/50 SL
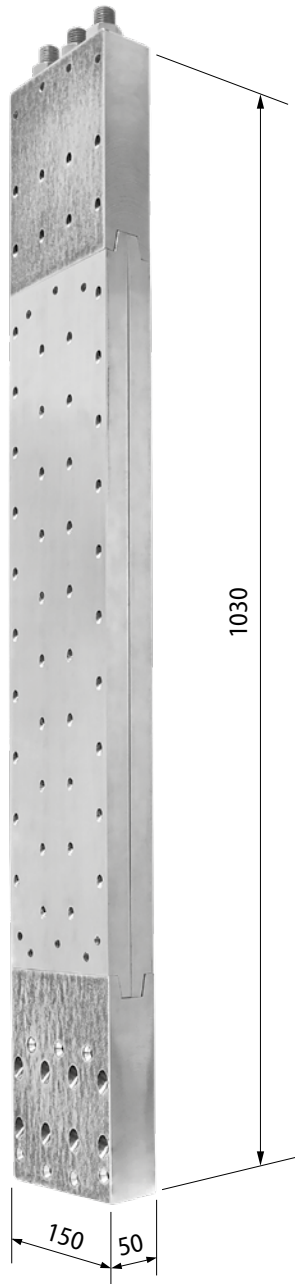
Art.-No.K180

(Dimensions in mm)

**1030**

**150**  **50**

### MEGANT® 150 - load capacities with 8x160 screws, timber quality GL24h

| MEGANT® | Min. secondary beam height [mm] | Characteristic values [kN] | | | |
|---|---|---|---|---|---|
| | | max $F_{1,Rk}$ | max $F_{2,Rk}$ | max $F_{3,Rk}$ | max $F_{45,Rk}$ |
| 1030x150x50 SL* | 190x1130 | 43,0 | 604,0* | 100,0 | 81,6 |
| 1030x150x50 SL** | 190x1130 | 43,0 | 768,0** | 100,0 | 81,6 |

\*   MEGANT® 1030x150x50, calculated with angled screws 8x160 and horizontal screws 8x240/8x160 on GL24h
\** MEGANT® 1030x150x50, calculated with 8x240 slant screws and 8x240/8x160 horizontal screws on GL24h

The full range of resistance values can be found online on our website.
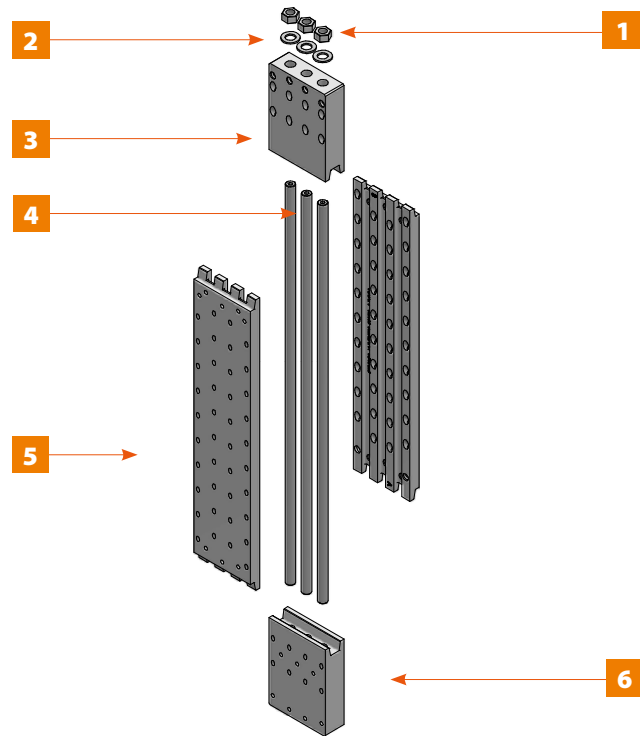


| Pos. | Description | Pos. | Description |
|---|---|---|---|
| 1 | 3 hexagonal nuts M20 | 4 | 3 threaded rods M20x920 |
| 2 | 3 washers M20 | 5 | 2 connector plates 670x150x25 |
| 3 | 1 top clamping jaw (without thread) 150x200x50 | 6 | 1 bottom clamping jaw (with thread) 150x200x50 |

# Vis MEGANT®
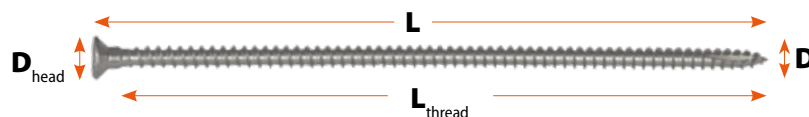
| Art.-No. | Quantity | Type | $D_{head}$ | | L | | $L_{thread}$ | | D | | Bits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | mm | [inch] | mm | [inch] | mm | [inch] | mm | [inch] | |
| Z581 | 96 | Angled CS screw | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| Z530 | 12 | CS horizontal screws | 15 | 0.59 | **240** | 9.45 | 225 | 8.86 | **8** | 0.31 | Torx 40 |
| Z581 | 15 | CS horizontal screws | 15 | 0.59 | **160** | 6.30 | 145 | 5.70 | **8** | 0.31 | Torx 40 |
| **Screw connection on hardwood** | | | | | | | | | | | |
| Z670/Z675 | 123 | ASSY CS screws for hardwoods | 15 | 0.59 | **160** | 9.45 | 141 | 5.55 | **8** | 0.31 | Torx 40 |

**Application:** for positioning screws and diagonal screws as well as assembling the clamping jaw of the MEGANT®.

# Timber wall connector

## Connecting timber frame constructions up to 10,8 kN*

I Timber width from 60 mm

I High level of prefabrication

I Simple and easy – the wall panels are plugged together,

I Self-tightening, stable and invisible – the structure is stable from the first corner onwards

I Wood frame and plywood board walls frictionally interconnected

**WALCO®Z**

**Available in 2 sizes.**

**Design values are available on our website under Planer Service.**

\* Characteristic value $F_{2,Rk}$ in slide-in direction, valid only with the use of original KNAPP® CS screws 10x60 mm, on C24 according to ETA 10/0189 (2022/08/25).

**KNAPP®**
connectors.com

Ausbildungszentrum Bühl © Isocell

Installation example: WALCO® Z40 mounted on the wall with double-sided element seals.

# WALCO® Z40

▐ **Applications: concealed wall connectors in timber frame and wood panels**

▐ **Connections: solid woods, derived timber products e.g. CLT**

▐ **Areas of application: timber frame and timber panel construction, and CLT walls, and buildings**

▐ **Service class 1 and 2**
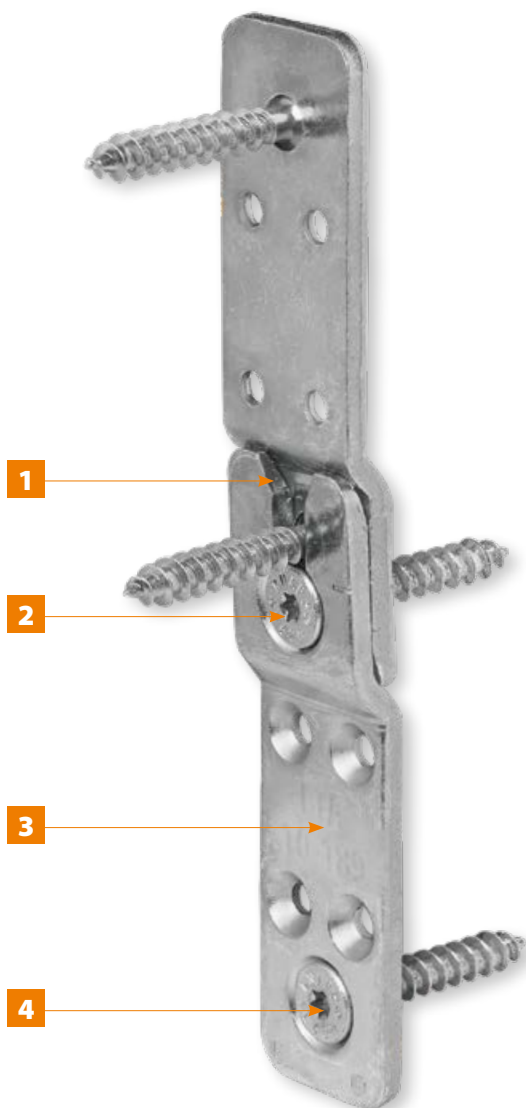
**1** The stop bevels and the guiding slot for the KNAPP® CS retaining screws bring the connector parts into position and on tension.

**2** The KNAPP® CS-retaining screw allows for adjustments to the compression of joints.

**3** WALCO® Z40 consists of two identical connector parts and is made of high quality steel in Austria.

**4** The Ø 10 mm CS-screws with integrated drilling tip enable rapid fastening with screws; the reinforced shaft provides friction-locked connection.

Fire rating: Fire resistance (EN 1995-1-2) through 3-4 sided concealed, joint-tight installation (R30 ≥ 28 mm, R60 ≥ 49 mm)

AUSTRIA

ETA    ETA-10/0189 (2022/08/25)

C E

**WALCO Z**

# WALCO® Z40

## Application examples and connection details

### Timber frame construction

(Dimensions in mm)

A

C

B

Meeting room

Office 2

D

E

Workshop/ Warehouse

Office 1

Lobby

A

### Precast walls with CLT walls

**Detail A₃ :**
CLT exterior wall corner

CLT wall

Insulation and plastering

WALCO® Z40
2 CS-screws 10x60
2 CS-screws 10x80

WALCO® Z40 :
W ≥ 95 mm
D = 15 mm

**Detail C :**
CLT exterior and interior wall connection

Interior CLT wall joint

WALCO® Z40 :
W ≥ 80 mm

Exterior CLT wall joint

WALCO® Z40
4 CS-screws 10x80

**Detail E :**
CLT wall mitre connection

WALCO® Z40 :
W ≥ 60 mm

WALCO® Z40
4 CS-screws 10x80

135°

CLT double side planked wall

**Detail A₁ :**
Timber frame exterior wall corner

40

WALCO® Z40

WALCO® Z40 :
W ≥ 60 mm
D = 15 mm
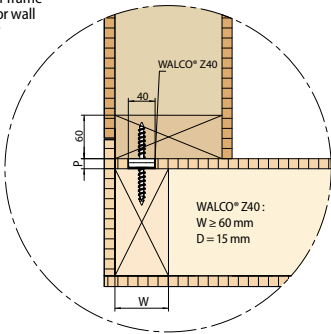
**Detail A₂ :**
Timber frame exterior wall corner

40

WALCO® Z40

WALCO® Z40 :
W ≥ 60 mm
D = 15 mm

L
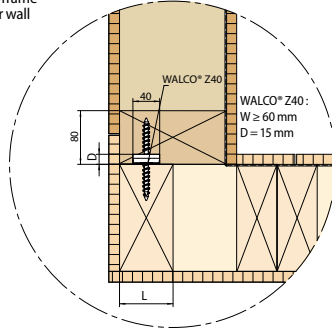
**Detail B :**
Timber frame exterior wall column connection

Column

WALCO® Z40 with
2 CS-screws 10x60 mm

Timber panel wall

WALCO® Z40 :
W ≥ 60 mm
D ≤ 20 mm

W    W
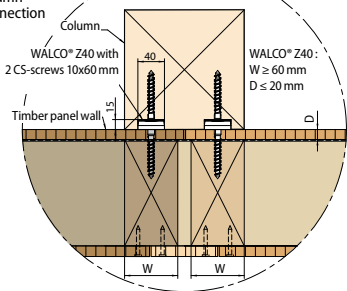
**Detail C :**
Timber frame exterior and interior wall connection

Timber panel construction-internal wall

Timber panel construction external wall

WALCO® Z40

WALCO® Z40 :
W ≥ 60 mm
D = 15 mm

L

**Detail B :**
CLT exterior wall column connection

Column

WALCO® Z40

Exterior CLT wall

WALCO® Z40 :
L ≥ 60 mm
D ≥ 60 mm
Wood-based panel layer
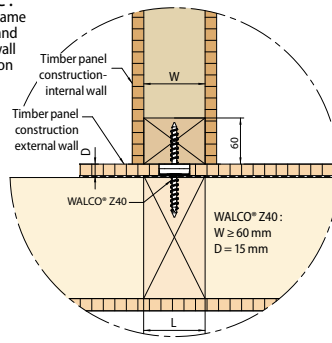
**Detail D :**
Timber frame interior wall connection

W

60

WALCO® Z40

80

W

WALCO® Z40 :
W ≥ 60 mm
D = 15 mm
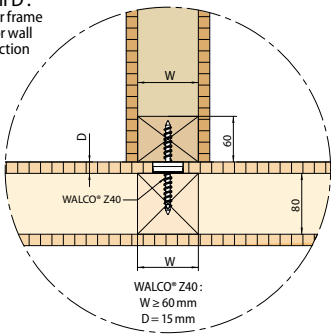
**Detail E :**
Timber frame wall mitre connection

WALCO® Z40 :
W ≥ 60 mm

60

80

40

135°

W
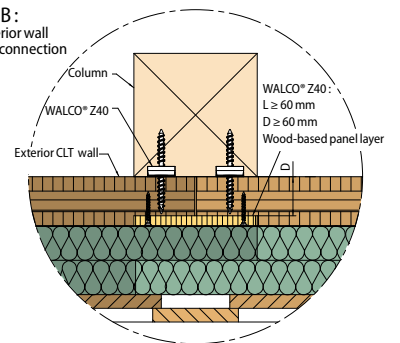
WALCO® Z40

**Detail D :**
CLT interior wall connection

W

40

Interior CLT side planked wall

WALCO® Z40
4 CS-screws 10x60

15

W

WALCO® Z40 :
W ≥ 60 mm
D= 15 mm
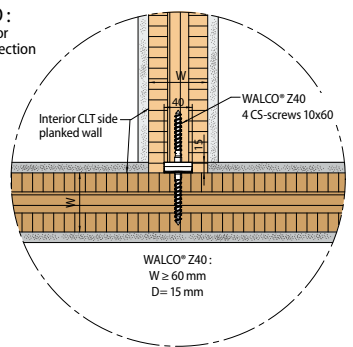
# WALCO® Z40

## WALCO® Z40 - Partial screw connection
Art.-No. K072

(Dimensions in mm)

| Screw connection | |
|---|---|
| Wall 1 | Wall 2 |
| 2x CS 10x60 mm | 2x CS 10x60 mm |

Full screw connection :
8x 6 x 50 mm

Minimum timber cross section:
L. x Ep. = 60 x 60 mm

## WALCO® Z40 - Full screw connection
Art.-No. K072

## Tensile values*

### Characteristic tensile values $F_{1,Rk}$ [kN] for timber grade C24 and above

| Connector | Minimum timber cross section [mm] | No interlayer | | OSB ≤ 22 mm** | | Plasterboard ≤ 22 mm*** | |
|---|---|---|---|---|---|---|---|
| | | Partial screw connection | Full screw connection | Partial screw connection | Full screw connection | Partial screw connection | Full screw connection |
| WALCO® Z40 | Internal wall : 60x60 External wall : 100x60 | 4,73 | 4,73 | 4,73 | 4,73 | 4,73 | 4,73 |
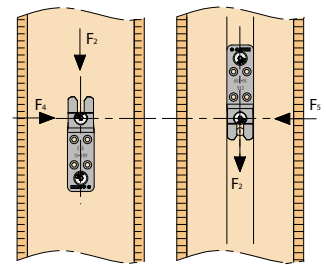
### Characteristic shear values in the direction of insertion $F_{2,Rk}$ [kN] for timber grade C24 and above

| Connector | Minimum timber cross section [mm] | No interlayer | | OSB ≤ 22 mm** | | Plasterboard ≤ 22 mm*** | |
|---|---|---|---|---|---|---|---|
| | | Partial screw connection | Full screw connection | Partial screw connection | Full screw connection | Partial screw connection | Full screw connection |
| WALCO® Z40 | Internal wall : 60x60 External wall : 100x60 | 10,8 | 10,8 | 10,8 | 10,8 | 7,60 | 10,8 |

### Characteristic shear values perpendicular to the direction of insertion $F_{45,Rk}$ [kN] for timber grade C24 and above

| Connector | Minimum timber cross section [mm] | No interlayer | | OSB ≤ 22 mm** | | Plasterboard ≤ 22 mm*** | |
|---|---|---|---|---|---|---|---|
| | | Partial screw connection | Full screw connection | Partial screw connection | Full screw connection | Partial screw connection | Full screw connection |
| WALCO® Z40 | Internal wall : 60x60 External wall : 100x60 | 4,41 | 4,41 | 4,41 | 4,41 | 3,14 | 3,93 |

### Values of $K_{mod}$

| Serv. class | LDC* | GLT | OSB/3 OSB/4 | Plaster board |
|---|---|---|---|---|
| 1 | Permanent | 0,6 | 0,4 | 0,2 |
| | Long | 0,7 | 0,5 | 0,4 |
| | Medium | 0,8 | 0,7 | 0,6 |
| | Short | 0,9 | 0,9 | 0,8 |
| | Very short to short | 1,0 | 1,0 | 0,95 |
| | Very short | 1,1 | 1,1 | 1,1 |
| | $\gamma_M$ | 1,3 | 1,3 | 1,3 |

* Load Duration Class

\* The load capacity values $F_{1,Rk}$ ; $F_{2,Rk}$ and $F_{45,Rk}$ have been updated according to the expert report of 30.06.2021, in connection with ETA-10/0189 (2019/10/11).
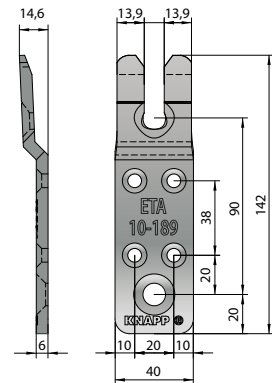\** OSB/3 or OSB/4 - thickness up to 22 mm according to EN 300 or ETA
\*** Plasterboard - thickness up to 22 mm according to EN 15283-2 or ETA
For the determination of $F_{45,Rd}$ when fixing to intermediate materials, the $k_{mod}$ and $\gamma_M$ factors of the materials are to be taken into account.

## KNAPP® CS-screws (WALCO® Z40 will be supplied with the corresponding CS-screws)

| Art.-No. Z638 | CS-screw 6x50 with drill point (according to ETA 12-0276) |
|---|---|
| Art.-No. Z639 | CS-screw 6x70 with drill point (according to ETA 12-0276) |

**Application:** for fixing the connector parts into the studs.

| Art.-No. Z519 | KNAPP® CS-screw 10x60 with drill point and reinforced shank |
|---|---|

**Application:** for fixing the connector parts into the studs.

| Art.-No. Z523 | KNAPP® CS-screw 10x80 with drill point and reinforced shank |
|---|---|

**Application:** When screwing through wood-based panels and cross-laminated timber walls (detail B page 111).

## Drilling-template WALCO® Z (Aluminium)

| Art.-No. K466 | Drilling-template WALCO® Z40 |
|---|---|
| Art.-No. K486 | Drilling-template WALCO® Z32 |

**Application:** for pre-drilling of screw holes.

Franck PAUBEL © Maison booa

# WALCO® Z32

I **Connector for narrow wall joints (32 mm, 1.26 inches) in timber frame, timber panel construction, posts and beams, and cross laminated timber walls (e.g. 38 x 89 mm or 2x4 inches)**
I **Service class 1 and 2**
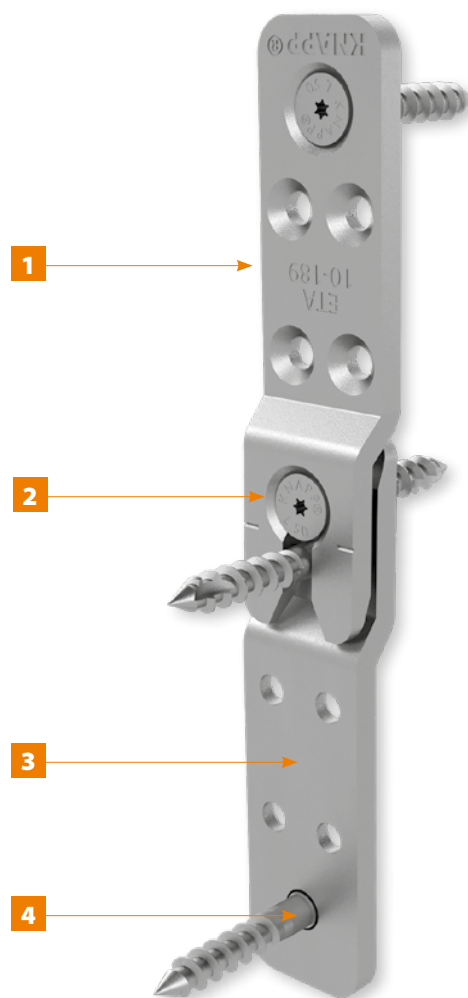
**1** The stop bevels and the guiding slot for the KNAPP® SC retaining screws bring the connector parts into position and on tension.

**2** The KNAPP® CS-retaining screw allows for adjustments to the compression of joints.

**3** WALCO® Z32 consists of two identical connector parts and is made in Austria in high-quality steel.

**4** The Ø 8 mm CS-screws with integrated drilling tip enable rapid fastening with screws; the reinforced shaft provides friction-locked connection.

Fire rating: Fire resistance (EN 1995-1-2)
through 3-4 sided concealed, joint-tight installation
(R30 ≥ 28 mm, R60 ≥ 49 mm)

# WALCO® Z32

## WALCO® Z32 - Partial screw connection
Art.-No. K168

## WALCO® Z32 - Full screw connection
Art.-No. K168

| Screw connection | |
| --- | --- |
| Mur 1 | Mur 2 |
| 2x TF 8x50 mm | 2x TF 8x50 mm |

Full screw connection :
8x 5x 50 mm

Minimum timber cross section:
L. x Ep. = 2 x 4 Inch
(50 x 100 mm)

## Examples and connection details
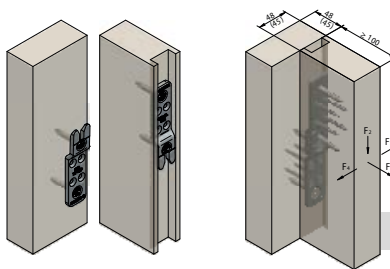
Corner connection

Straight connection

## Tensile values*

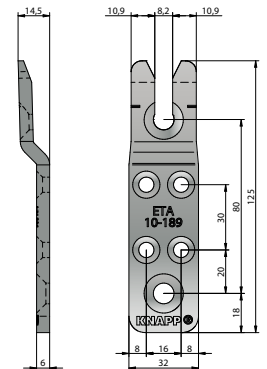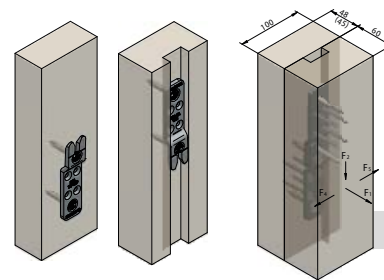| | | Characteristic tensile values $F_{1,Rk}$ [kN] for timber grade C24 and above | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Connector | Minimum timber cross section [mm] | No interlayer | | OSB ≤ 22 mm** | | Plasterboard ≤ 22 mm*** | |
| | | Partial screw connection | Full screw connection | Partial screw connection | Full screw connection | Partial screw connection | Full screw connection |
| WALCO® Z32 | Internal wall : 60x60 External wall : 100x60 | 3,64 | 3,64 | 3,64 | 3,64 | 3,64 | 3,64 |

| | | Characteristic resistance in the direction of insertion $F_{2,Rk}$ [kN] for timber grade C24 and above | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Connector | Minimum timber cross section [mm] | No interlayer | | OSB ≤ 22 mm** | | Plasterboard ≤ 22 mm*** | |
| | | Partial screw connection | Full screw connection | Partial screw connection | Full screw connection | Partial screw connection | Full screw connection |
| WALCO® Z32 | Internal wall : 60x60 External wall : 100x60 | 8,20 | 9,0 | 8,56 | 9,0 | 5,96 | 9,0 |

| | | Characteristic resistance perpendicular to the direction of insertion $F_{45,Rk}$ [kN] for timber grade C24 and above | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Connector | Minimum timber cross section [mm] | No interlayer | | OSB ≤ 22 mm** | | Plasterboard ≤ 22 mm*** | |
| | | Partial screw connection | Full screw connection | Partial screw connection | Full screw connection | Partial screw connection | Full screw connection |
| WALCO® Z32 | Internal wall : 60x60 External wall : 100x60 | 3,39 | 3,76 | 3,70 | 3,76 | 2,52 | 3,12 |

| Value of $K_{mod}$ | | | | |
| --- | --- | --- | --- | --- |
| Serv. class | LDC* | GLT | OSB/3 OSB/4 | Plaster board |
| 1 | Permanent | 0,6 | 0,4 | 0,2 |
| | Long | 0,7 | 0,5 | 0,4 |
| | Medium | 0,8 | 0,7 | 0,6 |
| | Short | 0,9 | 0,9 | 0,8 |
| | Very short Short | 1,0 | 1,0 | 0,95 |
| | Very short | 1,1 | 1,1 | 1,1 |
| | $\gamma_M$ | 1,3 | 1,3 | 1,3 |
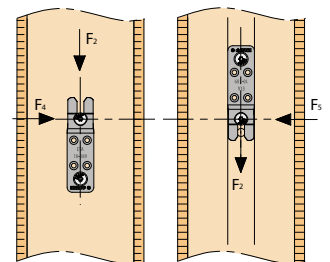
* Load Duration Class

* The load capacity values $F_{1,Rk}$; $F_{2,Rk}$ and $F_{45,Rk}$ have been updated according to the expert report of 30.06.2021, in connection with ETA-10/0189 (2019/10/11).
** OSB/3 or OSB/4 - thickness up to 22 mm according to EN 300 or ETA
*** Plasterboard - thickness up to 22 mm according to EN 15283-2 or ETA
For the determination of $F_{45,Rd}$ when fixing to intermediate materials, the $k_{mod}$ and $\gamma_M$ factors of the materials are to be taken into account.

## KNAPP® CS-screws (WALCO® Z40 will be supplied with the corresponding CS-screws)

Art.-No. Z533 and Z534    KNAPP® CS-screw 5x50 and 5x80 with drill point and reinforced shank

**Application:** for fixing the connector parts into the studs.

Art.-No. Z531    KNAPP® CS-screw 8x50 with drill point and reinforced shank

**Application:** fixing the connector parts into the studs.

Art.-No. Z532    KNAPP® CS-screw 8x80 with drill point and reinforced shank.

**Application:** When screwing through wood-based panels and cross-laminated timber walls (detail B page 111).

# Connecting systems for prefabricated walls

## Connecting timber frame constructions up to 16 kN*

I Timber width from 80 mm

I Fast and accurate assembly on site – fully prefabricated walls are assembled without any screwing or nailing

I Stable from the first wall corner

I Quick and easy assembly through the spacious V-shaped bracket

I Collar screw and collar bolt are screwed directly into the building component with or without intermediate layer

I Hanging of end walls and later insertion of intermediate walls

I Adjustment of joint spacings e.g. for gaskets

I No milling necessary for panel thicknesses 13/15 mm
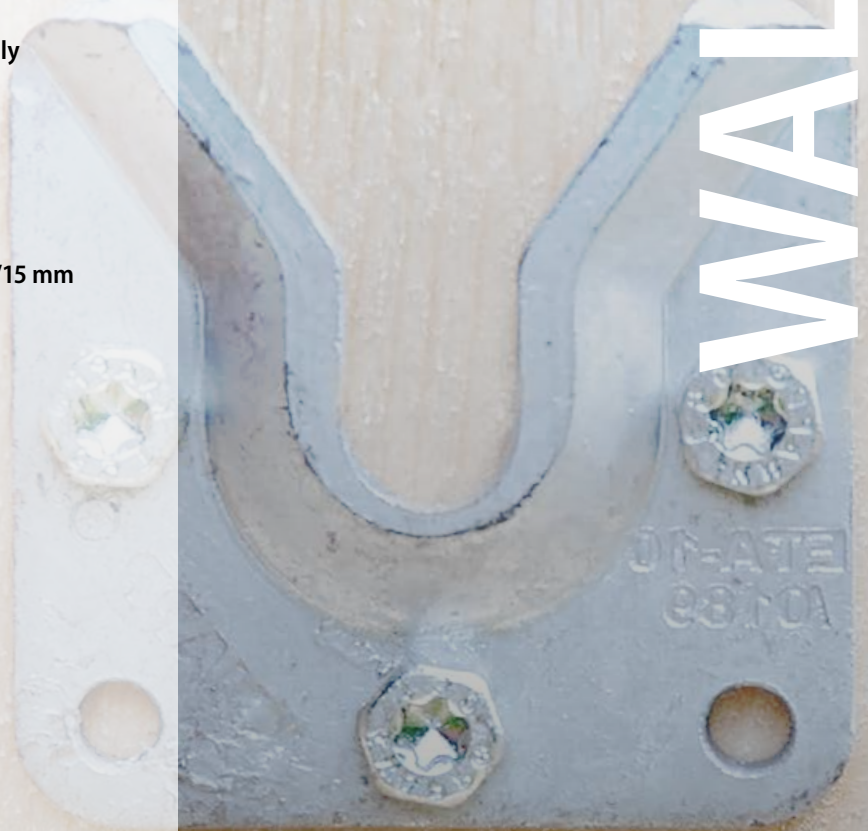
WALCO®V

**Available in 2 sizes and 5 versions.**

**Design values are available on our website under Planer Service.**

\* Characteristic value $F_{2,Rk}$ in slide-in direction, valid only with the use of original KNAPP® CS screws, on C24 according ETA 10/0189 (2022/08/25). Data refers to the use of 3 original KNAPP® hexagon head screws.

**KNAPP®**
connectors.com

Prutscher © Christian Schneider Photography
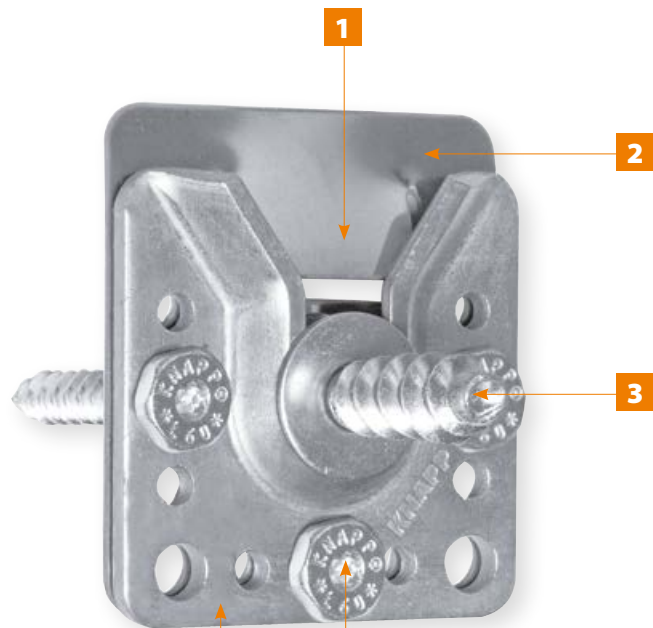
# WALCO® V

❙ **Applications: concealed wall connections**
❙ **Connections: solid wood, glulam, CLT, MAGNUMBOARD® OSB, steel and concrete**
❙ **Areas of application: timber frame construction and prefabricated house construction**
❙ **Service class 1 and 2**



**Installation example:** wall connection.

**1** The generous v-shaped bracket slides the holding screw into place.

**2** The WALCO® V locking clip (optional) made of stainless spring steel locks against the slide-in direction, thereby transferring the transmission of the anchor tensile force $Z_A$ from one wall to the next.

**3** The WALCO® V holding screw is the counter part to the connector. Available in 4 versions.

**4** WALCO® V hexagon head screws for screwing with Torx or hexagon nut.

**5** WALCO® V is made in Germany from high-quality hot-dip galvanised steel.

Fire protection: fire resistance (EN 1995-1-2) through 3-sided concealed, tight-joint mounting (R30 ≥ 28 mm, R60 ≥ 49 mm)

WALCO® V60

WALCO® V80

made in Germany

C E
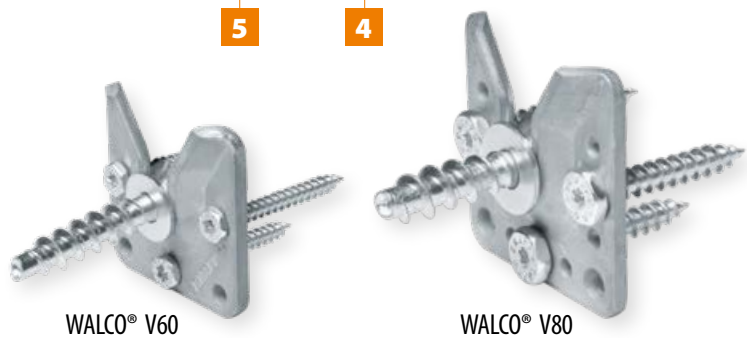
**ETA**  ETA-10/0189 (2022/08/25)

**WALCO V**

# WALCO® V60 and WALCO® V80

**Application examples and connection details**

(Dimensions in mm - W = WIDTH, t = THICKNESS)



**Detail A₁ :**
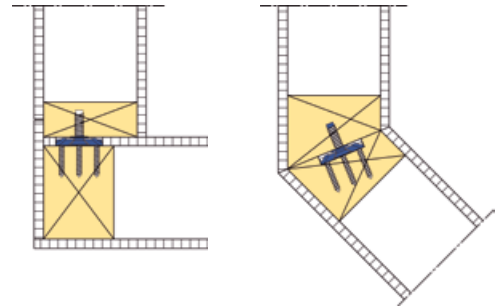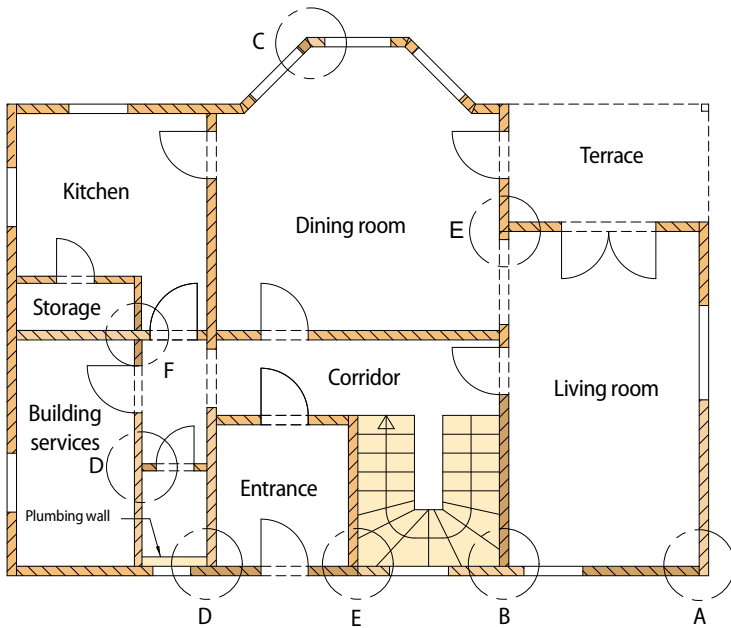External wall corner, planked with wood-based panel

WALCO® V and screwed collar bolt

WALCO® V60 :
W ≥ 80 mm
t = 13 mm
WALCO® V80 :
W ≥ 100 mm
t = 15 mm
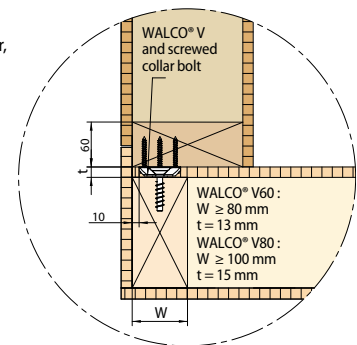
**Detail A₂ :**
Exterior wall corner with vapor barrier (PE- lm)

WALCO® V and holding screw with captive washer

WALCO® V60 :
W ≥ 80 mm
P = 13 mm
WALCO® V80 :
W ≥ 100 mm
P = 15 mm
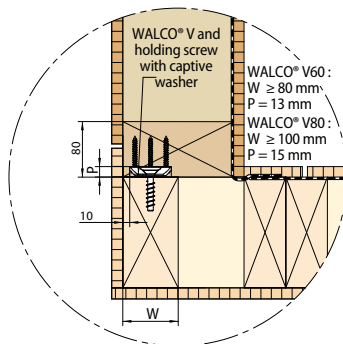
**Detail B :**
Connection of exterior with interior wall

WALCO® V and holding screw with captive washer

WALCO® V60 :
W ≥ 80 mm
t = 13 mm
WALCO® V80 :
W ≥ 100 mm
t = 15 mm
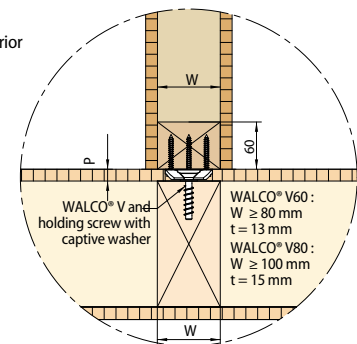
**Detail C :**
Exterior wall mitre joint

WALCO® V and holding screw with captive washer
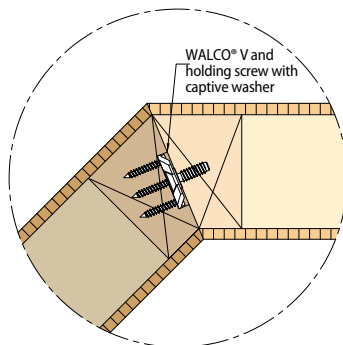
**Detail D :**
Interior wall connection (e. g. plumbing wall)

WALCO® V and spring retaining holding screw

WALCO® V60 :
W ≥ 80 mm t = 13 mm
WALCO® V80 :
W ≥ 100 mm
t = 15 mm
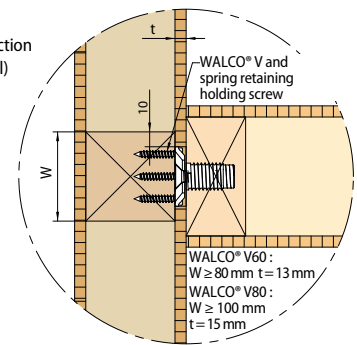
**Detail E :**
Straight joint for exterior or interior walls

WALCO® V and holding screw with captive washer

WALCO® V60 :
W ≥ 80 mm t = 13 mm
WALCO® V80 :
W ≥ 100 mm t = 15 mm
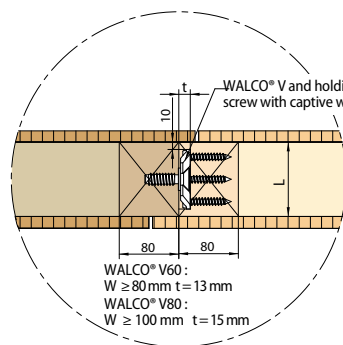
**Detail F :**
Internal wall double connection

WALCO® V and adjustable holding screw

WALCO® V80 :
t ≥ 15 mm (variable)
W ≥ 100 mm

WALCO® V60 :
t ≥ 13 mm (variable)
W ≥ 80 mm
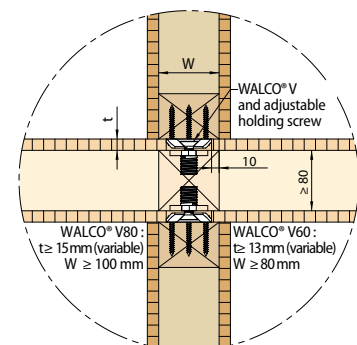
# WALCO® V60 and WALCO® V80

## Load-bearing capacities for WALCO® V with collar screw (KS)

| KNAPP® Connectors | Timber grade | Characteristic values | | | Design values $F_{1,Rd}$ [kN] | Design values $F_{2,Rd}$ [kN] | | Design values $F_{3,Rd}$ [kN] | Design values $F_{45,Rd}$ [kN] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | $k_{mod}$ [SC* 1+2] | $k_{mod}$ [SC* 1+2] | | $k_{mod}$ [SC* 1+2] | $k_{mod}$ [SC* 1+2] | |
| | | $F_{1,Rk}$ [kN] | $F_{2,Rk}$ [kN] | $F_{45,Rk}$ [kN] | 0,9 | 0,6 | 0,9 | 0,9 | 0,6 | 0,9 |
| WALCO® V60 KS | C24 | 6,49 | 5,94 | 3,88 | 4,49 | 2,74 | 4,11 | | 1,79 | 2,69 |
| | GL24h | 7,00 | 6,53 | 4,27 | 4,85 | 3,01 | 4,52 | 1,3 | 1,97 | 2,96 |
| | CLT | 6,93 | 6,45 | 4,22 | 4,80 | 2,98 | 4,47 | | 1,95 | 2,92 |
| WALCO® V80 KS | C24 | 7,08 | 7,10 | 4,46 | 4,90 | 3,28 | 4,92 | | 2,06 | 3,09 |
| | GL24h | 7,64 | 7,81 | 4,91 | 5,29 | 3,60 | 5,41 | 1,3 | 2,27 | 3,40 |
| | CLT | 7,56 | 7,71 | 4,85 | 5,23 | 3,56 | 5,34 | | 2,24 | 3,36 |

*SC = service class

$F_{1,Rd}$    Design values for tension
$F_{2,Rd}$    Design values in direction of insertion
$F_{3,Rd}$    Design values against the direction of insertion
$F_{45,Rd}$    Design values perpendicular to the direction of insertion

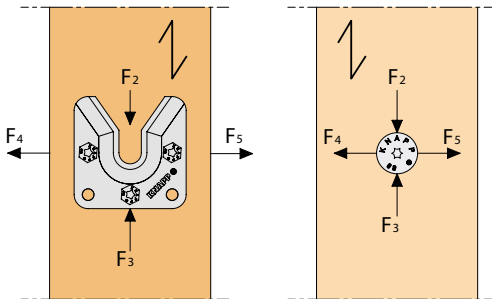$k_{mod}$    Modification factors depending on material, load duration and service class
$k_{mod}$ = 0,6 => Permanent (more than 10 years for example self weight)
$k_{mod}$ = 0,8 => Medium term (1 week - 6 months for example imposed floor load, snow load)
$k_{mod}$ = 0,9 => Short term (shorter than one week, for example snow- and wind load)



**The characteristic values and design values for each load direction on solid wood, glued laminated timber and other wood materials are available on our website under the Planner Service tab or on request.**

## Practical examples

The values listed below are given as an example and calculated according to EN 1991-1-4. The following table gives you recommendations regarding the wall length **W** in addition to the wind load wd and also the number of installed connectors. The wind load $w_d$=0,6 kN/m² to the designed wind load of German midland wind area 1 (impact pressure q = 0,5 kN/m², aerodynamics factor $c_{pe}$=0,8, v=102 km/h).
The listed wind loads are referring to the following wind areas:

$w_d$ = 1,0 kN/m² (q = 0,8 kN/m², $c_{pe}$ = 0,8, v = 129 km/h)
$w_d$ = 1,5 kN/m² (q = 1,25 kN/m², $c_{pe}$ = 0,8, v = 160 km/h)
$w_d$ = 1,9 kN/m² (q = 1,55 kN/m², $c_{pe}$ = 0,8, v = 179km/h) 18 m < H <= 25 m

Derivation: $w_d = \gamma Q \cdot c_{pe} \cdot q$  =  $\gamma Q$ = 1,5



Table 1: Wall width B in dependence of the number of connectors and wind load.
**We recommend min. 3 WALCO® V connectors for external wall corner.**

| Qty/joint | Connector | Max. length of wall B [m] | | | |
|---|---|---|---|---|---|
| | | Designed wind load [kN/m²] | | | |
| | | $w_d$ = 0,6 | $w_d$ = 1,0 | $w_d$ = 1,5 | $w_d$ = 1,9 |
| 3 | WALCO® V60 KS | 9,0 | 5,4 | 3,6 | 2,8 |
| 4 | | 12,0 | 7,2 | 4,8 | 3,8 |
| 5 | | 14,9 | 9,0 | 6,0 | 4,7 |
| 3 | WALCO® V80 KS | 10,3 | 6,2 | 4,1 | 3,3 |
| 4 | | 13,7 | 8,2 | 5,5 | 4,3 |
| 5 | | 17,2 | 10,3 | 6,9 | 5,4 |
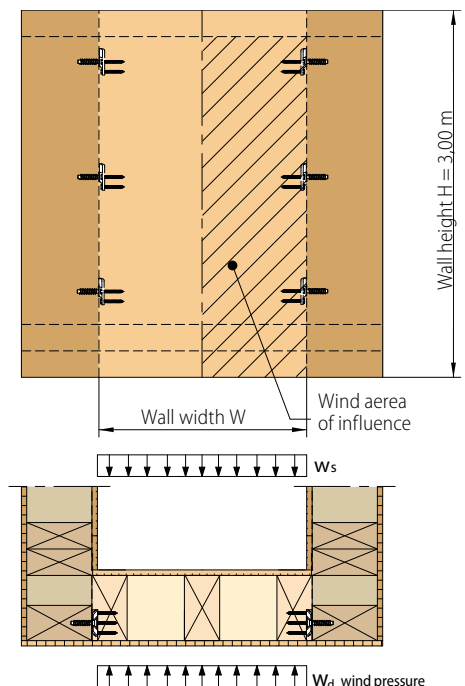
The graph shows the load directions and installation. Design values given in the table below should be used for structural analysis according to EC5 (EN 1995-1-1). The values listed below are given as examples and valid for Germany only!

# WALCO® V60 and WALCO® V80
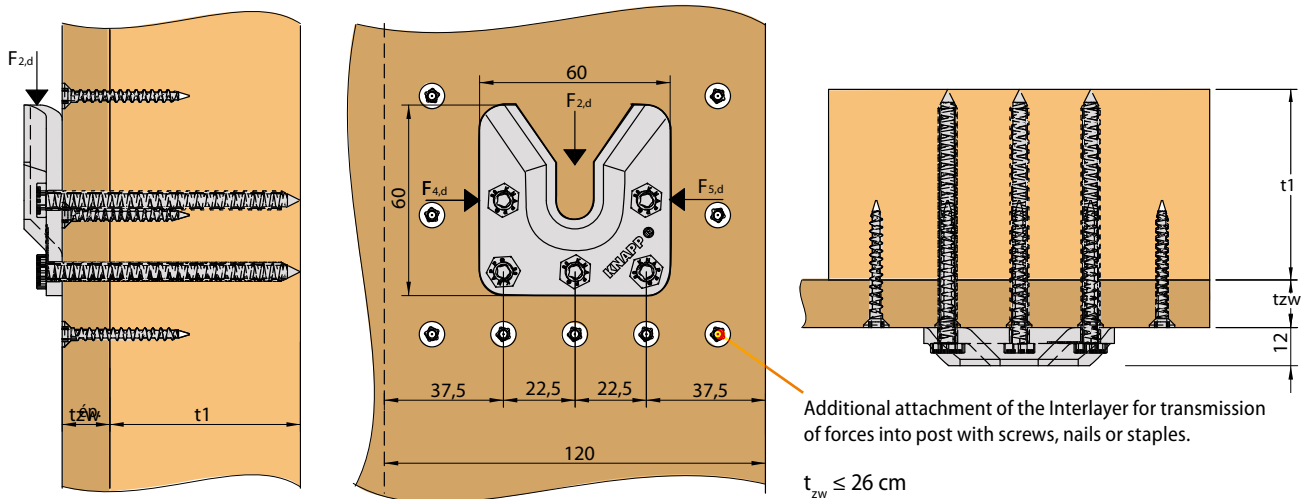
**Permissible load values with interlayer**

**WALCO® V directly to intermediate layer (cladding) attached:**

When fixing the WALCO® V connector to an intermediate layer, the design values listed below come into effect, these refere to the ETA-10/0189 and on the DIN 1995-1-1 (EC5). The values are subdivided into the different load duration classes (LDC) and the load directions. In addition, it should be noted that the intermediate layer is force-fitted to the timber stud with screws, nails or staples (see picture below).

| Thickness $t_{zw}$ [mm] | Interlayer/ Stud | WALCO® V60 with 5 screws 6x80 1 screw 12x60 | | | | WALCO® VV80 with 5 screws 10x80 1 screw 16x60 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Design values of load-bearing capacity $F_{Rd}$ [kN] | | | | Design values of load-bearing capacity $F_{Rd}$ [kN] | | | |
| | | $F_{2,Rd}$ [kN] [permanent] | $F_{2,Rd}$ [kN] [medium] | $F_{2,Rd}$ [kN] [short] | $F_{45,Rd}$ [kN] [short] | $F_{2,Rd}$ [kN] [permanent] | $F_{2,Rd}$ [kN] [medium] | $F_{2,Rd}$ [kN] [short] | $F_{45,Rd}$ [kN] [short] |
| 12 | Plasterboard / C24 | 1,4 | 2,8 | 3,4 | 2,7 | 2,1 | 4,2 | 4,9 | 3,1 |
| 15 | | 1,5 | 3,0 | 3,7 | | 2,3 | 4,4 | | |
| 12 | OSB Plate / C24 | 2,4 | 3,7 | 4,1 | 2,7 | 2,8 | 4,4 | 4,9 | 3,1 |
| 15 | | 2,2 | 3,7 | 4,1 | | 2,8 | 4,4 | | |
| 13 | Particleboard / C24 | 1,9 | 3,3 | 4,0 | 2,7 | 2,3 | 3,9 | 4,8 | 3,1 |
| 19 | | 1,8 | 3,1 | 3,8 | | 2,3 | 4,0 | | |
| 13 | Particleboard / C24 | 2,7 | 3,7 | 4,1 | 2,7 | 3,3 | 4,4 | 4,9 | 3,1 |
| 15 | | | | | | 3,3 | 4,4 | | |

**WALCO® V60**

(Dimensions in mm)



Additional attachment of the Interlayer for transmission of forces into post with screws, nails or staples.

$t_{zw} \leq 26$ cm

**WALCO® V80**

(Dimensions in mm)



Additional attachment of the Interlayer for transmission of forces into post with screws, nails or staples.

$t_{zw} \leq 26$ cm

# WALCO® V80

| KNAPP® Connector | Minimal wall thickness [mm] | Characteristic values of of load-bearing capacity $F_{Rk}$ on **MAGNUM**BOARD® OSB | | | | | |
|---|---|---|---|---|---|---|---|
| | | Tensile force $F_{1,Rk}$ [kN] | | Shear force $F_{2,Rk}$ [kN] | | Shear force $F_{45,Rk}$ [kN]] | |
| | | $F_{1,0,Rk}$ | $F_{1,90,Rk}$ | $F_{2,0,Rk}$ | $F_{2,90,Rk}$ | $F_{45,0,Rk}$ | $F_{45,90,Rk}$ |
| WALCO® V80 KS | 100 | 3,5 | 8,8 | 3,7 | 5,3 | 3,7 | 5,3 |
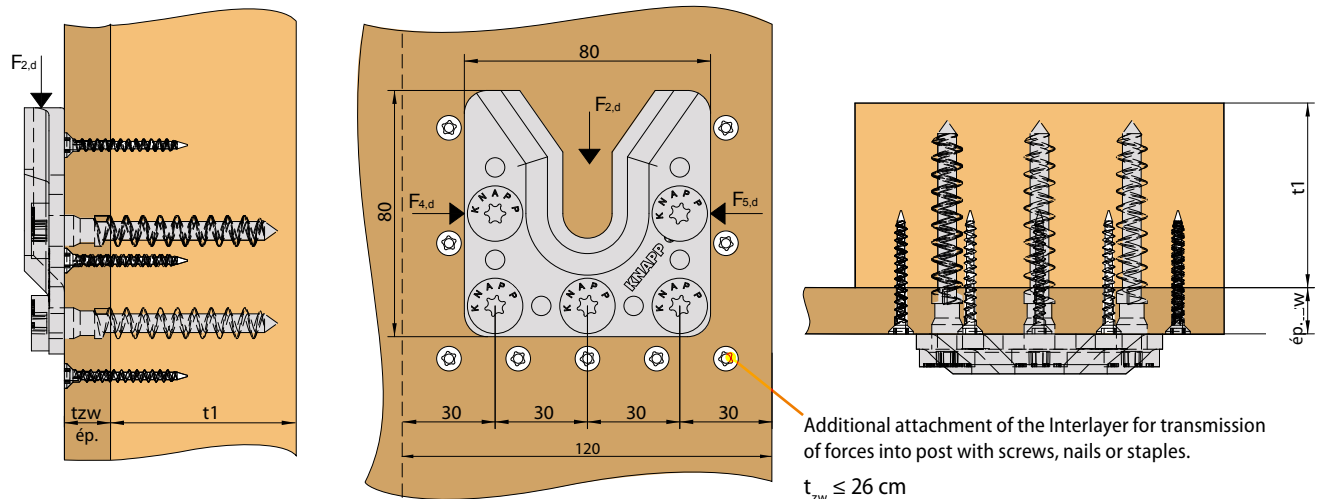
**Characteristic values of load-bearing capacity for WALCO® V with collar screw (KS) on MAGNUMBOARD® OSB**

$F_{1,0,Rk}$     Tensile force in **MAGNUM**BOARD® OSB end-grain timber
$F_{1,90,Rk}$    Tensile force in **MAGNUM**BOARD® OSB side timber
$F_{2,0,Rk}$     Shear force in insertion direction in **MAGNUM**BOARD® OSB end grain
$F_{2,90,Rk}$    Shear force in insertion direction in **MAGNUM**BOARD® OSB side timber
$F_{45,0,Rk}$    Shear force perpendicular to the direction of insertion in **MAGNUM**BOARD® OSB end grain
$F_{45,90,Rk}$   Shear force perpendicular to the direction of insertion in **MAGNUM**BOARD® OSB side timber

**Note**
The load-bearing values have been calculated according to ETA 10-0189 (2019/10/11).

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**VIDEO**

## Tensile force $F_1$ design values

| KNAPP® Connector | Tensile force $F_{1,0,Rd}$ in **MAGNUM**BOARD® OSB end grain depending on the load duration class (LDC) | | | | | |
|---|---|---|---|---|---|---|
| | permanent | long | medium | short | short/very short | **very short** |
| | $k_{mod} = 0,4$ | $k_{mod} = 0,5$ | $k_{mod} = 0,7$ | $k_{mod} = 0,9$ | $k_{mod} = 1,0$ | $k_{mod} = 1,1$ |
| WALCO® V80 KS | 1,08 | 1,34 | 1,88 | 2,42 | 2,69 | 2,96 |

| KNAPP® Connector | Tensile force $F_{1,90,Rd}$ in **MAGNUM**BOARD® OSB wide face in dependence of the load duration (LDC) | | | | | |
|---|---|---|---|---|---|---|
| | permanent | long | medium | short | short/very short | **very short** |
| | $k_{mod} = 0,4$ | $k_{mod} = 0,5$ | $k_{mod} = 0,7$ | $k_{mod} = 0,9$ | $k_{mod} = 1,0$ | $k_{mod} = 1,1$ |
| WALCO® V80 KS | 2,72 | 3,40 | 4,76 | 6,11 | 6,79 | 7,47 |

## Shear force $F_2$ design values in direction of insertion

| KNAPP® Connector | Shear force $F_{2,0,Rd}$ in **MAGNUM**BOARD® OSB end grain depending on the load duration (LDC) | | | | | |
|---|---|---|---|---|---|---|
| | permanent | long | medium | short | short/very short | **very short** |
| | $k_{mod} = 0,4$ | $k_{mod} = 0,5$ | $k_{mod} = 0,7$ | $k_{mod} = 0,9$ | $k_{mod} = 1,0$ | $k_{mod} = 1,1$ |
| WALCO® V80 KS | 1,14 | 1,43 | 2,00 | 2,57 | 2,85 | 3,14 |

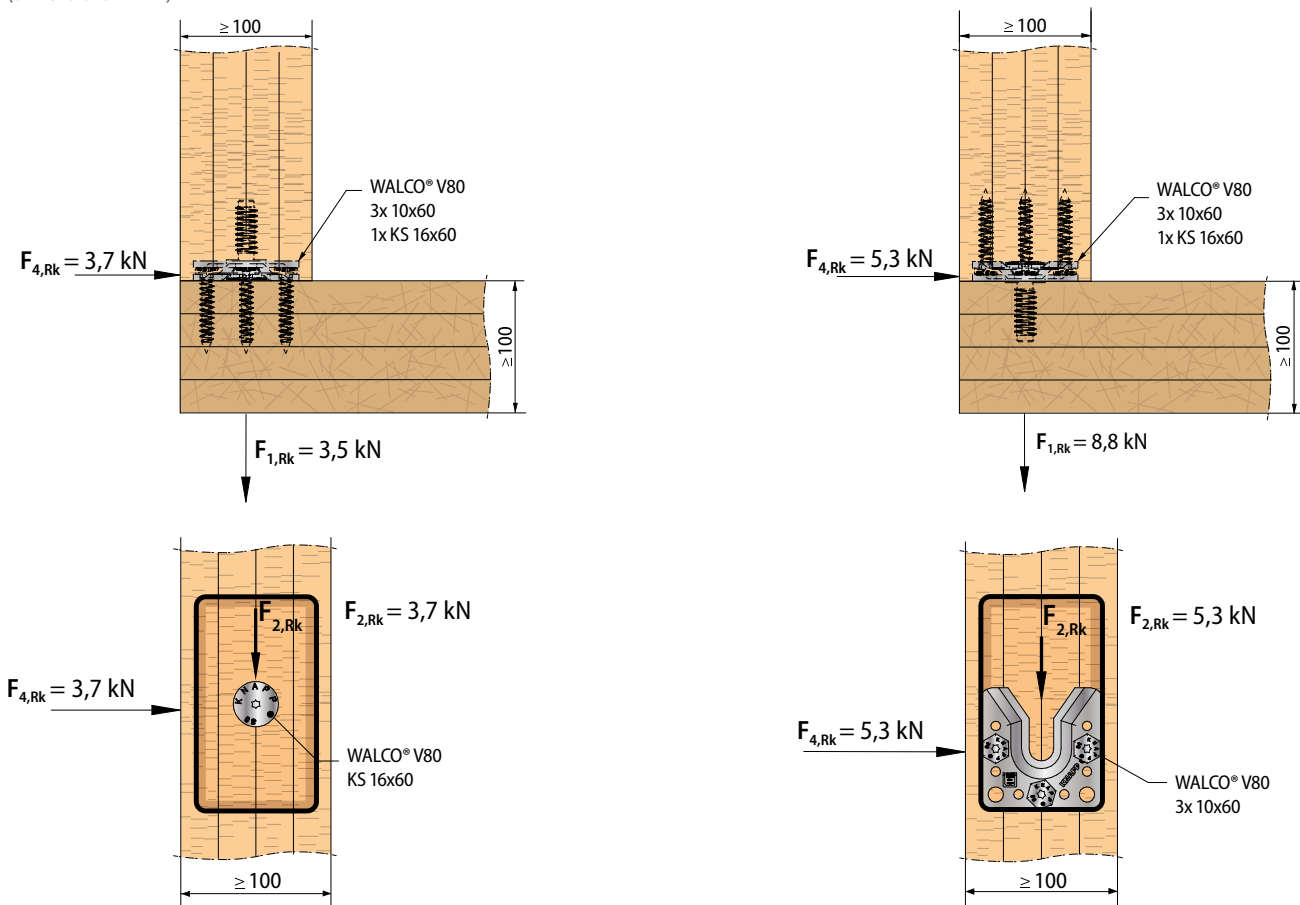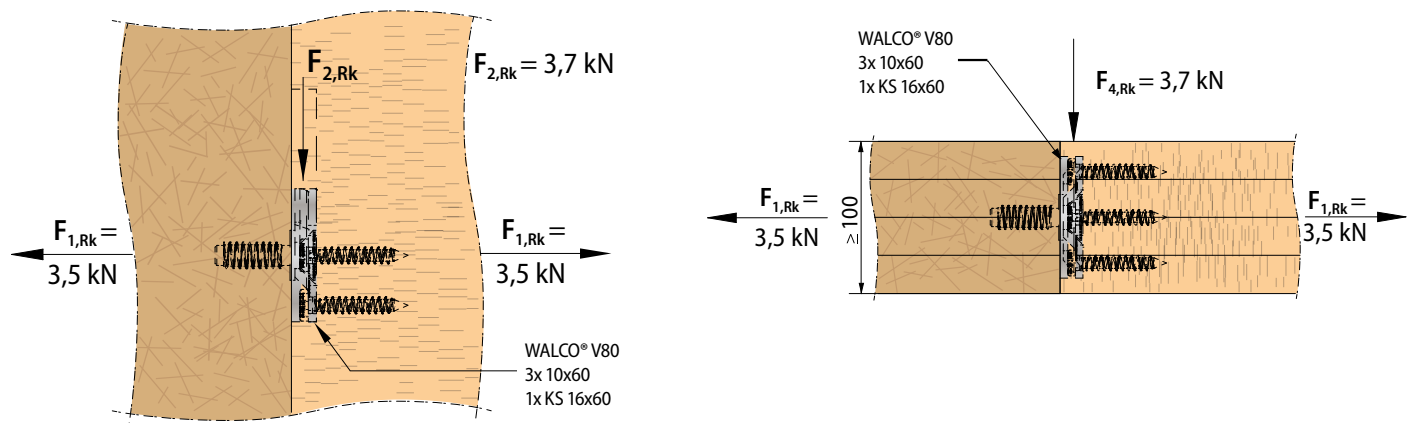| KNAPP® Connector | Shear force $F_{2,90,Rd}$ in **MAGNUM**BOARD® OSB wide face depending on the load duration (LDC) | | | | | |
|---|---|---|---|---|---|---|
| | permanent | long | medium | short | short/very short | **very short** |
| | $k_{mod} = 0,4$ | $k_{mod} = 0,5$ | $k_{mod} = 0,7$ | $k_{mod} = 0,9$ | $k_{mod} = 1,0$ | $k_{mod} = 1,1$ |
| WALCO® V80 KS | 1,63 | 2,04 | 2,85 | 3,67 | 4,08 | 4,48 |

## Shear force F₄₅ design values of perpendicular to the direction of insertion

| KNAPP® Connector | Shear force $F_{45,0,Rd}$ in **MAGNUM**BOARD® OSB end grain depending on the load duration class (LDC) | | | | | |
|---|---|---|---|---|---|---|
| | permanent | long | medium | short | short/very short | **very short** |
| | $k_{mod} = 0{,}4$ | $k_{mod} = 0{,}5$ | $k_{mod} = 0{,}7$ | $k_{mod} = 0{,}9$ | $k_{mod} = 1{,}0$ | $k_{mod} = 1{,}1$ |
| WALCO® V80 KS | 1,14 | 1,43 | 2,00 | 2,57 | 2,85 | 3,14 |

| KNAPP® Connector | Shear force $F_{45,90,Rd}$ in **MAGNUM**BOARD® OSB side timber depending on the load duration class (LDC) | | | | | |
|---|---|---|---|---|---|---|
| | permanent | long | medium | short | short/very short | **very short** |
| | $k_{mod} = 0{,}4$ | $k_{mod} = 0{,}5$ | $k_{mod} = 0{,}7$ | $k_{mod} = 0{,}9$ | $k_{mod} = 1{,}0$ | $k_{mod} = 1{,}1$ |
| WALCO® V80 KS | 1,63 | 2,04 | 2,85 | 3,67 | 4,08 | 4,48 |

## Illustrating a WALCO® V80 external wall corner joint in MAGNUMBOARD® OSB:

(Dimensions in mm)



WALCO® V80
3x 10x60
1x KS 16x60

$F_{4,Rk} = 3{,}7$ kN

$F_{1,Rk} = 3{,}5$ kN

$F_{2,Rk} = 3{,}7$ kN

$F_{4,Rk} = 3{,}7$ kN

WALCO® V80
KS 16x60



WALCO® V80
3x 10x60
1x KS 16x60

$F_{4,Rk} = 5{,}3$ kN

$F_{1,Rk} = 8{,}8$ kN

$F_{2,Rk} = 5{,}3$ kN

$F_{4,Rk} = 5{,}3$ kN

WALCO® V80
3x 10x60

## Illustrating a WALCO® V80 external wall joint in MAGNUMBOARD® OSB:



$F_{2,Rk} = 3{,}7$ kN

$F_{1,Rk} = 3{,}5$ kN

$F_{1,Rk} = 3{,}5$ kN

WALCO® V80
3x 10x60
1x KS 16x60

WALCO® V80
3x 10x60
1x KS 16x60

$F_{4,Rk} = 3{,}7$ kN

$F_{1,Rk} = 3{,}5$ kN

$F_{1,Rk} = 3{,}5$ kN

# WALCO® V60

**WALCO® V60 includes holding screw and hex-head wood screws**

(Dimensions in mm)

| Holding bolt wall #1 | Screws wall #2 | Characteristic values [C24] | | |
|---|---|---|---|---|
| | | $F_{2,Rk}$ [kN] | $F_{45,Rk}$ [kN] | $F_{1,Rk}$ [kN] |
| **KS** 12x60 | 3 screws 6x50 | 5,9 | 3,9 | 6,5 |
| **VK** D12 | 3 screws 6x50 | 4,9 | 3,2 | 6,4 |
| **EH** M12 | 3 screws 6x50 | 4,8 | 2,9 | 4,7 |
| **GH** M12 | 3 screws 6x50 | 8,6 | 5,4 | 7,1 |

Minimum timber cross section: L x t = 80 x 60 mm
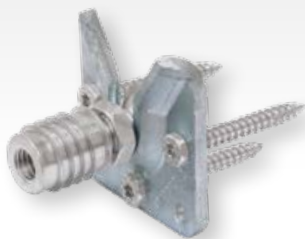
## Walco V60 (KS) collar screw
Art.-No.K102
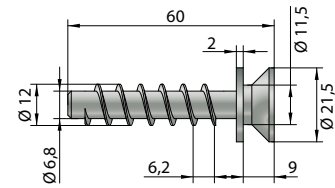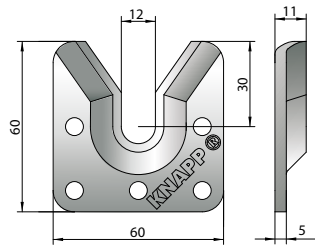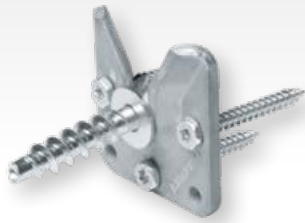
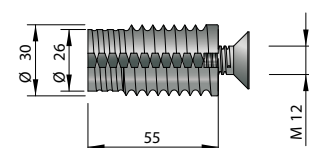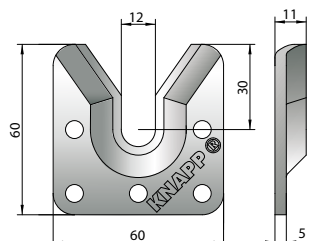## Walco V60 (VK) collar bolt
Art.-No.K108
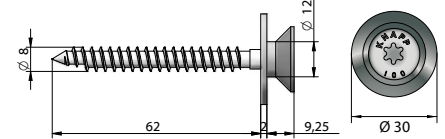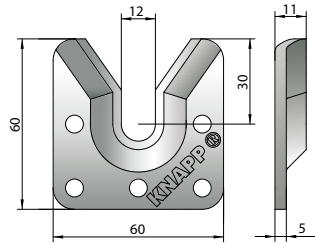
## Walco V60 (EH) adjustable retaining screw collar bolt
Art.-No.K104
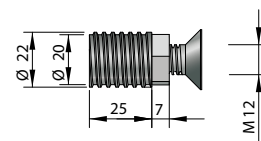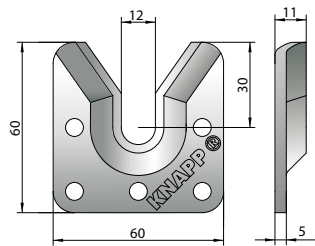
## Walco V60 (GH) spring loaded collar bolt
Art.-No.K106

# WALCO® V80

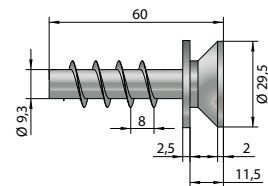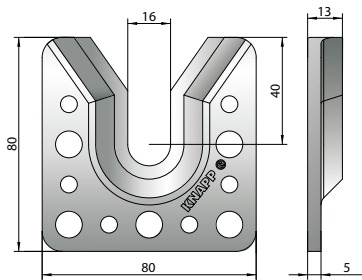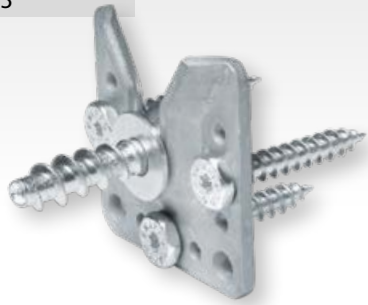**WALCO® V80 includes holding screw and hex-head wood screws**

(Dimensions in mm)

| Holding bolt wall #1 | Screws wall #2 | Characteristic values [C24] | | |
|---|---|---|---|---|
| | | $F_{2,Rk}$ [kN] | $F_{45,Rk}$ [kN] | $F_{1,Rk}$ [kN] |
| **KS** 16x60 | 3 screws 10x60 | 7,1 | 4,5 | 7,1 |
| **VK** D16 | 3 screws 10x60 | 6,2 | 4,1 | 7,1 |
| **EH** M16 | 3 screws 10x60 | 6,5 | 3,7 | 6,0 |
| **GH** M16 | 3 screws 10x60 | 16,0 | 9,1 | 10,0 |

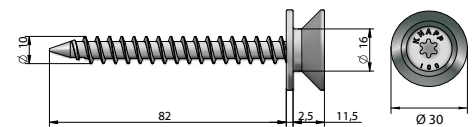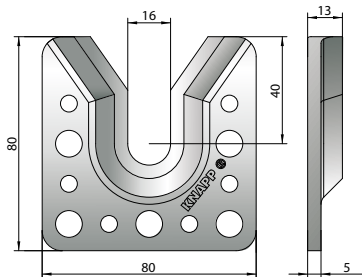Minimum timber cross section: L x t = 100 x 60 mm
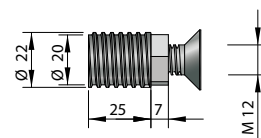
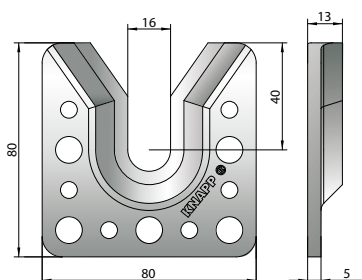## Walco V80 (KS) collar screw

Art.-No.K103



## Walco V80 (VK) collar bolt
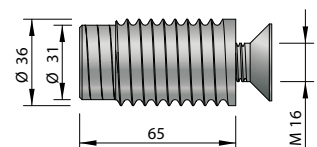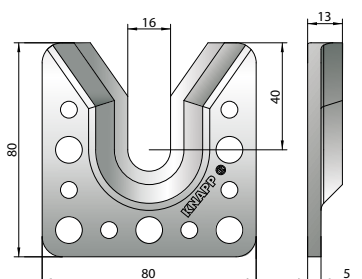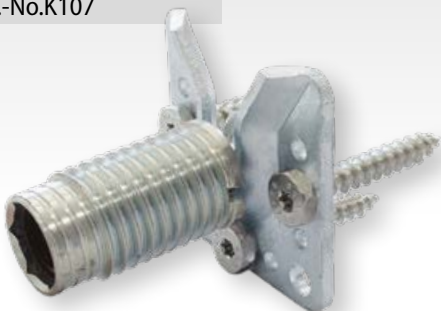
Art.-No.K109



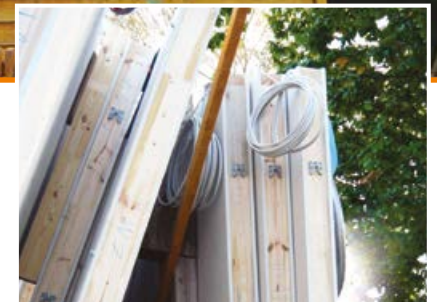## Walco V80 (EH) adjustable retaining screw collar bolt

Art.-No.K105



## Walco V80 (GH) spring loaded collar bolt

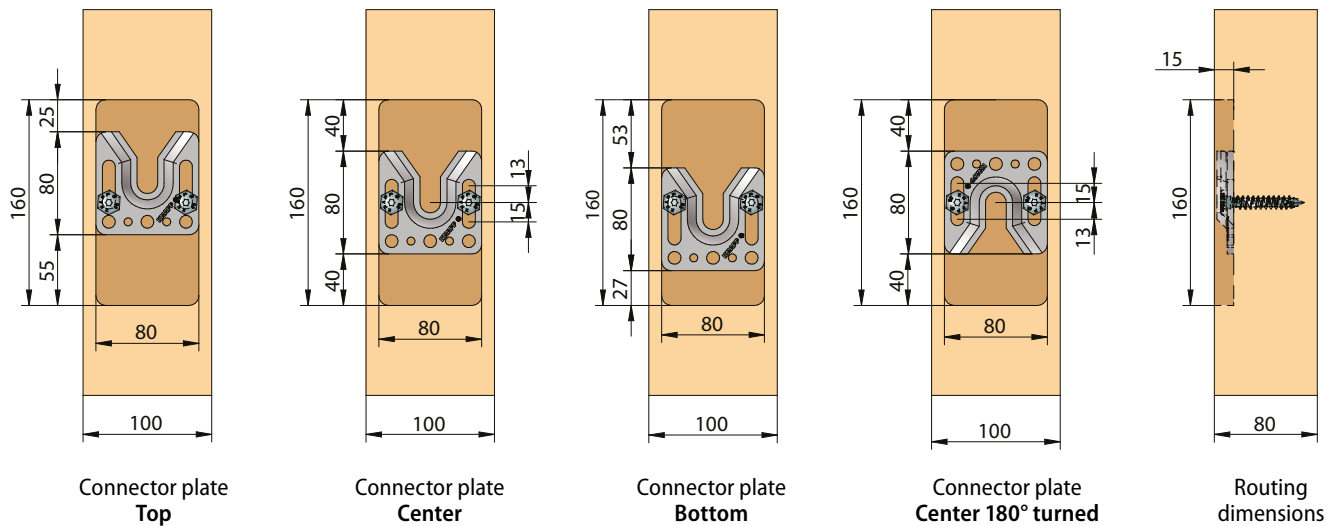Art.-No.K107

© Holzhaus Schröder

# WALCO® V80 oblong-hole

❚ Stable and invisible connection for prefabricated wall elements made of wood and CLT wall, as well as connections to wood, steel and concrete.

❚ Re-adjustment possible due to the slotted holes

❚ Positioning tolerance +/- 15 mm in height and +/- 2 mm in width for later compensation of unevenness on the building site

❚ Load-bearing in the direction of tension as well as at right angles to the direction of insertion


© Holzhaus Schröder

Installation example:
WALCO® V

## Adjustability
(Dimensions in mm)



| Connector plate **Top** | Connector plate **Center** | Connector plate **Bottom** | Connector plate **Center 180° turned** | Routing dimensions |

## Load values

| Connector | Timber grade | Min. cross section of square timber | Charact. values | Design values F$_{45,Rd}$ [kN] | |
|---|---|---|---|---|---|
| | | | | k$_{mod}$ [service class 1+2] | |
| | | | F$_{45,Rk}$ [kN] | 0,9 | 1,0 |
| WALCO® V 80 oblong hole | C24 | 100x60 for KS and 100x80 for oblong hole plate | 4,46 | 3,09 | 3,43 |
| | GL24h | | 4,91 | 3,40 | 3,78 |
| | CLT | | 4,85 | 3,36 | 3,73 |

CLT with characteristic bulk density r$_k$ ≥ 380 kg/m³

Load direction F$_2$ and F$_3$ cannot be used due to the connector's adjustability.



Installation example: WALCO® V
Oblonghole directly bolted on a OSB board.

# WALCO® V60 and WALCO® V80

## WALCO® V hexagonal - head, self-tapping wood screws

| Art.-No. Z550 | V60 hex-head wood screw 6x50 | Art.-No. Z551 | V80 hex-head wood screw 10x60 |

Ø 6  3  50  SW 10

Ø 10  5  60  SW 17
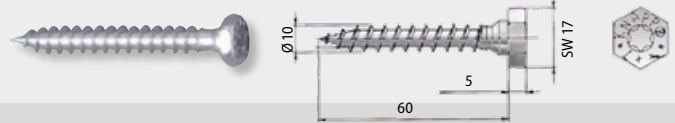
**Application:** to screw on WALCO® V.

# Accessories

## WALCO® V marking template (stainless steel)

WALCO® V60    WALCO® V80

| Art.-No. K578 | WALCO® V60 marking template |
| Art.-No. K579 | WALCO® V80 marking template |

WALCO® V60: 60, 22,5, 7,5, Ø 4, 7,5, 22,5, 60
WALCO® V80: 80, 30, 10, Ø 4, 10, 30, 80
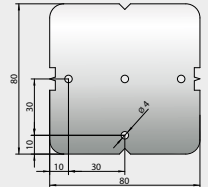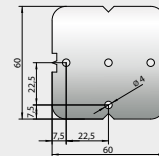
**Application:** for pre-drilling the pilot holes for exact assembly.

## WALCO® V clip lock (made of stainless steel)

WALCO® V60    WALCO® V80

| Art.-No. K112 | WALCO® V60 clip lock |
| Art.-No. K113 | WALCO® V80 clip lock |

WALCO® V60: 36,5, 21, 4, 16, 60, KNAPP WALCO V 60, Ø 5,3, 60, 1
WALCO® V80: 47,7, 27, 4, 22, 80, KNAPP WALCO V 80, Ø 6,3, Ø 10, 80, 1
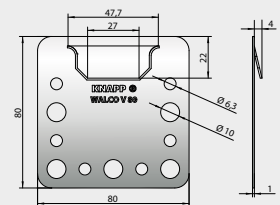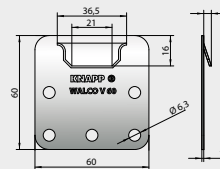
**Application:** locks and can be loaded against the insertion direction, e.g. when connecting anchor tensile forces.

## WALCO® V PH-screws

| Art.-No. Z521 | PH screw 10x80 |
| Art.-No. Z522 | PH screw 10x120 |

**Application:** for special solutions such as cladding or angled screw connections.

## Project pictures


1

Photos 1 and 2 © P. Lienbacher Holzbauwerk GmbH, artofsight GesbR


2


3


4
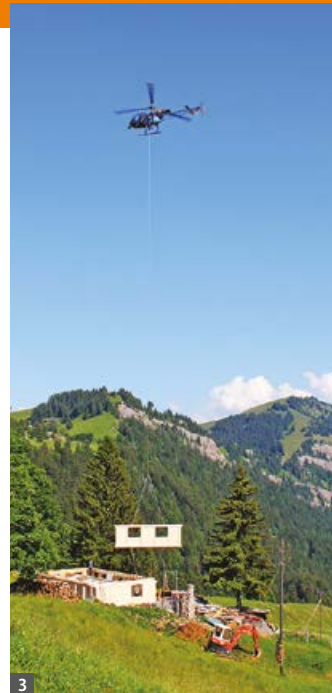
Photos 3 and 4 © Holzwerkstatt EBI

# WALCO® V

## Installation

❚ Simple and fast fabrication with router and optional KNAPP® marking template.
❚ Installation with CNC joinery machine possible – all data for the standard CNC joinery machine programs is included.

| WALCO® V milling dimensions | | | |
|---|---|---|---|
| | Width | Length | Depth |
| V60 | 60 mm | 80 mm | 13 mm |
| V80 | 80 mm | 100 mm | 15 mm |
| V80L | 80 mm | 160 mm | 15 mm |
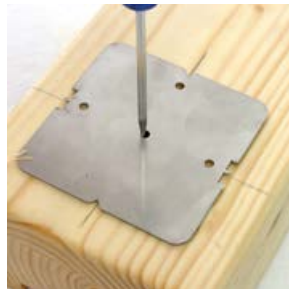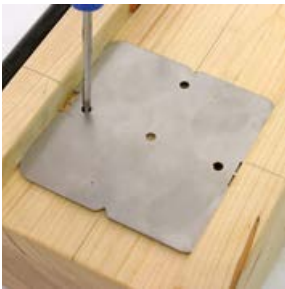



If necessary make milling, mark drilling




CNC joinery machine, router or portable router




Pre-drill assembly instructions







Fasten the WALCO® V to the wood and screw in the WALCO® V retaining screw.

## Project pictures






© Genböck
© Im Jaich, HOKO-Fertighaus GmbH
© Augsburger Holzhaus
© Maison Eau & Soleil

# Connectors for facade and modular building

## Load-bearing up to 8 kN*

I **Thanks to slotted holes, even faster and more precise assembly on site is possible**

I **Compensation for structural irregularities later by means of positioning tolerance of +/- 15 mm in height and +/- 2 mm in width**

I **The connector is load-bearing in tensile direction**

I **Solid and concealede**

**WALCO®**

**Available in 2 sizes and 8 versions.**

**Design values are available on our website under Planer Service.**

\* Characteristic value $F_{2,Rk}$ in slide-in direction, valid only with the use of original KNAPP® screws, according to ETA-10/0189 (2022/08/25), for glulam GL24h.

**KNAPP®**
connectors.com

Holzbau Schröder



HASSLACHER Gruppe © GETEC

Installation example: ORF-Studio, Oberstdorf, DE.

# WALCO®

▮ **Applications:** concealed and adjustable connectors for facades, wall elements and modular building

▮ **Connections:** for prefabricated wall elements made of wood, CLT or similar, as well as connections of wood to steel or concrete

▮ **Areas of application:** in prefabricated timber house construction, modular construction and facade elements

▮ **Service class 1 and 2**
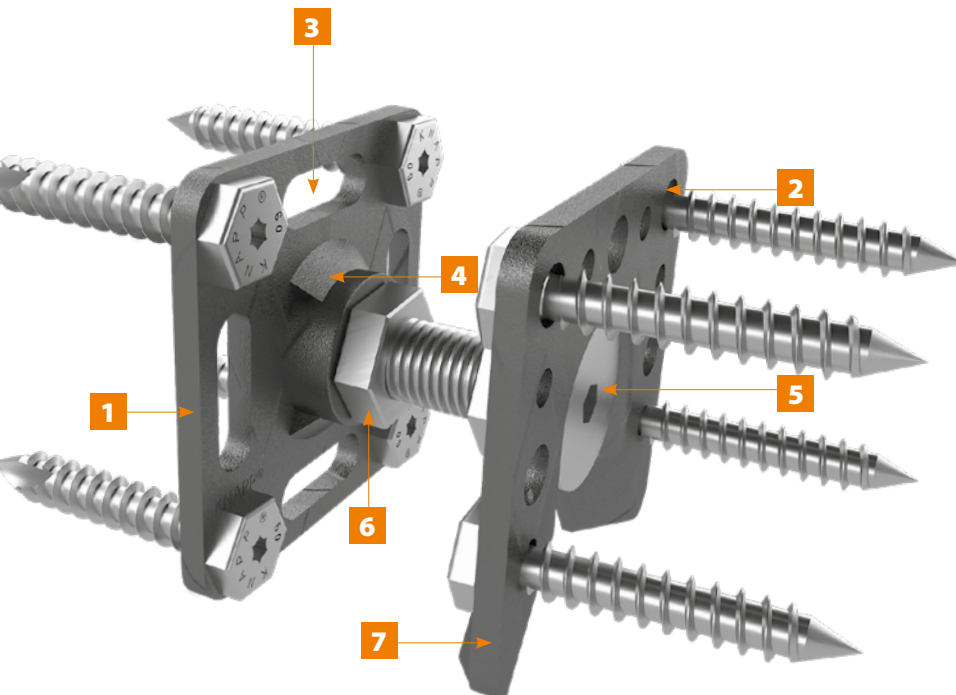


| 1 | WALCO® 80 M16 or WALCO® 60 M12 |
| 2 | 4-point screw |
| 3 | Slotted hole screw connection, adjustment - optional |
| 4 | Welded threaded sleeve |
| 5 | Retaining screw adjustable |
| 6 | Lock nut |
| 7 | WALCO® V80 or WALCO® V60 |

The locking screw, secured with a locknut, transmits the tensile forces.

ETA  ETA-10/0189 (2022/08/25)

WALCO

# Areas of application and connector types

Universal connections to solid wood, wood-based materials such as CLT or OSB boards, steel or concrete for wood widths of 80 mm and more.

## Connector types with respective bolt version and WALCO® V connector plate as a counterpiece

**WALCO® V80 VS**
**with welded collar bolt**
(Art.-No. K711/Set)

**WALCO® 80 M16**
**with adjustable**
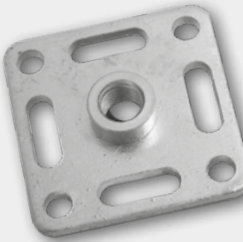**counter sunk screw**
(Art.-No. K712/Set)

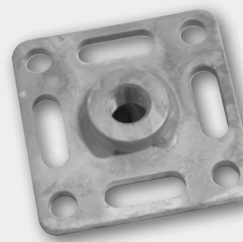**WALCO® 80 VK**
**with screw-in collar bolt**
(Art.-No. K710/Set)

**WALCO® V80 oblong model**
(Art.-No. K115/B)
or its alternative **WALCO® V80**
(Art.-No. K101/Set)

### Components and accessories

**WALCO® 80 M16**
**pressed-in sleeve**
(Art.-No. K712/B)

**WALCO® 80 M16**
**with M16 welded sleeve**
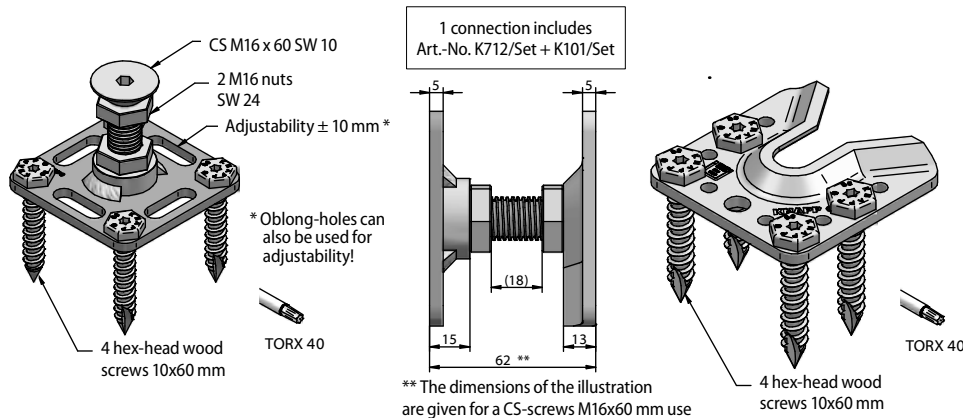(Art.-No. K712/V)

**WALCO® 80**
(Art.-No. K710/B)

**Clip lock WALCO® V80 in**
**stainless spring steel** (Art.-No. K113)

The base plates are optionally adjustable via slotted holes and the joint distances are adjustable. Possible construction tolerances can be compensated. An optional locking flap made of stainless spring steel, which cannot be seen from the outside, locks and secures the respective connection with a click for loads against the direction of insertion. **WALCO® V (hot-dip galvanized steel) is available in sizes 60 and 80 mm.**
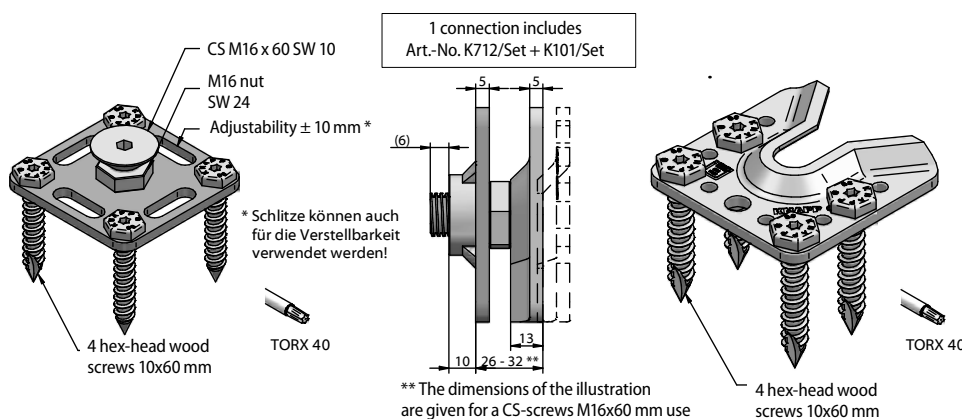
## Connectors for curtain walls

(Dimensions in mm)

CS M16 x 60 SW 10

2 M16 nuts
SW 24

Adjustability ± 10 mm *

* Oblong-holes can
also be used for
adjustability!

4 hex-head wood
screws 10x60 mm

TORX 40

1 connection includes
Art.-No. K712/Set + K101/Set

5    5

(18)

15    13

62 **

** The dimensions of the illustration
are given for a CS-screws M16x60 mm use

4 hex-head wood
screws 10x60 mm

TORX 40

## Connectors for prefabricated walls

CS M16 x 60 SW 10

M16 nut
SW 24

Adjustability ± 10 mm *

* Schlitze können auch
für die Verstellbarkeit
verwendet werden!

4 hex-head wood
screws 10x60 mm

TORX 40

1 connection includes
Art.-No. K712/Set + K101/Set

5    5

(6)

10  26 - 32 **

13

** The dimensions of the illustration
are given for a CS-screws M16x60 mm use

4 hex-head wood
screws 10x60 mm

TORX 40

## Options

▌ Two different base plates
with counterpart WALCO® V
connector plate for easy
assembly without further use
of screws on the building site.

▌ Firmly welded support bolt
for connecting modular walls.

▌ Metric thread for precise adjust-
ment of the element spacing for
insulated facades.

▌ The WALCO® V system can be
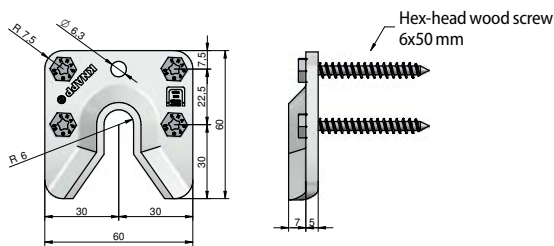structurally calculated and
has a European Technical
Assesment (ETA).

# WALCO® 60

## WALCO® 60 with holding screw or collar bolt

(Dimensions in mm)

Hex-head wood screw
6x50 mm

* Hex = hex-head wood screw

$F_{1,Rk}$ = Characteristic values (tension)
$F_{2,Rk}$ = Characteristic values in direction of insertion
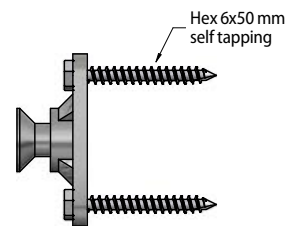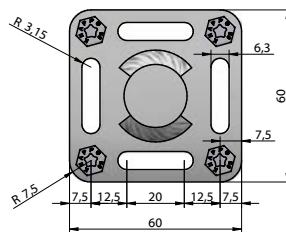$F_{45,Rk}$ = Characteristic values perpendicular to the direction of insertion

| Connector | Screws on wall #1 | Screws on wall #2 | Characteristic values [C24] | | |
|---|---|---|---|---|---|
| | | | $F_{1,Rk}$ [kN] | $F_{2,Rk}$ [kN] | $F_{45,Rk}$[kN] |
| WALCO® V60 WALCO® 60 VS | WALCO® **V60** 4 Hex 6x50* | WALCO® **V60 VS** 4 Hex 6x50* | 2,55 | 4,52 | 7,57 |
| WALCO® V60 WALCO® 60 VK | WALCO® **V60** 4 Hex 6x50* | WALCO® **60 VK** 4 Hex 6x50* 1 CS 8x80 | 0,80 | 4,52 | 7,57 |
| WALCO® V60 WALCO® 60 EH | WALCO® **V60** 4 Hex 6x50* | WALCO® **60 EH** 4 Hex 6x50* | 2,55 | 2,65 | 6,21 |
| WALCO® V60 WALCO® 60 EH | WALCO® **V60** 4 Hex 6x50* | WALCO® **60 EH** 4 Hex 6x50* | 2,55 | 2,65 | 6,21 |

Min. timber cross-section: WxH = 80 x 60 mm

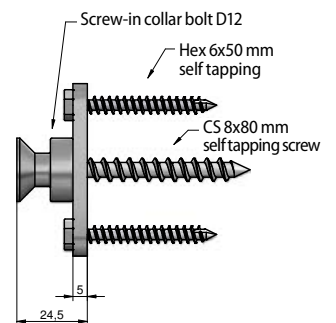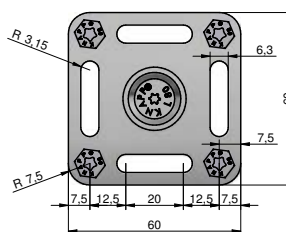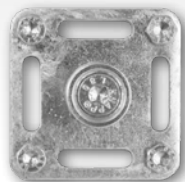## WALCO® V60 and WALCO® 60 with welded collar bolt (VS)

| Art.-No.K100/Set | Art.-No.K701/Set |
|---|---|

Hex 6x50 mm self tapping

## WALCO® V60 and WALCO® 60 with screw-in collar bolt (VK)

| Art.-No.K100/Set | Art.-No.K700/Set |
|---|---|

Screw-in collar bolt D12
Hex 6x50 mm self tapping
CS 8x80 mm self tapping screw

## WALCO® V60 and WALCO® 60 with welded sleeve and adjustable counter sunk screw M12 (EH)

| Art.-No.K100/Set | Art.-No.K702/Set |
|---|---|

CS M12x60 mm
Hex 6x50 mm self tapping
Lock nut M12
welded sleeve
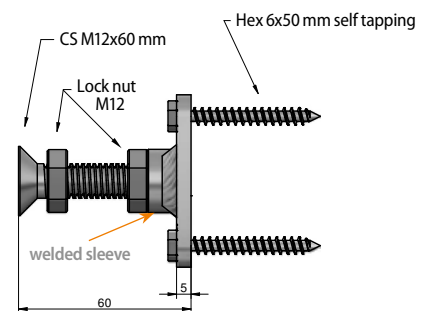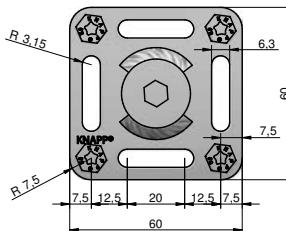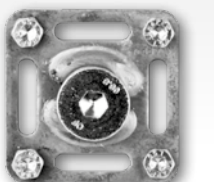
## WALCO® V60 and WALCO® 60 pressed-in sleeve with adjustable counter sunk screw M12 (EH)

| Art.-No.K100/Set | Art.-No.K704/Set |
|---|---|

CS M12x60 mm
Hex 6x50 mm self tapping
Lock nut M12
pressed-in sleeve
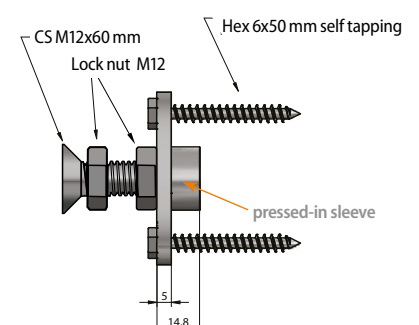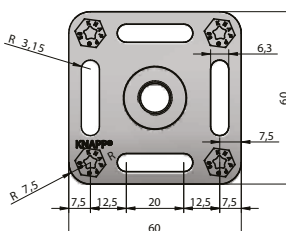
# WALCO® 80

## WALCO® 80 with holding screw or collar bolt

Hex-head wood screw 10x60 mm

* Hex = hex-head wood screw

$F_{1,Rk}$ = Characteristic values (tension)
$F_{2,Rk}$ = Characteristic values in direction of insertion
$F_{45,Rk}$ = Characteristic values perpendicular to the direction of insertion

| Connector | Screws on wall #1 | Screws on wall #2 | Characteristic values [C24] | | |
|---|---|---|---|---|---|
| | | | $F_{1,Rk}$ [kN] | $F_{2,Rk}$ [kN] | $F_{45,Rk}$[kN] |
| WALCO® V80 WALCO® 80 VS | WALCO® **V80** 4 Hex 10x60* | WALCO® **V80 VS** 4 Hex 10x60* | 3,62 | 7,58 | 14,18 |
| WALCO® V80 WALCO® 80 VK | WALCO® **V80** 4 Hex 10x60* | WALCO® **80 VK** 4 Hex 10x60* 1 CS 10x100 | 2,61 | 7,88 | 14,18 |
| WALCO® V80 WALCO® 80 EH | WALCO® **V80** 4 Hex 10x60* | WALCO® **80 EH** 4 Hex 10x60* | 3,62 | 3,30 | 11,90 |
| WALCO® V80 WALCO® 80 EK | WALCO® **V80** 4 Hex 10x60* | WALCO® **80 EH** 4 Hex 10x60* | 3,62 | 3,30 | 11,90 |

Min. timber cross-section: WxH = 100 x 60 mm

## WALCO® V80 and WALCO® 80 with welded collar bolt (VS)

| Art.-No.K101/Set | Art.-No.K711/Set |
|---|---|

Hex 10x60 mm self tapping

## WALCO® V80 and WALCO® 80 with screw-in collar bolt (VK)

| Art.-No.K101/Set | Art.-No.K710/Set |
|---|---|

Screw-in collar bolt D16
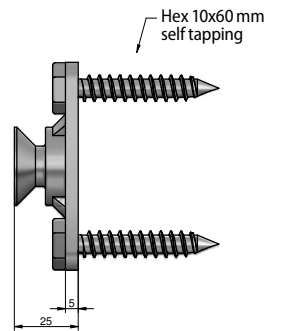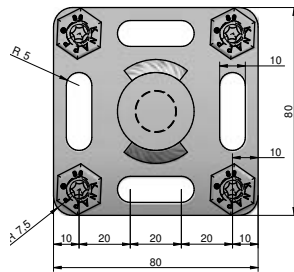Hex 10x60 mm self tapping
CS 10x100 mm self tapping screw
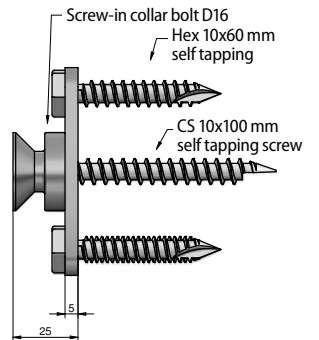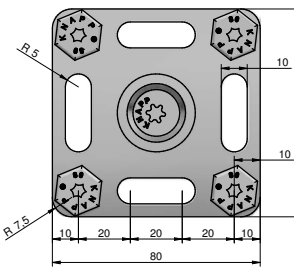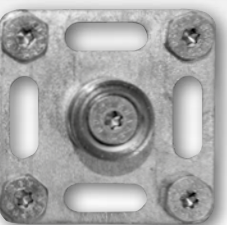
## WALCO® V80 and WALCO® 80 with welded sleeve and adjustable counter sunk screw M12 (EH)

| Art.-No.K101/Set | Art.-No.K712/Set |
|---|---|

Hex 10x60 mm self tapping
CS M16x75 mm
Lock nut M16
welded sleeve
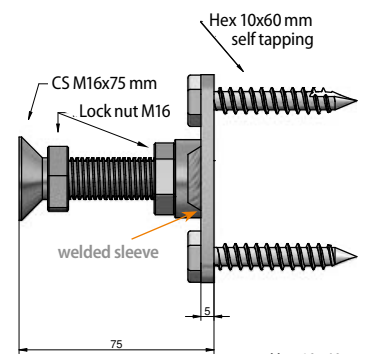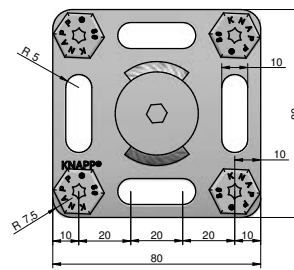
## WALCO® V80 and WALCO® 80 pressed-in sleeve with adjustable counter sunk screw M12 (EH)

| Art.-No.K101/Set | Art.-No.K713/Set |
|---|---|

CS M16x75 mm
Lock nut M16
Hex 10x60 mm self tapping
pressed-in sleeve
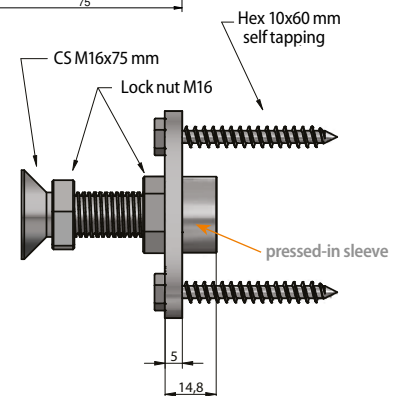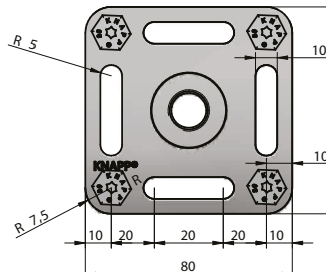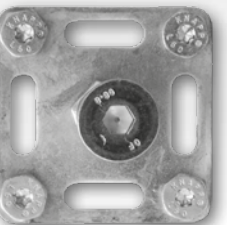
Timber frame construction
Mobile homes, USA



Timber frame construction
Schramm office building, Austria

*Lengauer GmbH*



Timber frame construction
Roof extension, Germany

*Holzbau Schröder*



Timber frame construction
Urban density, London (GB)

*Becker & Sohn © SUSD Ltd.*



Prefab. house construction
Housing development, Austria

*© Schafflner*



Timber frame construction
Multi-storey residential building, Germany

*© Huber & Sohn GmbH & Co. KG*



Timber frame construction
Chalets "Alpegg", Austria

*Foidl Holzbau, © de francesco photography*

# Anchoring system

## Anchoring timber-framed walls, up to 24,4 kN*

I **Timber width from 100 mm**

I **Highly advanced production prefabrication**

I **Anchoring by simply interlocking the wall elements**

I **Very strong anchoring**

I **Disassembly and reassembly without damage**

**WALCO® BOLT**

**Available in 3 versions.**

**Design values are available on our website under Planer Service.**

\* Characteristic value $F_{1,Rk}$ in tension, valid only with the use of 4 original KNAPP® CS screws 10x60 mm, on C24 according ETA-23/0670 (2023/09/25).

**KNAPP®**
connectors.com

# WALCO® BOLT

❚ Stable and concealed connection for prefabricated wall elements made of wood and CLT, as well as connections between wood, steel and concrete.

❚ The slotted holes of the WALCO® 80 base plate allow for readjustment when attached with screws

❚ Loadable with tension as well as perpendicular to the insertion direction

❚ Service class 1 and 2

**Installation example:** fixing carport rafters, Austria.

© KNAPP GmbH
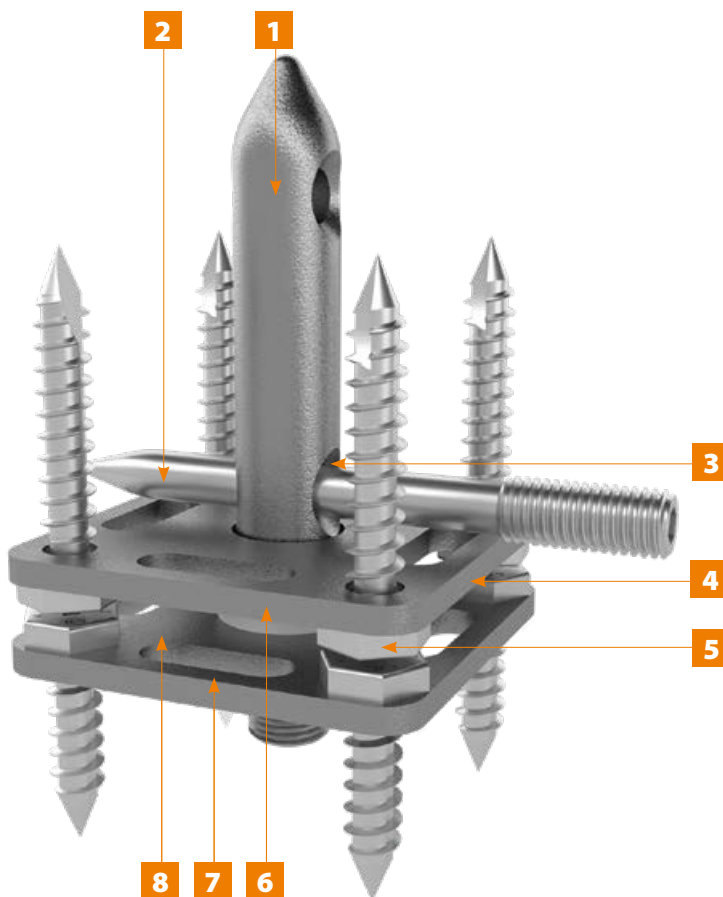
| | |
|---|---|
| **1** | Ø20 mm bolts for anchoring and connecting wall elements |
| **2** | Clamping bolt for securing and tightening the wall elements |
| **3** | Hole for allowing the clamping bolt to fix the wall to the floor |
| **4** | WALCO® 80 base plate VS D22 increases the stability and the strength of the system |
| **5** | Hex screw 10x60 mm |
| **6** | Spring washer M16 |
| **7** | WALCO® 80 with M16 welded sleeve |
| **8** | Oblong holes for vertical or horizontal adjustments (optional) |

WALCO BOLT

## Dimensions - WALCO® BOLT D20 L100

Art.-No.K909

(Dimensions in mm)

60°

Ø 20

100

75

130

Ø 17

Ø 10

20

30

M 16

Hexagon socket SW6

Ø 10

M 12

120
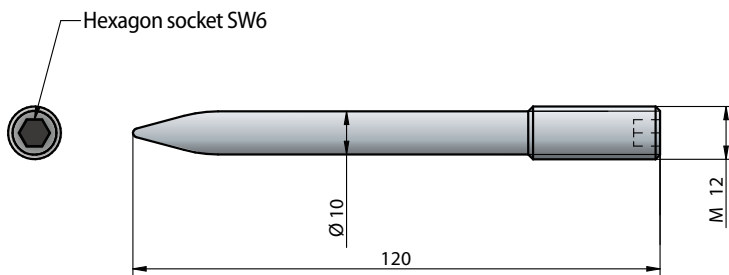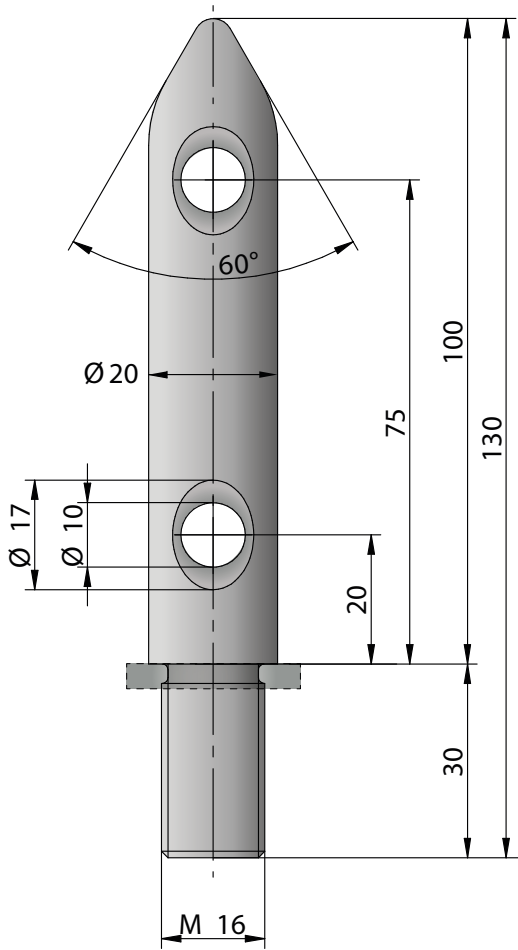
## Technical details - WALCO® BOLT A130

Art.-No.K900

4

5

3

1

2

6

5

7
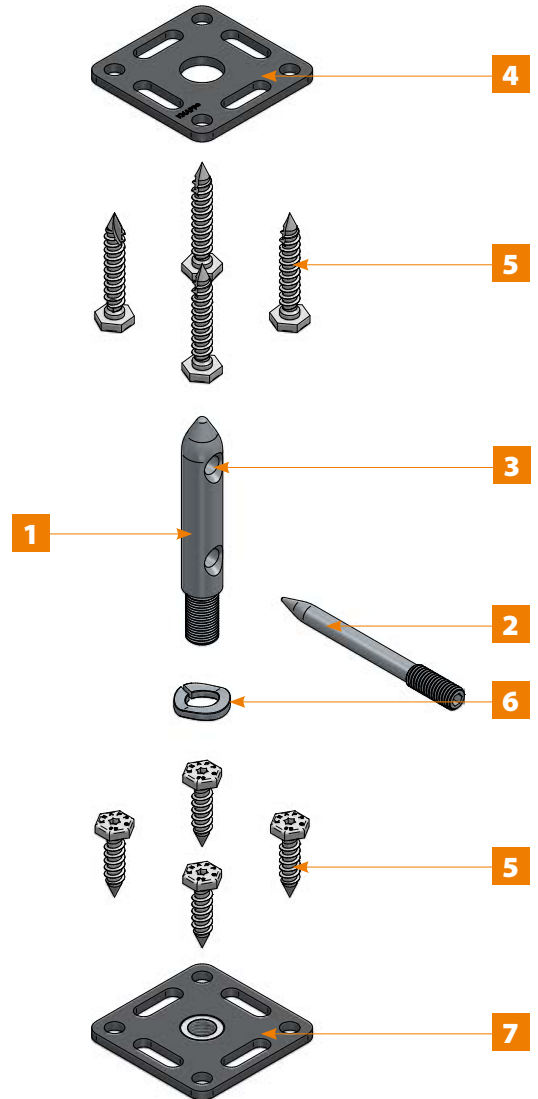
| Pos. | Description | Art.-No. |
|------|-------------|----------|
| 1 | Ø 20 mm bolt | K909 |
| 2 | M12x120 clamping bolt | K908 |
| 4 | WALCO® 80 VS D22 base plate | K712 |
| 5 | Hex screw 10x60 mm | Z551 |
| 6 | Spring washer M16 | Z895 |
| 7 | WALCO® 80 with M16 welded sleeve | K712/V |

## Installation options

(Dimensions in mm)

B

90

19

11

22

L

B

Section B-B

Ø 25

Ø 10

Ø 30

Bolt Ø 20 mm
spring washer M16
WALCO® 80 M16
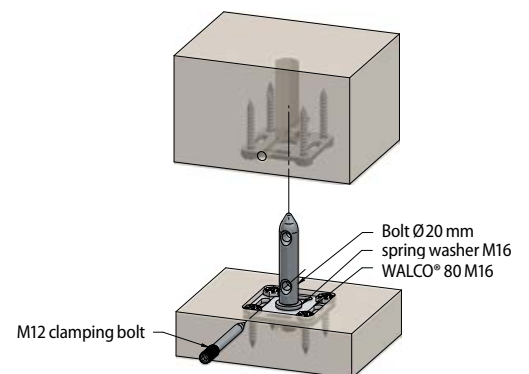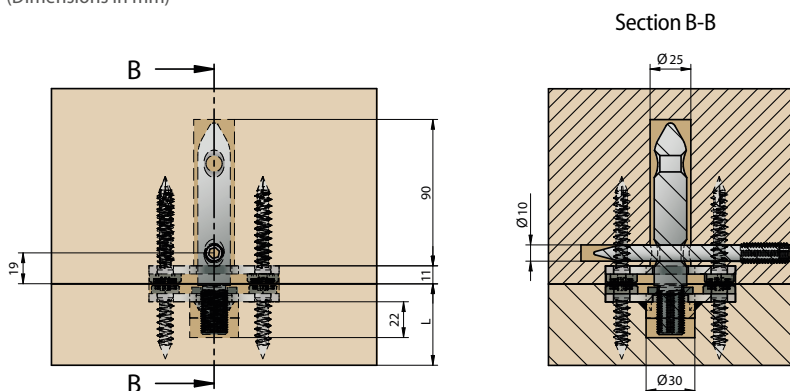
M12 clamping bolt

# WALCO® BOLT  Single D20

**WALCO® BOLT B130**

Art.-No.K902

(Dimensions in mm)

Example :
WALCO BOLT B130 wall to wall connection.

**1** Ø20 mm bolts for anchoring and connecting wall elements

**2** Clamping bolt for securing and tightening the wall elements

**3** Alternative hole for clamping bolt positionning

**4** Spring washer M16

**5** Hex screw 10x60 mm

**6** WALCO® 80 with M16 welded sleeve

**Installation options**

(Dimensions in mm)

Section A-A

Bolt Ø 20 mm
Spring washer M16
WALCO 80 M16 VS
Hex screw 10x60 mm

M12 clamping bolt

**Dimensions - WALCO® BOLT B130**

Art.-No.K902

(Dimensions in mm)

60°

Ø 20

Ø 17

Ø 10

100

75

130

20

30

M 16
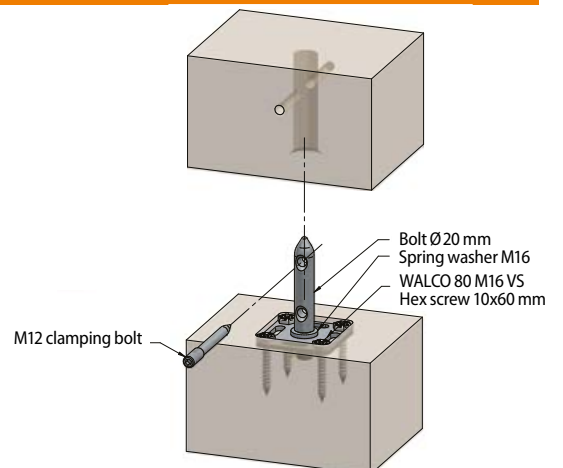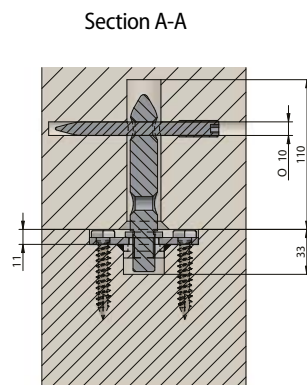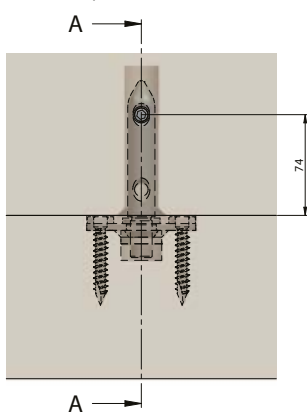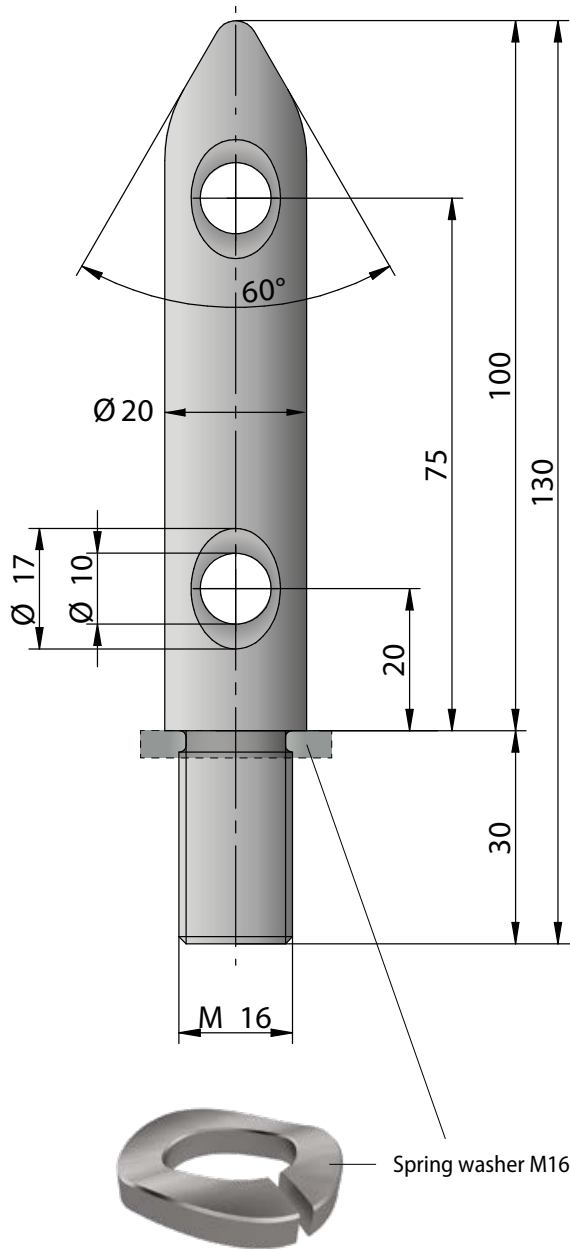
Spring washer M16

**Technical details - WALCO® BOLT B130***

Art.-No.K902

| Pos. | Description | Art.-No. |
|------|-------------|----------|
| 1 | Ø 20 mm bolt | K909 |
| 2 | M12x120 clamping bolt | K908 |
| 3 | Clamping bolt alternative bore | – |
| 4 | Spring washer M16 | Z895 |
| 5 | Hex screw 10x60 mm | Z551 |
| 6 | WALCO® 80 with M16 welded sleeve | K712/V |

# WALCO® BOLT D20

**Accessories**

| Art.-No.Z551 | Hexagon head self tapping screw 10x60 | Art.-No.Z895 | Spring washer M16 |
|---|---|---|---|

**Application:** to screw in WALCO® 80 base plate.

Spring washer M16 for fixing the position of the bolt.

# WALCO® BOLT  simple D20

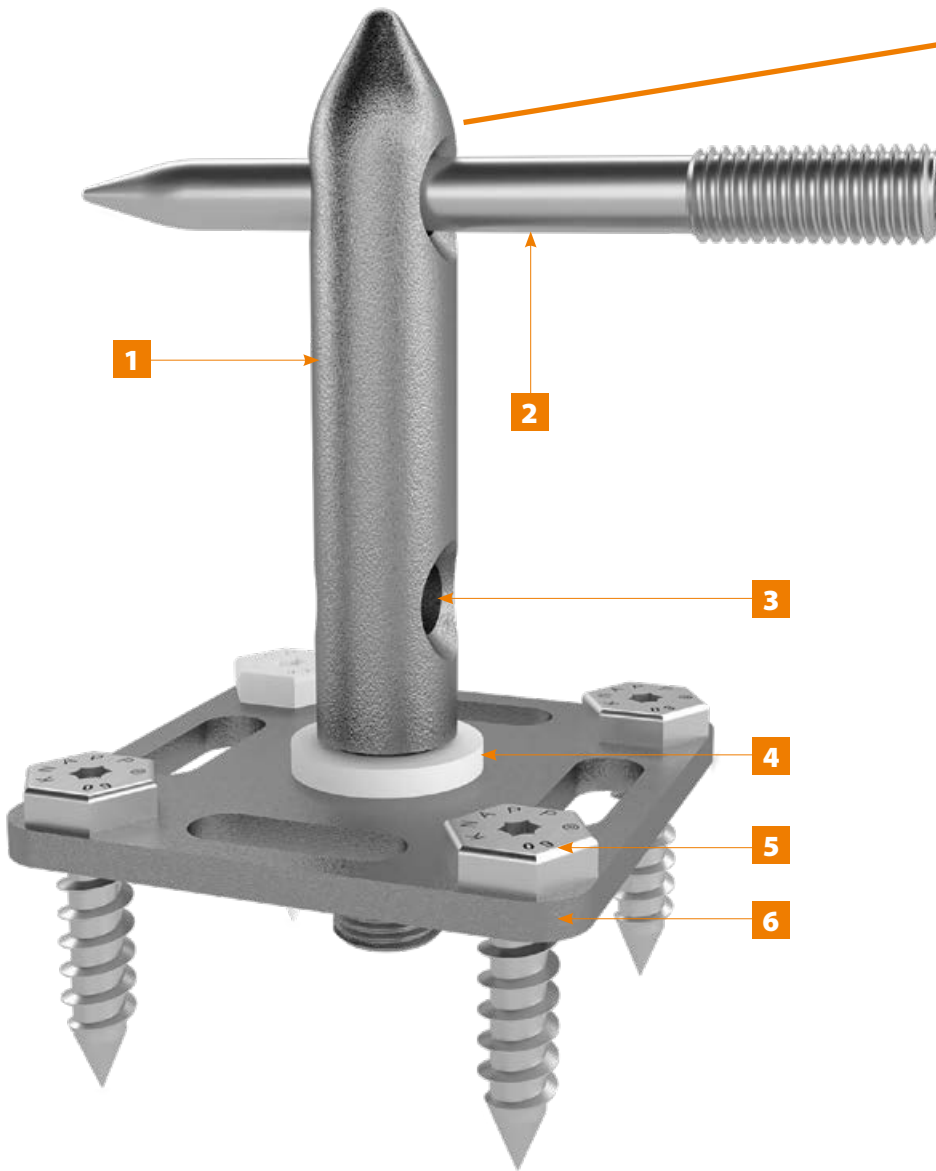## WALCO® BOLT C130

Art.-No.K901

(Dimensions in mm)

**Exemple :**
Jonction mur-mur avec WALCO BOLT B130
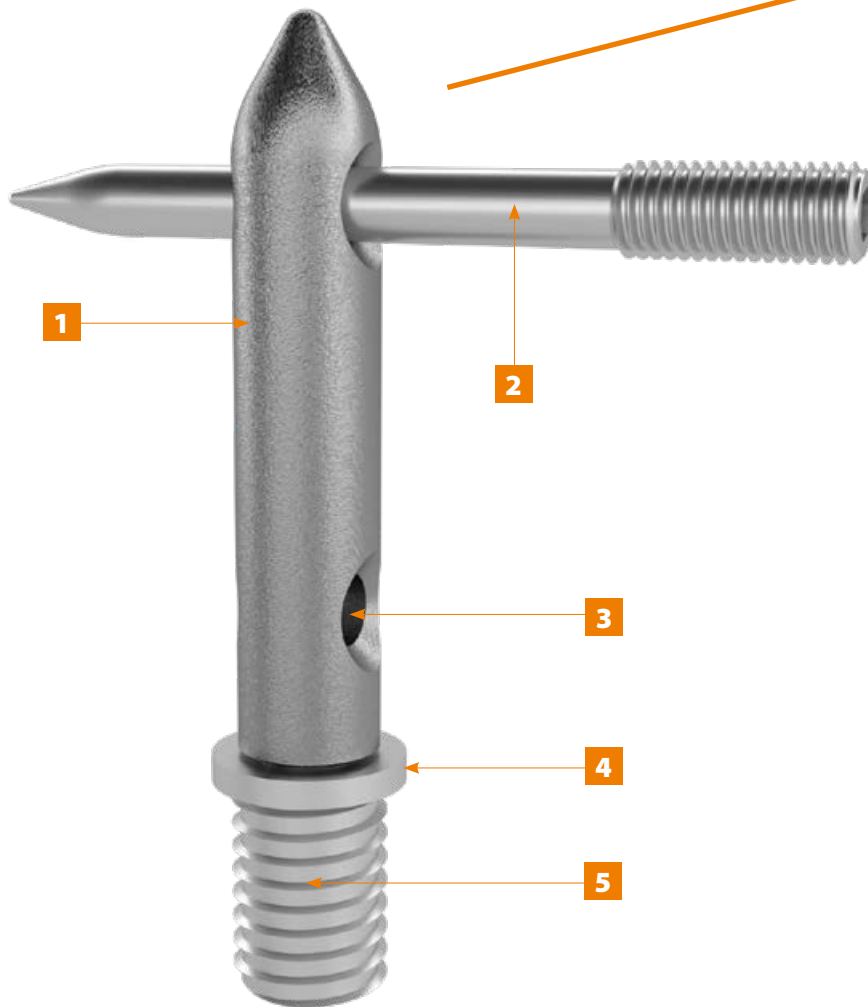
| | |
|---|---|
| **1** | Ø20 mm bolts for anchoring and connecting wall elements |
| **2** | Clamping bolt for securing and tightening the wall elements |
| **3** | Clamping bolt for securing and tightening the wall elements |
| **4** | Spring washer M16 |
| **5** | Insert for screwing the bolt system into wooden components |

## Installation options

(Dimensions in mm)

Section A-A

Ø 25
Ø 10
Ø 23

120
80
45

110
75
30
35

Bolt Ø20 mm
Spring washer M16
Screw-in insert
25x30 M16

M12 clamping
bolt

## Dimensions - WALCO® BOLT C130

Art.-No.K901

(Dimensions in mm)

60°

Ø 20

Ø 17

Ø 10

100

75

130

20

30

M 16
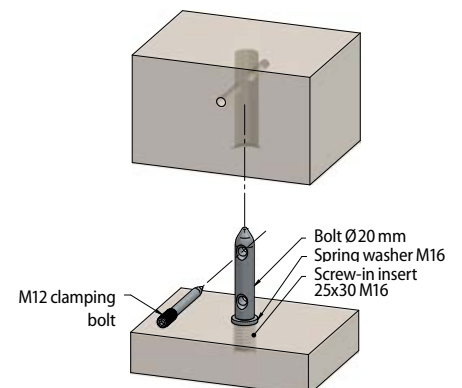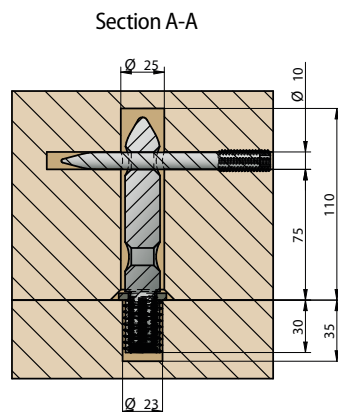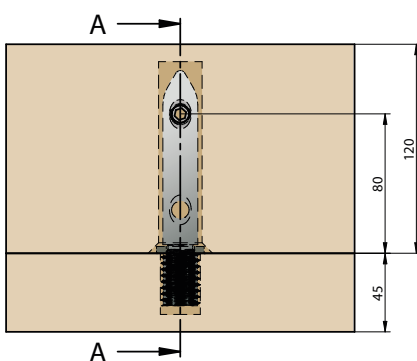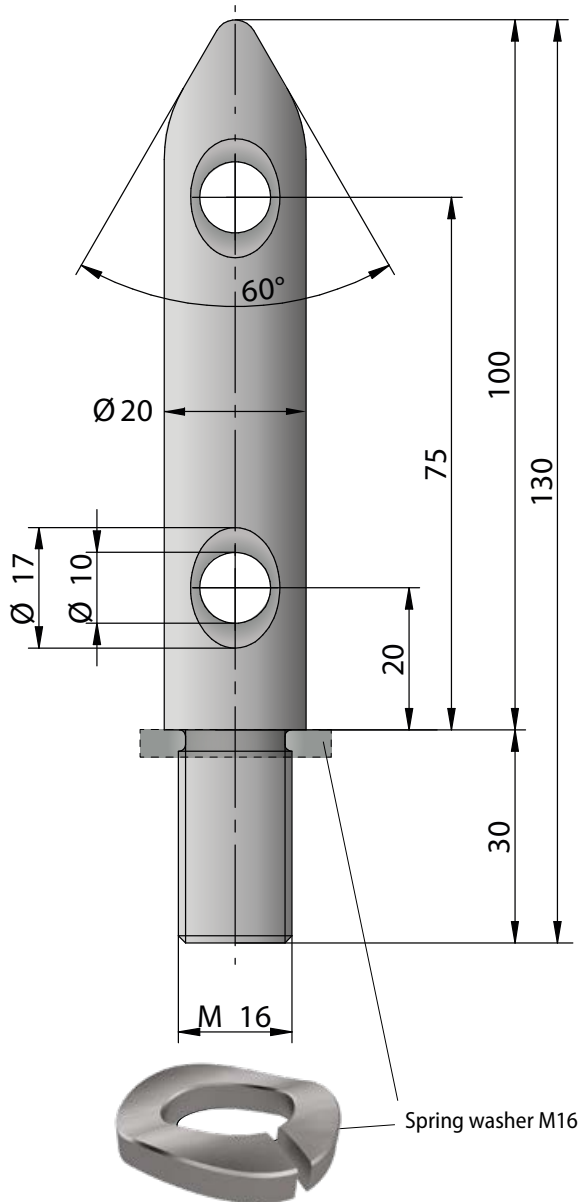
Spring washer M16

## Technical details - WALCO® BOLT C130

Art.-No.K901

1

2

3

4

5

| Pos. | Description | Art.-No. |
|------|-------------|----------|
| 1 | Ø 20 mm bolt | K909 |
| 2 | M12x120 clamping bolt | K908 |
| 3 | Clamping bolt bore | – |
| 4 | Spring washer M16 | Z895 |
| 5 | Insert D25/40 | Z644 |

# WALCO® BOLT D20

## Parts and accessories

| Art.-No.K908 | M12x120 clamping bolt |
|--------------|------------------------|

**Application:** to fix and clamp WALCO® Bolt to the wooden elements.

| Art.-No.Z644 | Insert type BL 25x40 | Art.-No.Z561/100 | Insert type BL 25x100    (optional) |
|--------------|----------------------|------------------|-------------------------------------|

**Application:** pto screw the bolt into wood.

# WALCO® BOLT

**Performance data**

| WALCO BOLT A130: 4 screws 10x60 (wall) and 4 screws 10x60 (wfloor) | | | | Tensile characteristic resistance values | Tensile design value $F_{1,Rd}$ [kN] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Element | Timber grade | Dimensions [mm] | Screwdriving | $F_{1,Rk}$ [kN] | kmod =0,6 | kmod =0,7 | kmod =0,8 | kmod =0,9 | kmod =1,0 |
| Wall | CLT (350 kg/m³) | 100 (3S) | 90° | 21.00 | 9.69 | 11.31 | 12.92 | 14.54 | 16.15 |
| Floor | CLT (350 kg/m³) | ≥ 120 (5S) | 90° | | | | | | |
| Wall | CLT (400 kg/m³) | 100 (3S) | 90° | 23.37 | 10.79 | 12.58 | 14.38 | 16.18 | 17,98 |
| Floor | CLT (400 kg/m³) | ≥ 120 (5S) | 90° | | | | | | |
| Wall | CLT (350 kg/m³) | 100 (5S) | 0° | 6.30 | 2.91 | 3.39 | 3.88 | 4.36 | 4.85 |
| Floor | CLT (350 kg/m³) | ≥ 120 (5S) | 90° | | | | | | |
| Wall | CLT (400 kg/m³) | 100 (5S) | 0° | 7.01 | 3.24 | 3.77 | 4.31 | 4.85 | 5.39 |
| Floor | CLT (400 kg/m³) | ≥ 120 (5S) | 90° | | | | | | |

▌0° butt screw connection

▌90° through-wire screw connection

**WALCO® BOLT A130**



▌90° through-wire screw connection on CLT
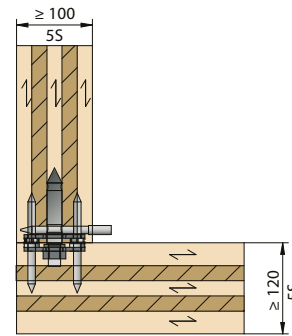


▌0° butt screw connection on CLT

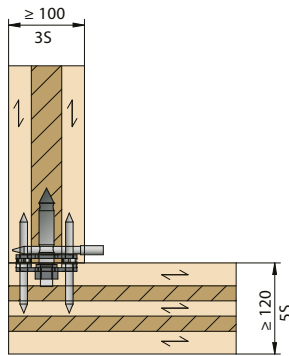| WALCO BOLT B130 and C130 : Clamping bolt (wall/joist) and B130, C130 bolt (floor) | | | | Tensile characteristic resistance values | Tensile design value $F_{1,Rd}$ [kN] | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Element | Timber grade | Dimensions [mm] | Screwdriving | $F_{1,Rk}$ [kN] | kmod =0,6 | kmod =0,7 | kmod =0,8 | kmod =0,9 | kmod =1,0 |
| Wall | CLT (350 kg/m³) | 100 (3S) | 90° | 7.20 | 3.32 | 3.88 | 4.43 | 4.99 | 5.54 |
| Floor | CLT (350 kg/m³) | ≥ 120 (5S) | 90° | | | | | | |
| Wall | CLT (400 kg/m³) | 100 (3S) | 90° | 7.76 | 3.58 | 4.18 | 4.78 | 5.37 | 5.97 |
| Floor | CLT (400 kg/m³) | ≥ 120 (5S) | 90° | | | | | | |
| Wall | Gl24c | 100 | 90° | 7.37 | 3.40 | 3.97 | 4.54 | 5.10 | 5.67 |
| Floor | CLT (350 kg/m³) | ≥ 120 (5S) | 90° | | | | | | |
| Wall | GL24h | 100 | 90° | 7.59 | 3.50 | 4.09 | 4.67 | 5.26 | 5.84 |
| Floor | CLT (400 kg/m³) | ≥ 120 (5S) | 90° | | | | | | |

▌0° butt screw connection

▌90° through-wire screw connection

**WALCO® BOLT B130**
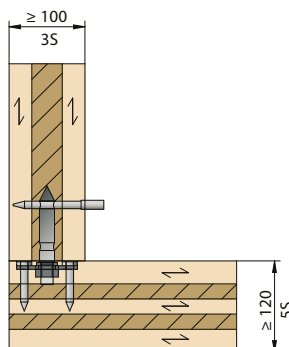
**WALCO® BOLT C130**
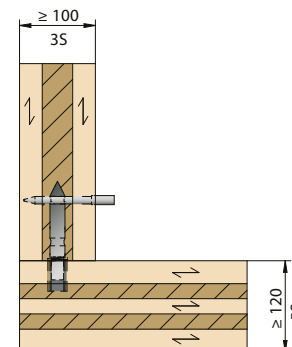
# Anchoring system

## Anchoring of timber-frame walls and posts, up to 19,6 kN*

I Timber width from 100 mm
I Highly advanced production prefabrication
I Anchoring by simply interlocking the wall elements
I Very strong anchoring
I Disassembly and reassembly without damage
I Use of the system for lifting

**WALCO® PIPE**

**Available in 2 sizes.**

The load-bearing capacity values of the connectors are available on our website in the research and design section.

\* Tensile characteristic values F1,Rk for WALCO PIPE C300 on CLT 400 Kg/m³, in accordance with ETA-23/0670 (2023/09/25).

**KNAPP®**
connectors.com

© WoodRocks Bau GmbH

# WALCO® PIPE

▎Stable and invisible connections for timber frame and CLT walls
▎Post to post connection solution
▎Precise positioning of wall elements in combination with WALCO® V
▎Can be dismantled and reassembled thanks to the thread on the needle screw
▎Lifting aid for wall units
▎Service class 1 and 2

© WoodRocks Bau GmbH

Installation example :
Wall to wall connection with Pipe System.
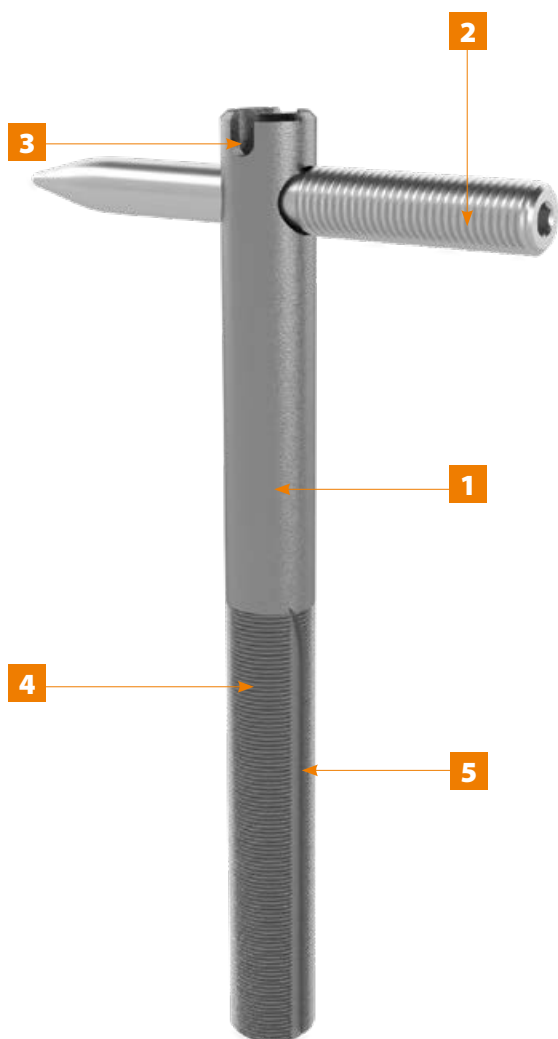
| 1 | Pipe connector for the connection of posts and wall elements. |
| 2 | Clamping bolts for securing and tightening the wall element. |
| 3 | Milled recesses to accommodate the insertion aid. |
| 4 | M28 thread. |
| 5 | Two-sided slit for easier screwing in. |

Lifting shackle

Insertion aid

**WALCO PIPE**

## Technical details

Art.-No.K903 and K904

(Dimensions in mm)

25
Ø 20
300
150
**1**
M28

180
75
M 20
6 pans creux SW8
Ø 17,5
**2** ou **3**
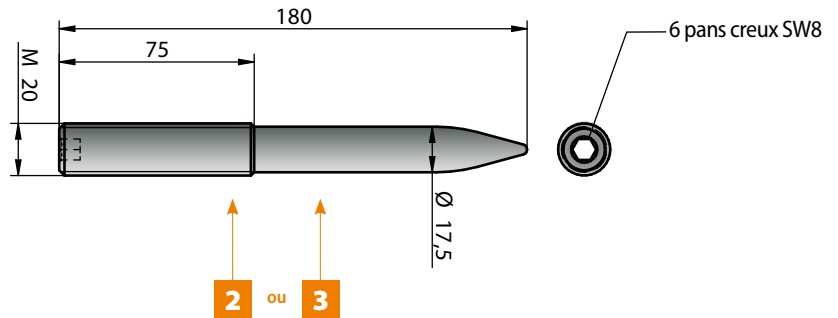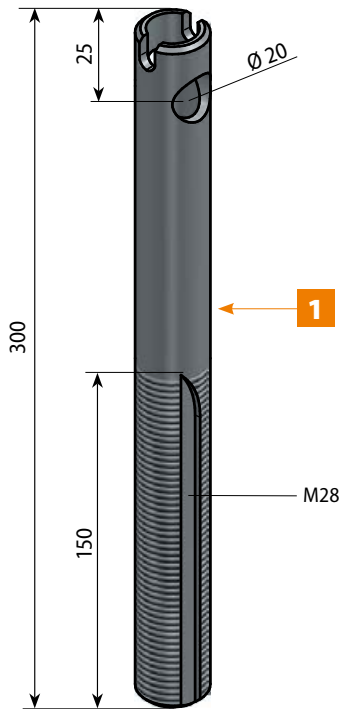
| Pos. | Description | Art.-No. |
|------|-------------|----------|
| 1 | Tube 300 M28 | K905 |
| 2 | Clamping bolt with thread Ø 18x180 | K906 |
| 3 | Clamping bolt without thread Ø 18x180 | K907 |

**N.B. : mèches adaptées disponibles sur demande.**

## Installation example

Art.-No.K903 and K904      Art.-No.K911 and K906      (Dimensions in mm)

Ø 30
75 75
50
Ø 18
300
150 *
120
160
160
Ø 26

Ø 30
75 75
50
Ø 18
250
100 *
120
160
110
Ø 26

Perçage Ø 30
Perçage Ø 18
Perçage Ø 26
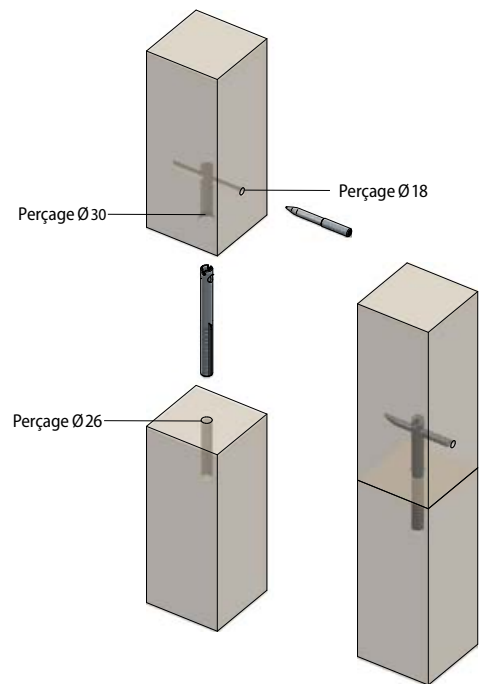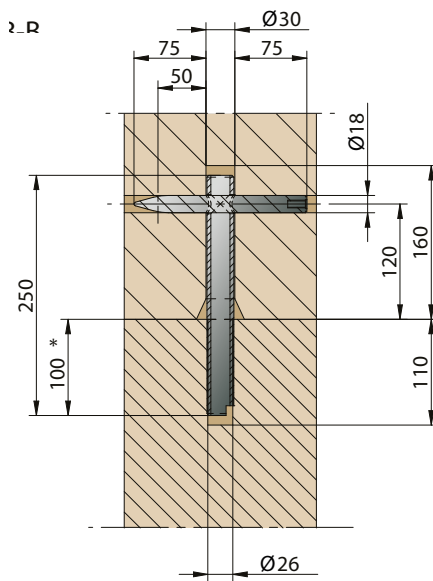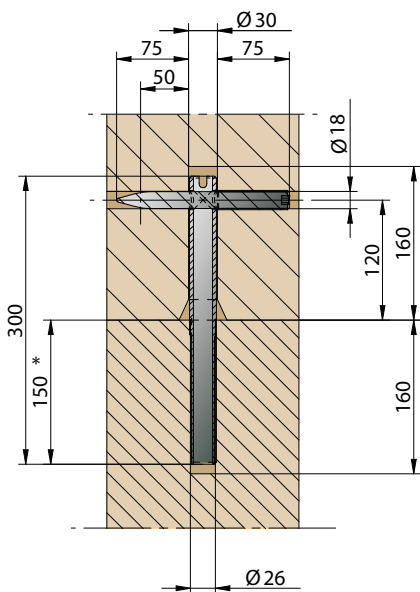
* ... La résistance des composants peut être adaptée en fonction de la
profondeur de vissage du tube dans l'élément bois. ▌Pas du filetage 3 mm.

# WALCO® PIPE M28

## Composants et accessoires

| Art.-No.K906 | Clamping bolt with thread D18x180 | Art.-No.K907 | Clamping bolt without thread D18x180 |
|---|---|---|---|

**Application:** fixing and clamping WALCO® PIPE with timber elements.

| Art.-No.K487 | Locking bolt | + Safety ball pin (Art.-No.K487/SET) | Art.-No.K488 | Lifting shackle |
|---|---|---|---|---|

Application: fixing WALCO® PIPE      Lifting timber components with WALCO® PIPE

# WALCO® PIPE

## Tensile resistance values $F_1$

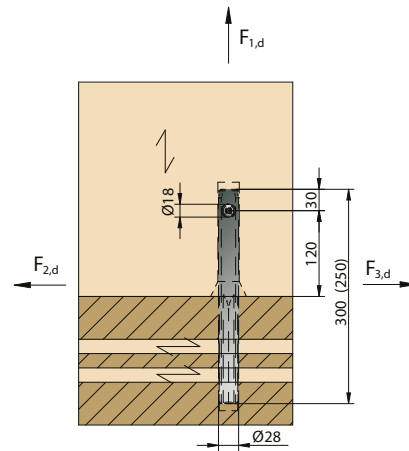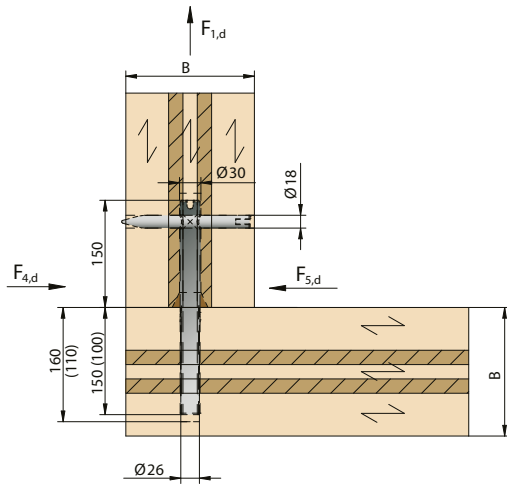| WALCO PIPE | Element | Timber grade | Dimensions [mm] | Screwdriving | Tensile characteristic resistance values $F_{1,Rk}$ [kN] | Tensile design value $F_{1,Rd}$ [kN] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | kmod =0,6 | kmod =0,7 | kmod =0,8 | kmod =0,9 | kmod =1,0 |
| C250 | Wall | CLT (350 kg/m³) NH C24 | 100 (3S) 80x180 | 0° | 14.00 | 6.46 | 7.54 | 8.62 | 9.69 | 10.77 |
| | Floor | CLT (350 kg/m³) NH C24" | 140 (5S) 120x180 | 90° | | | | | | |
| C250 | Wall | CLT (400 kg/m³) | 100 (3S) | 0° | 15.58 | 7.19 | 8.39 | 9.59 | 10.,79 | 11.98 |
| | Floor | CLT (400 kg/m³) | 140 (5S) | 90° | | | | | | |
| C250 | Post base | GL24h | 80x180 | 0° | 9.07 | 4.19 | 4.88 | 5.58 | 6.28 | 6.98 |
| | Post top | GL24h | 80x180 | 0° | | | | | | |
| C300 | Wall | CLT (350 kg/m³) NH C24" | 100 (3S) 80x180 | 0° | 18.10 | 8.35 | 9.75 | 11.14 | 12.53 | 13.92 |
| | Floor | CLT (350 kg/m³) NH C24" | 200 (5S) 180x180 | 90° | | | | | | |
| C300 | Wall | CLT (400 kg/m³) | 100 (3S) | 0° | 19.62 | 9.06 | 10.56 | 12.07 | 13.58 | 15.09 |
| | Floor | CLT (400 kg/m³) | 200 (5S) | 90° | | | | | | |
| C300 | Post base | GL24h | 80x180 | 0° | 13.60 | 6.28 | 7.32 | 8.37 | 9.42 | 10.46 |
| | Post top | GL24h | 80x180 | 0° | | | | | | |

❚ 0° butt screw connection                    ❚ 90° through-wire screw connection



## Shear strength values $F_2$ / $F_3$, in the plane of the wall

| WALCO PIPE | Element | Timber grade | Dimensions [mm] | Screwdriving | Tensile characteristic resistance values $F_{2,Rk}$ / $F_{3,Rk}$ [kN] | Tensile design value $F_{2,Rd}$ / $F_{3,Rd}$ [kN] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | kmod =0,6 | kmod =0,7 | kmod =0,8 | kmod =0,9 | kmod =1,0 |
| C250 | Wall | CLT (350 kg/m³) | 100 (3S) | 0° | 11.85 | 5.47 | 6.38 | 7.29 | 8.20 | 9.12 |
| | Floor | CLT (350 kg/m³) | 140 (5S) | 90° | | | | | | |
| C250 | Wall | CLT (400 kg/m³) | 100 (3S) | 0° | 12.89 | 5.95 | 6.94 | 7.93 | 8.92 | 9.92 |
| | Floor | CLT (400 kg/m³) | 140 (5S) | 90° | | | | | | |
| C300 | Wall | CLT (350 kg/m³) | 100 (3S) | 0° | 14.10 | 6.51 | 7.59 | 8.68 | 9.76 | 10.85 |
| | Floor | CLT (350 kg/m³) | 200 (5S) | 90° | | | | | | |
| C300 | Wall | CLT (400 kg/m³) | 100 (3S) | 0° | 15.56 | 7.18 | 8.38 | 9.58 | 10.77 | 11.97 |
| | Floor | CLT (400 kg/m³) | 200 (5S) | 90° | | | | | | |

❚ 0° butt screw connection                    ❚ 90° through-wire screw connection

## Shear strength values F$_4$ / F$_5$, perpendicular to the plane of the wall
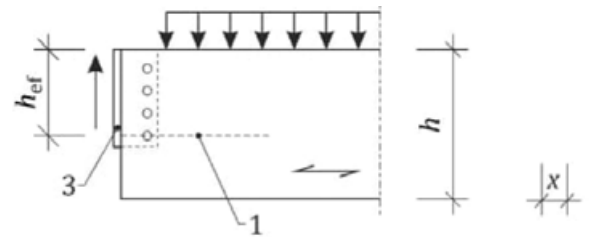
| WALCO PIPE | Element | Timber grade | Dimensions [mm] | Screwdriving | Tensile characteristic resistance values F$_{45,Rk}$ [kN] | Tensile design value F$_{45,Rd}$ [kN] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | kmod =0,6 | kmod =0,7 | kmod =0,8 | kmod =0,9 | kmod =1,0 |
| C250 | Wall | CLT (350 kg/m$^3$) | 100 (3S) | 0° | 8.42 | 3.89 | 4.53 | 5.18 | 5.83 | 6.48 |
| | Floor | CLT (350 kg/m$^3$) | 140 (5S) | 90° | | | | | | |
| C250 | Wall | CLT (400 kg/m$^3$) | 100 (3S) | 0° | 8.42 | 3.89 | 4.53 | 5.18 | 5.83 | 6.48 |
| | Floor | CLT (400 kg/m$^3$) | 140 (5S) | 90° | | | | | | |
| C300 | Wall | CLT (350 kg/m$^3$) | 100 (3S) | 0° | 8.42 | 3.89 | 4.53 | 5.18 | 5.83 | 6.48 |
| | Floor | CLT (350 kg/m$^3$) | 200 (5S) | 90° | | | | | | |
| C300 | Wall | CLT (400 kg/m$^3$) | 100 (3S) | 0° | 8.42 | 3.89 | 4.53 | 5.18 | 5.83 | 6.48 |
| | Floor | CLT (400 kg/m$^3$) | 200 (5S) | 90° | | | | | | |

❙ 0° butt screw connection     ❙ 90° through-wire screw connection

**The position is decisive for the justification of the F$_{45,Rk}$ load:**

$$F_{45,Rk} = \min \begin{cases} F_{23,Rk} \\ k_v \cdot f_{v,k} \cdot b \cdot h_{ef} \\ \dfrac{}{1,5} \end{cases}$$



## Tensile and shear strength values for the WALCO® PIPE lifting device

## WLL$_{tension}$ (WALCO Lifting Load Tension) Tensile strength of the WALCO® PIPE lifting device

| WALCO PIPE | Element | Timber grade | Dimensions [mm] | Screwdriving | WALCO® PIPE pull-off WLL$_{tension}$ [kN] | Load-splitting WLL$_{tension}$ [kN] |
|---|---|---|---|---|---|---|
| C250 | Wall | CLT (350 kg/m$^3$) | 100 (3S) | 0° | 1.10 | |
| | Floor | CLT (350 kg/m$^3$) | 140 (5S) | 90° | 3.20 | 4.10 |
| C250 | Wall | CLT (400 kg/m$^3$) | 100 (3S) | 0° | 1.30 | |
| | Floor | CLT (400 kg/m$^3$) | 140 (5S) | 90° | 3.50 | 4.10 |
| C300 | Wall | CLT (350 kg/m$^3$) | 100 (3S) | 0° | 1.70 | |
| | Floor | CLT (350 kg/m$^3$) | 200 (5S) | 90° | 4.80 | 7.60 |
| C300 | Wall | CLT (400 kg/m$^3$) | 100 (3S) | 0° | 1.90 | |
| | Floor | CLT (400 kg/m$^3$) | 200 (5S) | 90° | 5.30 | 7.60 |

❙ 0° butt screw connection     ❙ 90° through-wire screw connection

❙ The load values refer to the expert report dated 30.05.2023 (Professeur Dr.-Ing H.J. Blaß)

$$WLL_{tension} = \min \begin{cases} K_{ax} \cdot 4.800 \cdot \left( \dfrac{\rho_k}{350} \right)^{0,8} \\ \dfrac{h}{4,4 \cdot (h-150)} \cdot \left( 6,5 + \dfrac{18 \cdot 150^2}{h^2} \right) \cdot (t_{ef} \cdot h)^{0,8} \cdot f_{t,90,k} \end{cases}$$
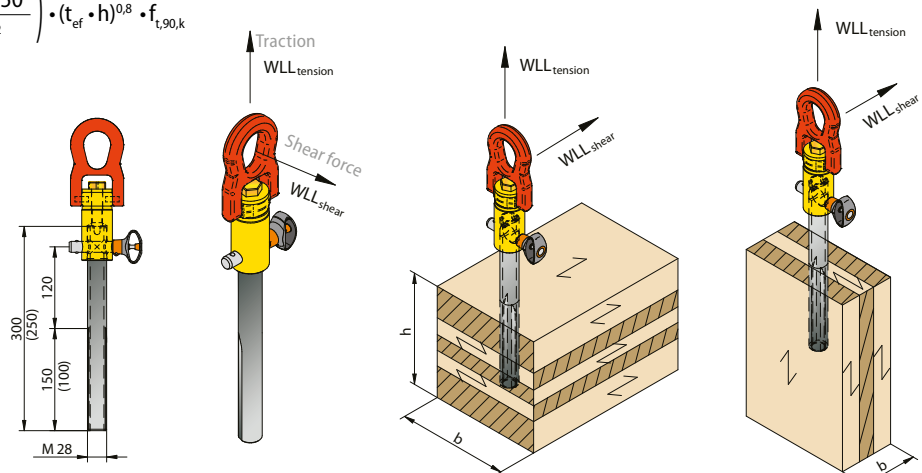
## WLL$_{shear}$ (WALCO® Lifting Tension Load) calculation example for the WALCO® PIPE lifting device

| | | | |
|---|---|---|---|
| Walco Pipe: | C300 | | |
| Diameter d = | 28 | mm | |
| Length in CLT wall t$_1$ = | 150 | mm | |
| Protruding length t$_i$ = | 165 | mm | |
| Flow moment M$_{y,Pipe,Rk}$ = | 486000 | Nmm | |
| CLT wall thickness h = | 100 | mm | |
| CLT wall width b = | 200 | mm (2 x h ) | |
| Material: | CLT | Bois de fil | |
| Density ρ$_k$ = | 350 | kg/m$^3$ | |
| Stress angle α = | 90 | ° | |
| Hole local bearing capacity f$_{h,0,k}$ = | 20,66 | N/mm$^2$ | = 0,082 x (1-0,01 x d) x ρ$_k$ |
| Hole local bearing capacity f$_{h,90,k}$ = | 4,67 | N/mm$^2$ | = 0,4 x 0,082 x (1-0,01 x d) x rk / (1,35 + 0,015 x d) |

❘ Load values refer to the expert report as of 30.05.2023 (Professeur Dr.-Ing H.J. Blaß)
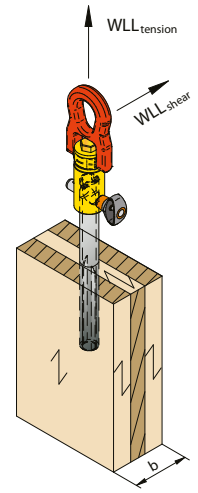
## Checking the resistance of CLT to splitting using WLL $_{shear}$ on WALCO® PIPE :

| | | | |
|---|---|---|---|
| CLT wall thickness CLT h = | 100 | mm | |
| CLT wall width CLT b = | 200 | mm (2 x h ) | |
| Shear strength f$_{v,k}$ = | 2 | N/mm$^2$ | |
| Height h$_{ef}$ = | 50 | mm | |
| a= h$_{ef}$ / h = | 0,5 | | |
| Distance x = | 215 | mm | |
| Coefficient k$_n$ = | 6,5 | (CLT) | |
| Reducing coefficient k$_v$ = | 0,234 | (EN 1995-1-1 (Gl. 6.62) | |
| | | | |
| Shear force WLL$_{shear}$ = | 0,71 | kN | =( k$_v$ x f$_{v,k}$ x b x h$_{ef}$ )/ 6,6 |
| | | | |
| Shear force WLL$_{shear}$ = | 1,95 | kN | = f$_{h,90,k}$ x 6,36 x min {65,8 ; (165$^2$ +(34700 / f$_{h,90,k}$)$^{0,5}$ - 165} |

$$K_v = \min \begin{cases} 1 \\[2mm] \dfrac{K_n\left(1+\dfrac{1,5\ i^{1,5}}{\sqrt{h}}\right)}{\sqrt{h}\left(\sqrt{a(1-a)} + 0,8\ \dfrac{x}{h}\sqrt{\dfrac{1}{a} - a^2}\right)} \end{cases}$$

| Min. shear. WLL$_{shear}$ = | 0,71 | kN |
|---|---|---|

$$WLL_{shear} = \min \begin{cases} \dfrac{K_{ax}\cdot 6,36 \cdot \min\begin{cases}65,8 \\ \sqrt{165^2 + \dfrac{34.700}{f_{h,k}}} - 165\end{cases}}{k_v \cdot f_{v,k}\cdot b \cdot h_{ef}} \\ \dfrac{}{6,6} \end{cases}$$

**Note:** to increase the WLL$_{shear}$ load-bearing capacity on CLT, it is necessary to add full-thread screws on the face of the wall next to WALCO® PIPE. These prevent the CLT walls or floors from splitting!

### Combined analysis:

$$\left(\frac{F_{Ed,\ tension}}{F_{WLL,\ tension}}\right)^2 + \left(\frac{F_{Ed,\ shear}}{F_{WLL,\ shear}}\right)^2 \leq 1$$

WLL$_{tension}$

WLL$_{shear}$

## Reference project
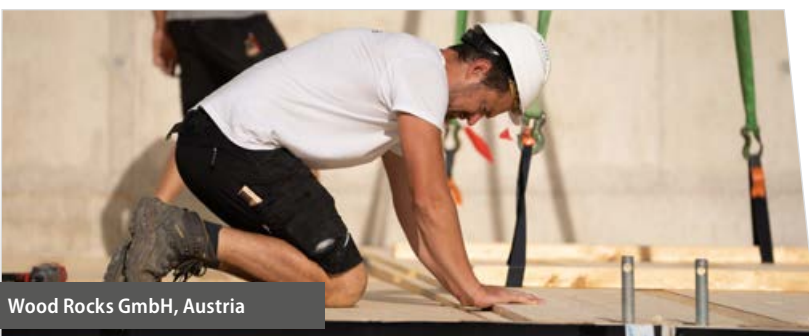


Wood Rocks GmbH, Austria

# Anchoring solution for timber walls

## L and T-shaped connector, anchoring timber-frame walls up to 10.8 kN

I Prefabrication of the wall modules in the factory

I Absorption of tensile and shear forces through the anchoring in the wall axis

I Stable fastening of the walls by means of tie rods and angle bracket

I Space-saving transport

I Easy adjustment of the walls on site

I Short assembly time of up to 15-20 minutes time saving per wall element(compared with conventional conventional bracket solutions)

**WALCO® L and T**
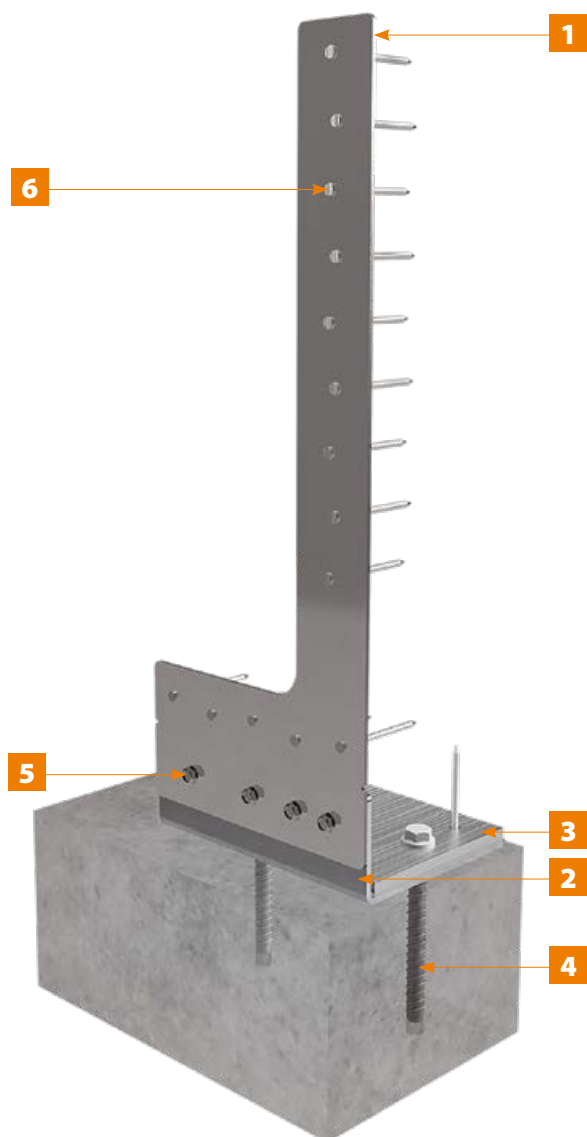
**Available in 1 size and 2 versions.**

**Design values are available on our website under Planer Service.**

Valeurs de résistance WALCO® L and T suivant ETA 10-0189 (2022/08/25).

**KNAPP®**
connectors.com
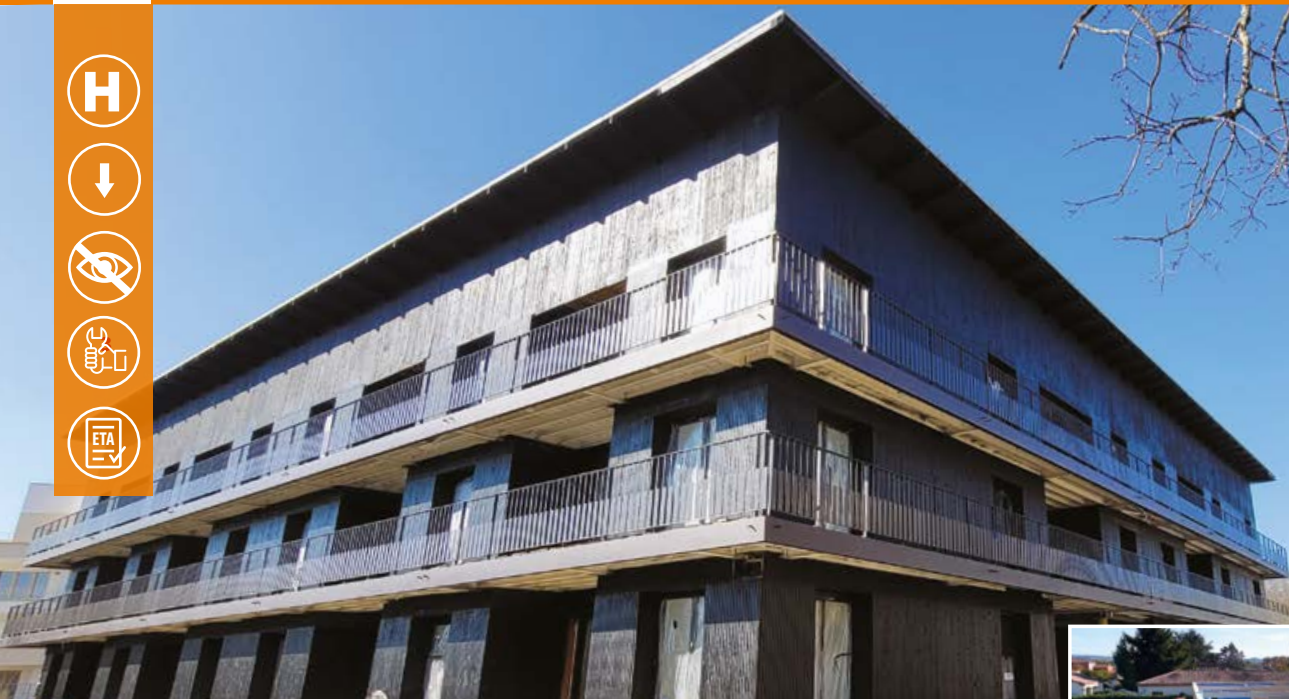
# WALCO® L and T

Installation example: Mounted on wall element.

| | |
|---|---|
| **1** | Hot-dip galvanised 3 mm sheet steel. Silver finish. |
| **2** | 4 mm galvanised steel anchor bracket |
| **3** | 10 mm Reinforcement pressure plate to ensure very high load bearing capacity |
| **4** | Concrete screw 12x130 requires a small drilling depth |
| **5** | Self-tapping hexagonal screw M8x25 for force-locking fastening and backlash-free connection. |
| **6** | Ring shank connecting nails 4x75 for quick processing with nailing equipment |

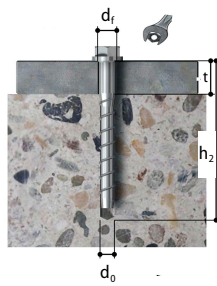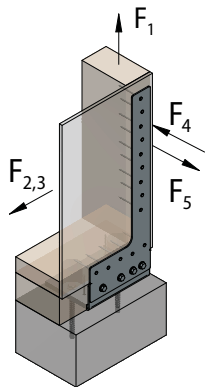**Can be combined with wall connector WALCO® V 60/80**

Our Planner service does not replace approval by an authorised structural engineer.

**PLANNER SERVICE**

# WALCO® L

**Tensile load values $F_{1,Rd}$ for tension anchor WALCO® L with fischer ULTRACUT FBS II concrete screw**



| FBS II 12x130 70/55/30 US, galvanised steel | |
|---|---|
| Drill diameter $d_0 =$ | 12 mm |
| Drill depth $h_2 =$ | 140 mm |
| Calculated anchoring depth $h_{ef} =$ | 81 mm |
| Installation depth $h_{nom} =$ | 100 mm |
| Minimum edge distance $c_{2,min} =$ | 73 mm |
| Reinforcement plate thickness $t =$ | 10+4 = 14 mm |
| Approval: | ETA-15/0352, Option 1 |

| KNAPP® connector | Minimum cross-section Stud [mm] | Cladding [mm] | Design values in NH C24 and concrete C20/25 | | Design values in NH C24 and concrete C25/30 | |
|---|---|---|---|---|---|---|
| | | | Max. tensile load $F_{1,Rd}$ [kN] LDC: short | Max. tensile load $F_{1,Rd}$ [kN] LDC: short/very short | Max. tensile load $F_{1,Rd}$ [kN] LDC: short | Max. tensile load $F_{1,Rd}$ [kN] LDC: short/very short |
| WALCO® L<br>9 Ring shank nails 4x75 in stud<br>5 Ring shank nails 4x75 in sill plate<br>4 Hexagonal screws M8x25<br>2 Concrete screws 12x130 * | 80x145 SWD C24 | 12 mm OSB 3 / OSB 4 Chipboard | 16,84<br>$F_{B,t,Rd} = 20,00$ | 17,31<br>$F_{B,t,Rd} = 20,00$ | 16,84<br>$F_{B,t,Rd} = 22,30$ | 17,31<br>$F_{B,t,Rd} = 22,30$ |
| | 80x145 SWD C24 | 15 mm OSB 3 / OSB 4 Chipboard | 17,20<br>$F_{B,t,Rd} = 20,00$ | 17,31<br>$F_{B,t,Rd} = 20,00$ | 17,20<br>$F_{B,t,Rd} = 22,30$ | 17,31<br>$F_{B,t,Rd} = 22,30$ |
| | 80x145 SWD C24 | 18 mm OSB 3 / OSB 4 Chipboard | 17,30<br>$F_{B,t,Rd} = 20,00$ | 17,31<br>$F_{B,t,Rd} = 20,00$ | 17,20<br>$F_{B,t,Rd} = 22,30$ | 17,31<br>$F_{B,t,Rd} = 22,30$ |
| | 80x145 SWD C24 | 22 mm OSB 3 / OSB 4 Chipboard | 16,90<br>$F_{B,t,Rd} = 20,00$ | 17,31<br>$F_{B,t,Rd} = 20,00$ | 17,20<br>$F_{B,t,Rd} = 22,30$ | 17,31<br>$F_{B,t,Rd} = 22,30$ |
| WALCO® L<br>9 Ring shank nails 4x75 in stud<br>5 Ring shank nails 4x75 in sill plate<br>4 Hexagonal screws M8x25<br>2 Concrete 12x130 * | 80x145 SWD C24 | 9 mm Plywood | 15,22<br>$F_{B,t,Rd} = 20,00$ | 16,25<br>$F_{B,t,Rd} = 20,00$ | 15,22<br>$F_{B,t,Rd} = 22,30$ | 16,25<br>$F_{B,t,Rd} = 22,30$ |
| | 80x145 SWD C24 | 12 mm Plywood | 15,48<br>$F_{B,t,Rd} = 20,00$ | 16,53<br>$F_{B,t,Rd} = 20,00$ | 15,48<br>$F_{B,t,Rd} = 22,30$ | 16,53<br>$F_{B,t,Rd} = 22,30$ |
| | 80x145 SWD C24 | 15 mm Plywood | 15,54<br>$F_{B,t,Rd} = 20,00$ | 16,57<br>$F_{B,t,Rd} = 20,00$ | 15,54<br>$F_{B,t,Rd} = 22,30$ | 16,57<br>$F_{B,t,Rd} = 22,30$ |
| | 80x145 SWD C24 | 18 mm Plywood | 15,51<br>$F_{B,t,Rd} = 20,00$ | 16,52<br>$F_{B,t,Rd} = 20,00$ | 15,51<br>$F_{B,t,Rd} = 22,30$ | 16,52<br>$F_{B,t,Rd} = 22,30$ |
| | 80x145 SWD C24 | 22 mm Plywood | 15,35<br>$F_{B,t,Rd} = 20,00$ | 16,29<br>$F_{B,t,Rd} = 20,00$ | 15,35<br>$F_{B,t,Rd} = 22,30$ | 16,29<br>$F_{B,t,Rd} = 22,30$ |
| WALCO® L<br>9 Ring shank nails 4x75 in stud<br>5 Ring shank nails 4x75 in sill plate<br>4 Hexagonal screws M8x25<br>2 Concrete 12x130 * | 80x145 SWD C24 | 12 mm GKB / GKF | 14,74<br>$F_{B,t,Rd} = 20,00$ | 16,09<br>$F_{B,t,Rd} = 20,00$ | 14,74<br>$F_{B,t,Rd} = 22,30$ | 16,09<br>$F_{B,t,Rd} = 22,30$ |
| | 80x145 SWD C24 | 15 mm GKB / GKF | 15,91<br>$F_{B,t,Rd} = 20,00$ | 17,31<br>$F_{B,t,Rd} = 20,00$ | 15,91<br>$F_{B,t,Rd} = 22,30$ | 17,31<br>$F_{B,t,Rd} = 22,30$ |
| | 80x145 SWD C24 | 18 mm GKB / GKF | 17,10<br>$F_{B,t,Rd} = 20,00$ | 17,31<br>$F_{B,t,Rd} = 20,00$ | 17,10<br>$F_{B,t,Rd} = 22,30$ | 17,31<br>$F_{B,t,Rd} = 22,30$ |

\* The table shows the load values $F_{B,t,Rd}$ of the fischer ULTRACUT FBS II concrete screws 12x130 70/55/30 US in concrete C20/25 and C25/30.
   If other concrete screws are used, these load values must be adjusted and, if necessary, verified again.

**Proof for the tensile load direction $F_1$: ( $F_{1,Ed}$ / $F_{1,Rd}$ ) ≤ 1,0**

**Verification for tensile load in concrete anchor:** ($F_{B,t,Ed}$ / $F_{B,t,Rd}$) ≤ 1,0
**Tensile load in concrete anchor:** $F_{B,t,Ed} = F_{1,Ed}$ x $k_t$ = $F_{1,Ed}$ x 1,4

| | |
|---|---|
| LDC | Load duration class |
| short | Short period (exposure shorter than one week) |
| short/very short | short/very short period (new LDC for wind in NA) |
| $F_{1,Ed}$ | Rated value of the tensile load (existing tensile load from the timber stud wall) |
| $F_{1,Rd}$ | Measurement value of the tensile load carrying capacity of the WALCO® L connector |
| $F_{B,t,Ed}$ | Design value of the tensile load of concrete screw |
| $k_t$ | Parameters for determining the axial load of the concrete screw/ concrete anchor |
| OSB 3 / OSB 4 | According to ETA approval or DIN EN 300 or DIN EN 12369-1 |
| Chipboard | According to ETA approval or DIN EN 312 |
| Plywood | According to ETA approval or DIN 20000-1:2017-06 (softwood) |
| GKB / GKF | Gypsum plasterboards/ fiber reinforced plasterboard according to ETA |

**Calculation example:**

WALCO® L tie rod connection is installed in an 80x145 mm NH C24 stud with 15 mm OSB planking and C20/25 concrete floor slab.

Der WALCO® L is loaded by a tensile load $F_{1,Ed}$ = 14 kN (LDC: short/ very short). The $k_t$ value for the off-centre tension connection in the concrete floor slab for the WALCO® L is 1,4.
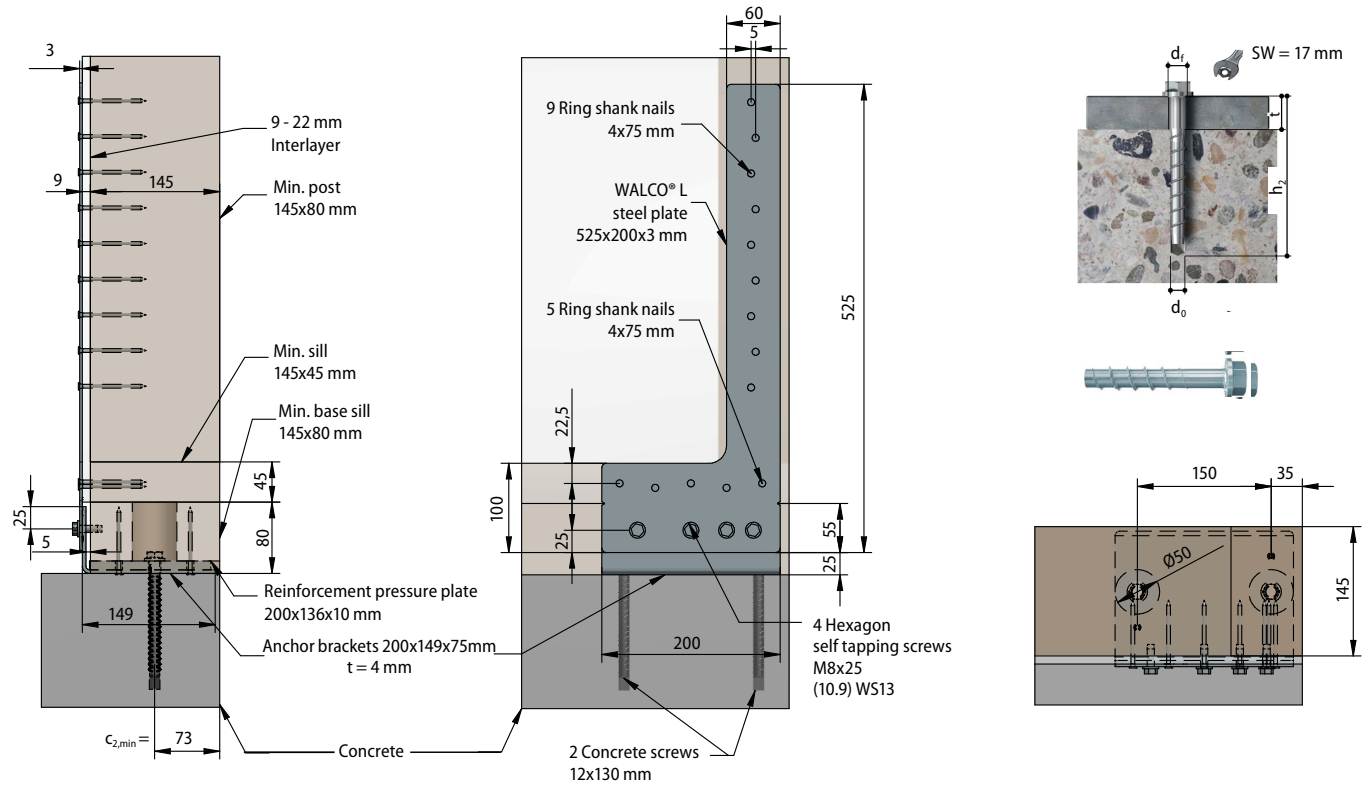
**Timber stud verification:** ($F_{B,t,Ed}$ / $F_{B,t,Rd}$) ≤ 1,0          ( 14,0 / 17,3 ) = 0,81 < 1,0
**Tensile load in the concrete anchor:** $F_{B,t,Ed} = F_{1,Ed}$ x $k_t$ = $F_{1,Ed}$ x 1,4 = 14 x 1,4 = 19,6 kN
**Concrete anchor verification:** ($F_{B,t,Ed}$ / $F_{B,t,Rd}$) ≤ 1,0          ( 19,6/ 20 ) = 0,98 < 1,0

The load values for the concrete anchor/concrete screw in the concrete substructure can be designed separately using a design programme, e.g. C-FIX from fischer. The WALCO® L can also be loaded and designed in other load directions  $F_{23}$, $F_4$ und $F_5$.
These verifications with the WALCO® L load values can be found in the ETA 10-0189 approval.

# WALCO® L - Anchoring connector for timber walls
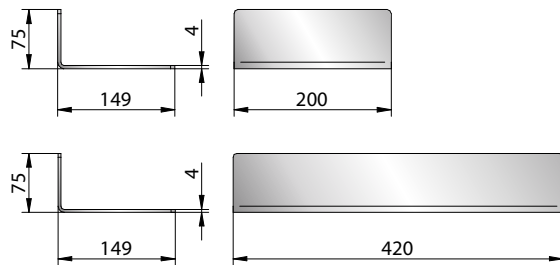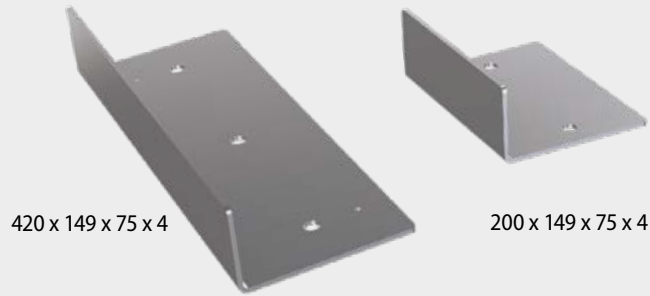
**WALCO® L**

(Dimensions in mm)

3

9 - 22 mm Interlayer

Min. post 145x80 mm

145

9

Min. sill 145x45 mm

Min. base sill 145x80 mm

45

80

25

5

Reinforcement pressure plate 200x136x10 mm

149

Anchor brackets 200x149x75mm t = 4 mm

$c_{2,min}$ = 73

Concrete

60
5

9 Ring shank nails 4x75 mm

WALCO® L steel plate 525x200x3 mm

5 Ring shank nails 4x75 mm

525

22,5

100

25

55

25

200

4 Hexagon self tapping screws M8x25 (10.9) WS13

2 Concrete screws 12x130 mm

$d_f$    SW = 17 mm

t

$h_2$

$d_0$

150

35

145

Ø50

**I** Hot-dip galvanised sheet steel - 3mm for left and right position

## Anchor bracket

**Art.-No. K496**

**Art.-No. K497**

420 x 149 x 75 x 4

200 x 149 x 75 x 4

## Reinforcement (pressure) plate

**Art.-No. K498**

**Art.-No. K499**

420 x 136 x 10

200 x 136 x 10

75

4

149

200

75

4

149

420
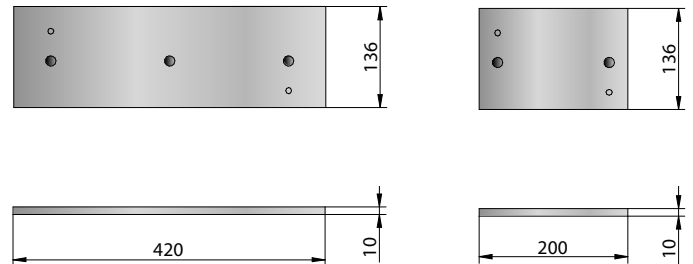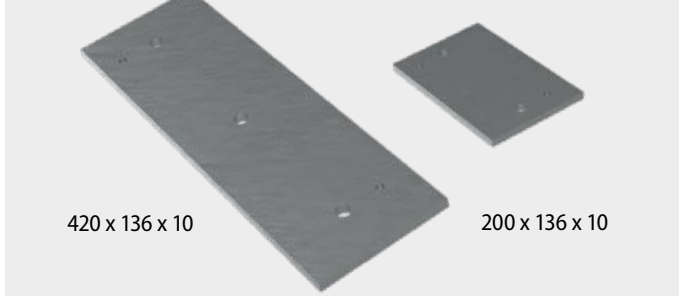
**I** 4 mm galvanized steel anchor bracket with pre-drilled fastening holes.

136

136

420

10

200

10

**I** 10 mm galvanized steel strengthening plate with pre-drilled fastening holes.

AUSTRIA

ETA

CE

ETA-10/0189 (2022/08/25)

WALCO L

# WALCO® L - Anchoring connector for timber walls

## WALCO® L - Single connection

Art.-No.K495/EA
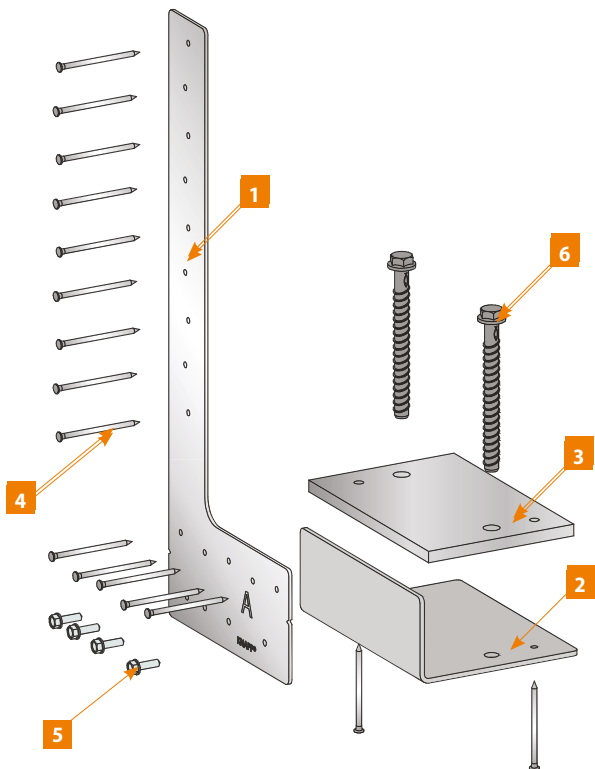


I The Hexagon screws M8x25 **5** , require pre-drilling with Ø 7.4 mm into side of anchor bracket **2** for on-site assembly.

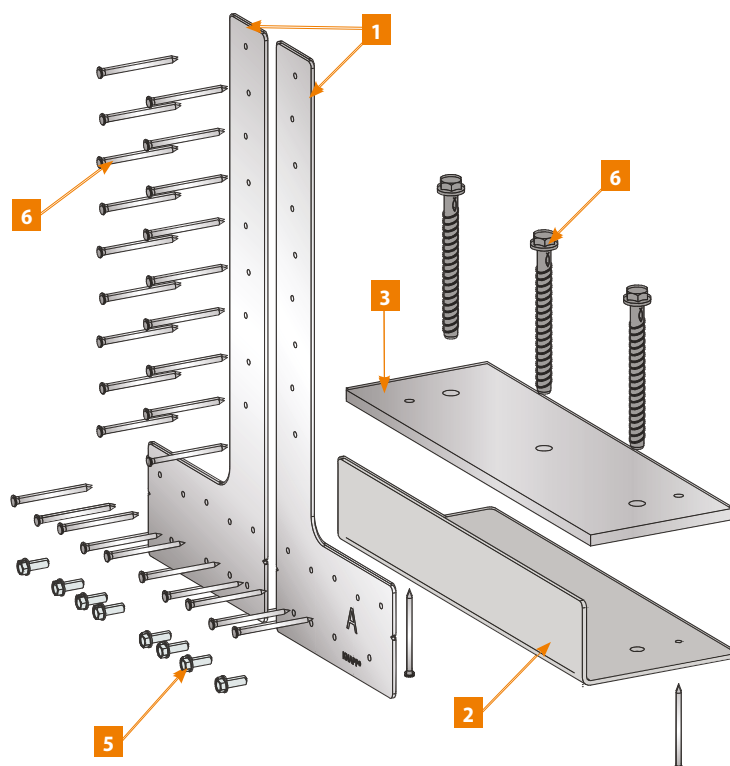### WALCO® L Set - Parts list single connector K495/EA

| | Art.-No. | Description | Quantity |
|---|---|---|---|
| 1 | K495 | Steel plate 3 mm thick | 1 piece |
| 2 | K497 | Anchor bracket 200/4 mm | 1 piece |
| 3 | K499 | Reinforcement plate 200/10 mm | 1 piece |
| 4 | Z850 | Ring shank nail 4x75 mm | 16 pieces |
| 5 | Z648 | Hexagon screw M8x25 mm | 4 pieces |
| 6 | Z852 | Concrete screw 12x130 mm | 2 pieces |

# WALCO® T - Anchoring connector for timber walls

## WALCO® T - Double connection

Art.-No.K495/DA
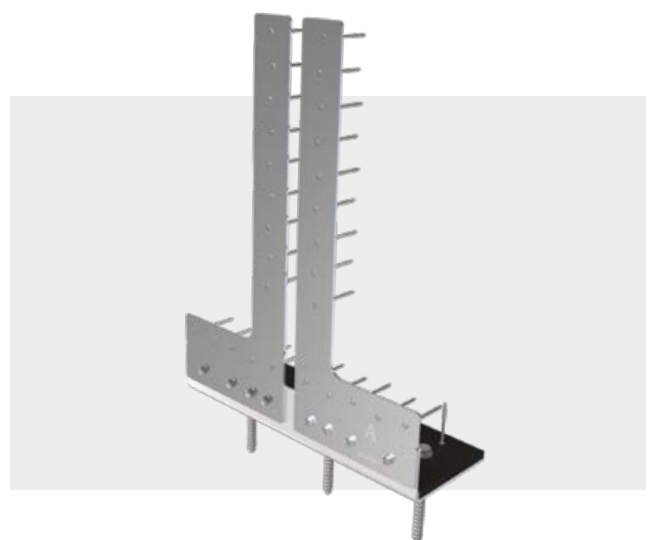


### WALCO® T Set - Parts list double connector K495/DA

| | Art.-No. | Description | Quantity |
|---|---|---|---|
| 1 | K495 | Steel plate 3 mm thick | 2 pieces |
| 2 | K496 | Anchor bracket 420/4 mm | 1 piece |
| 3 | K498 | Reinforcement plate 420/10 mm | 1 piece |
| 4 | Z850 | Ring shank nail 4x75 | 30 pieces |
| 5 | Z648 | Hexagon screw M8x25 mm | 8 pieces |
| 6 | Z852 | Concrete screw 12x130 | 3 pieces |

# WALCO® Installation

## Prefabrication in factory
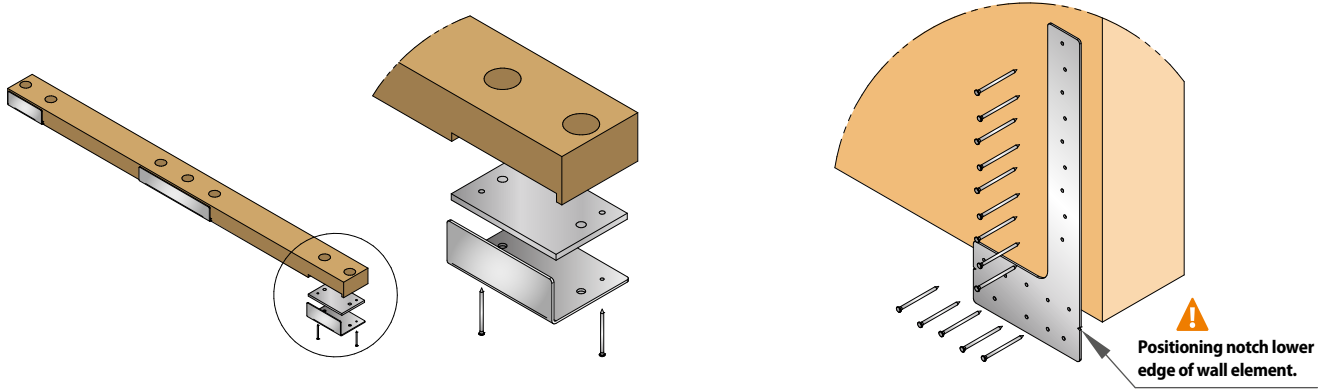


Mounting the anchor bracket with his reinforcement plate on the sill plate.

Mounting the L-shaped steel plate to wall element using the anchor nails.

**Positioning notch lower edge of wall element.**

## Anchor bracket and sill plate installation on site



Concrete slab

Position sill plate and fix to concrete slab.

## Wall installation

WALCO® T

WALCO® L



Position and screw elements together.
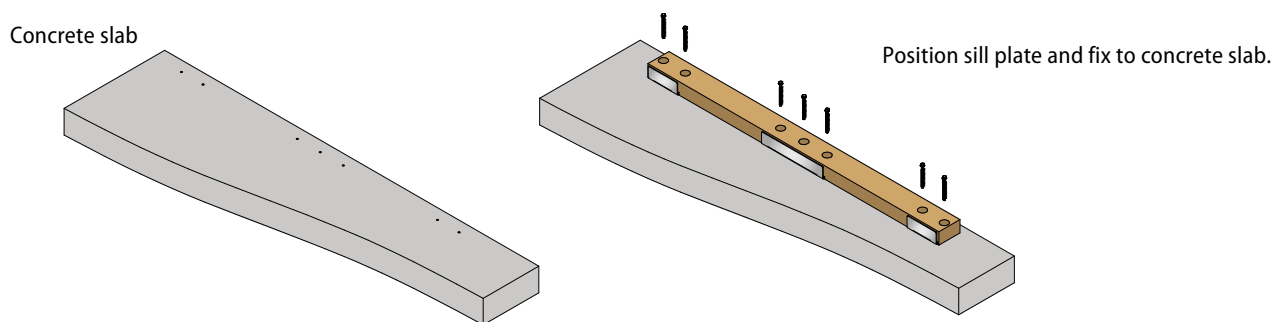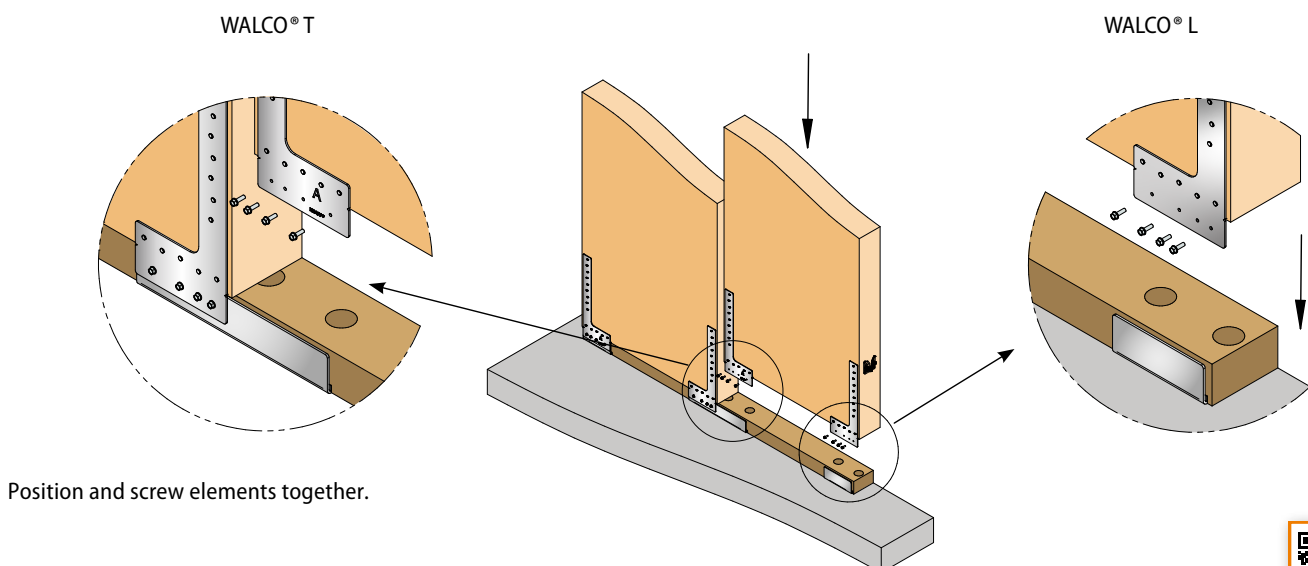
**VIDEO**

# Angled connection cylinder

### Three-dimensional screw joint cylinder up to 26 kN*  for diagonal screw connection

I Flush - no protruding connector parts
I Readjustable
I Dismantling and reassembly possible
I High degree of prefabrication
I Easy to install - simple positioning in the drill hole

**T-JOINT**

**Available in 5 sizes and 2 versions.**

**The values only apply when used with original KNAPP®
screws! Design values are available on our website under
Planner Service.**

\* Characteristic value $F_{t,Rk}$ applies to T-Joint D40 W30 in CLT walls.

**KNAPP®**
connectors.com

# T-JOINT

❙ **Applications: for flush 30º and 45º inclined screw connections, for bending resistant connections, floor connections and tension and wall joints as well as straight and angled connections.**

❙ **Connection: BSH, CLT, BauBuche, solid structural timber, MHM (solid timber wall), steel and timber tension joints.**

❙ **Areas of application: Ideal for timber construction, house building, pergola, carport and tensile force transmission in combination with steel ties for rigid connections (rafters of roof overhangs), timber stud walls and additional fastening of wooden panels of cantilevered canopies.**

❙ **Service class 1, 2 and 3.**

Installation example: T-JOINT D20
Hellabrunn Wildlife Park, Germany.

© Greinwald (2)
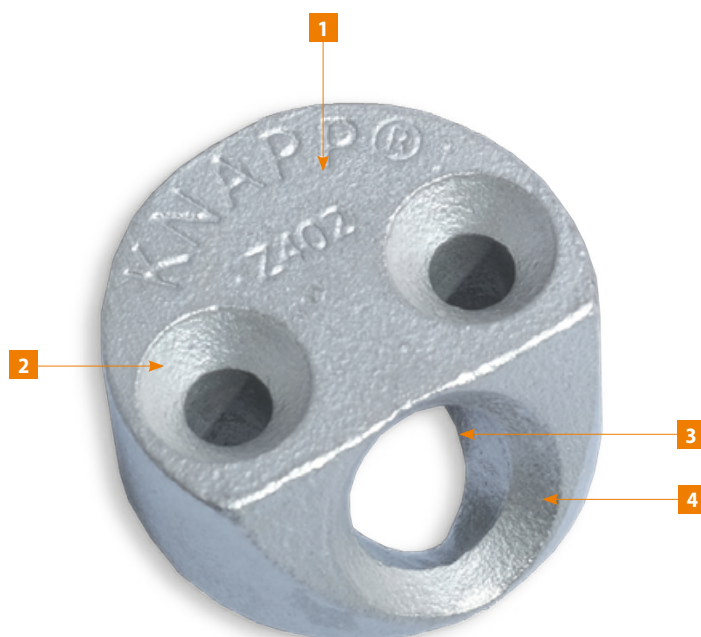


**1** Cylinder connector for screwing into wooden parts (cast inox)

**2** Cast steel screw connector for drilling into wooden components

**3** Suitable for Ø8 to Ø12 mm countersunk screws

**4** Optimum load distribution of the tensile force over the base and cylinder surface

**5** Countersunk screw hole Ø5 to Ø6 mm for positioning and/or additional fixing

T-JOINT can be used alone or in combination with RICON® Connectors, RICON® S, WALCO® V and MEGANT®.

ETA   ETA-19/0628 (2022/06/13)

T-JOINT

## Installation



With T-JOINT D35 W30 fastened hardwood tension ties for BSH tension joints.



Carport without brace.



RICON® S 140x60 VS + 4x8 mm threaded rods (double connection)

T-JOINT D35/W45 + 10x200 mm screw

T-JOINT D35/W45 + 10x300 mm screw

T-JOINT D35/W45 + 10x450 mm screw

T-JOINT D35/W45 + 10x200 mm screw
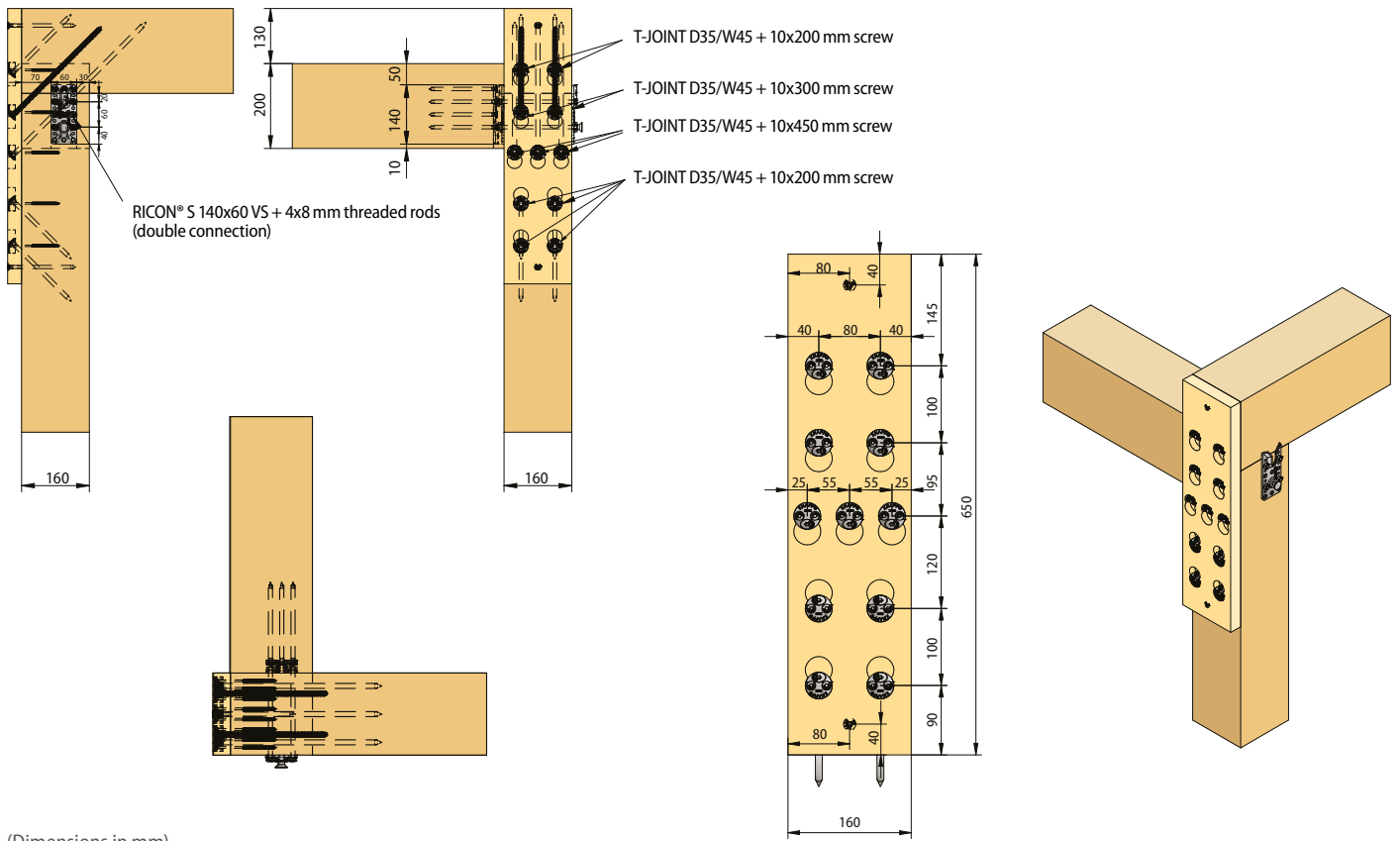
(Dimensions in mm)

## Connection details
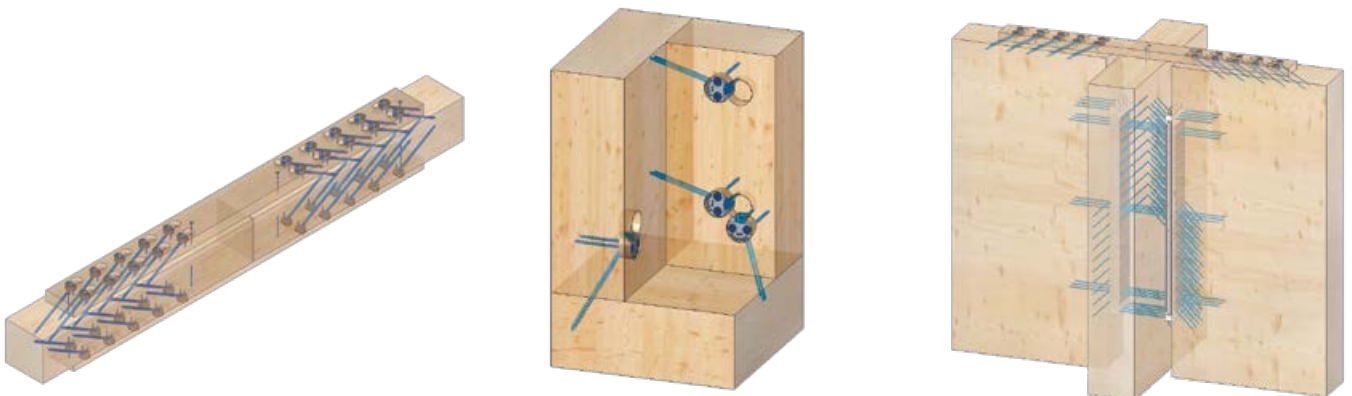


T-JOINT D35 W30 fastened hardwood tension ties for BSH tension joints.
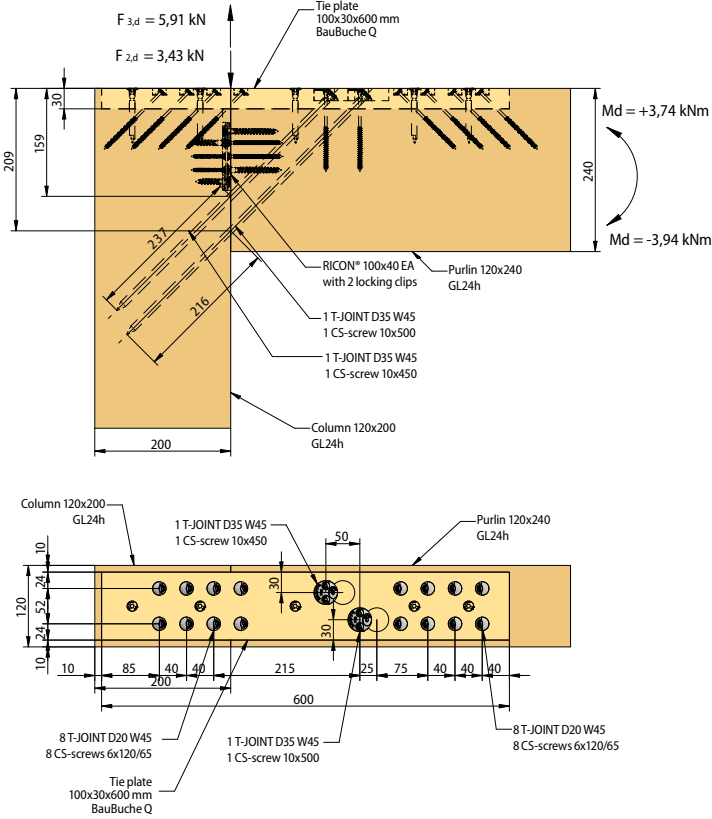


Corner tensile connection with T-JOINT D35 W30.



MEGANT® main secondary beam connection with T-JOINT D35 W30 screwed-on hardwood tensile ties.

# T-JOINT

## T-JOINT D35 W45 installation examples and connection details

### Tie plate with T-JOINT D35 W45 and T-JOINT D20 W45

(Dimensions in mm)



F $_{3,d}$ = 5,91 kN
F $_{2,d}$ = 3,43 kN

Tie plate
100x30x600 mm
BauBuche Q

Md = +3,74 kNm
Md = -3,94 kNm

RICON® 100x40 EA
with 2 locking clips
Purlin 120x240
GL24h

1 T-JOINT D35 W45
1 CS-screw 10x500

1 T-JOINT D35 W45
1 CS-screw 10x450

Column 120x200
GL24h

Column connection

Purlin connection

Column 120x200
GL24h

1 T-JOINT D35 W45
1 CS-screw 10x450

Purlin 120x240
GL24h

8 T-JOINT D20 W45
8 CS-screws 6x120/65

1 T-JOINT D35 W45
1 CS-screw 10x500

8 T-JOINT D20 W45
8 CS-screws 6x120/65

Tie plate
100x30x600 mm
BauBuche Q
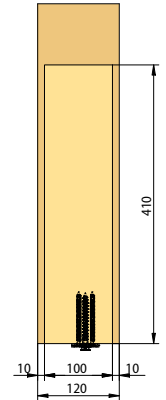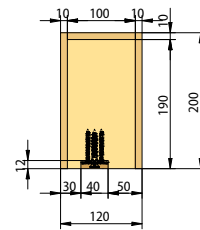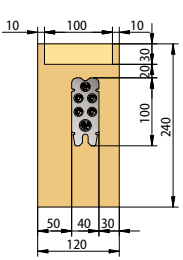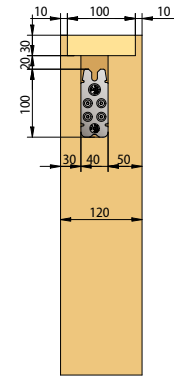
## T-JOINT D35 W45 installation examples and connection details

### Rigid connection with T-Joint and tie plate

(Dimensions in mm)
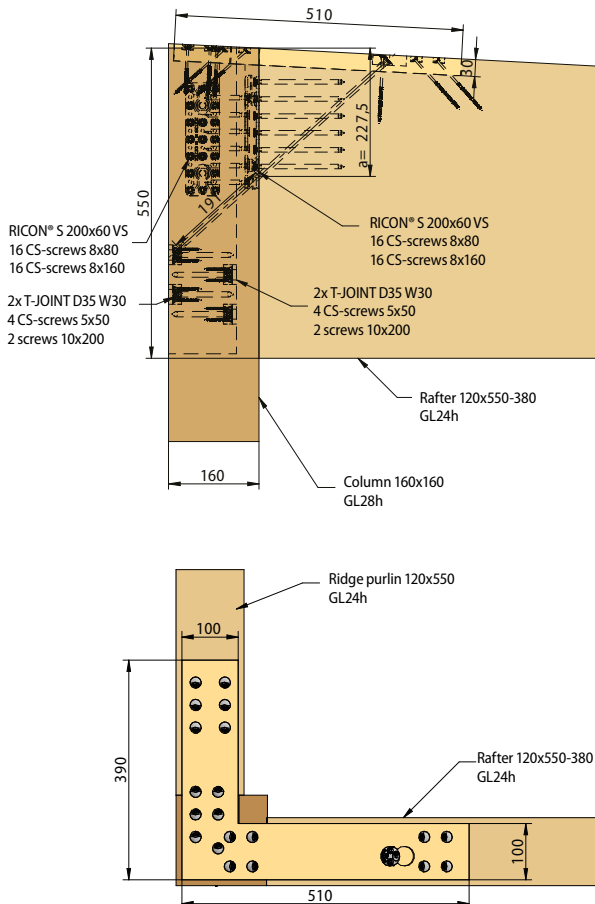
### Rigid column-beam connection



RICON® S 200x60 VS
16 CS-screws 8x80
16 CS-screws 8x160

2x T-JOINT D35 W30
4 CS-screws 5x50
2 screws 10x200

RICON® S 200x60 VS
16 CS-screws 8x80
16 CS-screws 8x160

2x T-JOINT D35 W30
4 CS-screws 5x50
2 screws 10x200

Rafter 120x550-380
GL24h

Column 160x160
GL28h

RICON® S 200x60 VS
16 CS-screws 8x80
16 CS-screws 8x160

Rafter 120x550-380
GL24h

Ridge purlin 120x550
GL24h

Column 160x160
GL28h

Ridge purlin 120x550
GL24h

Rafter 120x550-380
GL24h

**T-JOINT NOTICE**

## Installation examples



**1** Inclined rafter connections attached to the top of the dome with T-JOINT.



**2**



**5**

Photo 1 and 2: Yakgehege Tierpark Hellabrunn © Greinwald



**3** Rigid frame corner with T-JOINT and tension tie made of laminated veneer lumber for terrace roof with the view on columns, purlins and rafters.



**4**

Photo 3, 4 and 5: © Hausmeisterservice Schwarzenberg



**6** T-JOINT strengthening on post connections

Photo 6: © Tischlerei Matthias Komm



**7** Jonctions de faîtage, chevrons-poutres principales, rigides à la flexion avec T-Joint D40/W30.



**8**

Photo 7 and 8: © Pacegrade BV White Eagle Lodge



**9**



**10**

Photo 9, 10 and 11: © KNAPP GmbH



**11** Bending-resistant main beam-rafter connections with T-Joint D40/W30.

## Installation



Manual processing with
KNAPP® drilling templates.



T-JOINT D20 Drill hole
approx. 3 mm deep



Pre-drill at an angle using the
KNAPP® drilling template.



Screw on T-JOINT D20.



T-JOINT D30 or D35 prepositioned
with 2 CS-screws Ø 5 mm[1].



Screw on T-JOINT.



Longueur

T-JOINT screwed in place.

| T-JOINT holes dim. | | | |
|---|---|---|---|
| T-JOINT | Ø | Length | Depth |
| 20 | 20 mm | | 9,5 mm |
| 30 | 30 mm | 57 mm | 18 mm |
| 35 | 35 mm | 65 mm | 18 mm |
| 35 (45°) | 35 mm | 50 mm | 18 mm |
| 40 | 40 mm | _ | 3 mm |
| 40 | 40 mm | 75 mm | 18 mm |

[1] Pre-drilling of the fixing screws only for hardwood.

The T-JOINT makes it possible to produce inclined screw connections with exactly defined and repeatable screw angles in a statically calculable way.

The connection is very easy to handle, increases the degree of prefabrication and reduces assembly times as considerably fewer screws are required.

**T-JOINT D20**



| T-JOINT D20/W45 - Galvanised cast steel | |
|---|---|
| Art.-No. Z606 | KNAPP® T-JOINT Ø 20 mm, 45° screw angle |
| | Recommended screws: KNAPP® CS-screws 6x100 mm (Art.-No. Z494) or KNAPP® CS-screws 6x120 mm (Art.-No. Z495) |

**T-JOINT D30**



| T-JOINT D30/W30 - Galvanised cast steel | |
|---|---|
| Art.-No. Z617 | KNAPP® T-JOINT Ø 30 mm, angle de screw 30° |
| | Recommended screws: KNAPP® CS-screws 5x50 mm with reinforced shaft (Art.-No. Z533) or KNAPP® CS-screws 5x80 mm with reinforced shaft (Art.-No. Z534) **Fixing:** 2 screws are required for pre-assembling the T-JOINT D30. |
| | KNAPP® CS-screws 8x160 mm with reinforced shaft (Art.-No. Z581) or KNAPP® CS-screws 8x240 mm with reinforced shaft (Art.-No. Z672) or KNAPP® CS-screws 10x200 mm with reinforced shaft (Art.-No. Z583) |

**T-JOINT D35**



| T-JOINT D35/30 and  D35/45- inox | |
|---|---|
| Art.-No. Z402 | KNAPP® T-JOINT Ø 35 mm, 30° screw angle |
| Art.-No. Z403 | KNAPP® T-JOINT Ø 35 mm, 45° screw angle **Application:** for steep approach angles for diagonal screw connections. |
| | Recommended screws: KNAPP® CS-screws 5x50 mm with reinforced shaft (Art.-No. Z533) or KNAPP® CS-screws 5x80 mm with reinforced shaft (Art.-No. Z534) **Fixing:** 2 screws are required for pre-assembling the T-JOINT D35. |
| | KNAPP® CS-screws 8x160 mm with reinforced shaft  (Art.-No. Z581) or KNAPP® CS-screws 8x240 mm with reinforced shaft (Art.-No. Z672) or KNAPP® CS-screws 10x200 mm with reinforced shaft (Art.-No. Z583) |
| | Works with screws up to Ø 12 mm. |

| Accessories | |
|---|---|
| Art.-No. K256 | Drilling template D20, 45° screw angle |
| Art.-No. K258  K266  K267 | Drilling template D30, 30° (K258) ; D35, 30° (K266) ; D35, 45° (K267) |
| Art.-No. K563 | Adjustable drilling template (for UNO 30, DUO 30, DUO 35 and T-JOINT) |
| Art.-No. Z075/20 | HM drill bit 20 mm (for T-JOINT D20) HM drill bit 30 mm (Art.-No. Z070); 35 mm (Art.-No. Z071) with depth stop (for T-JOINT) |

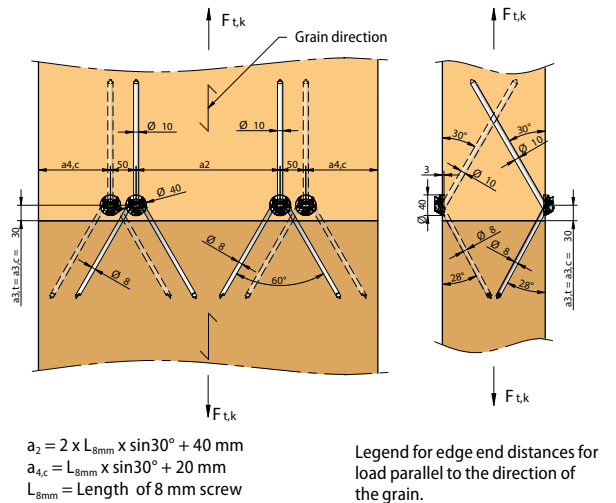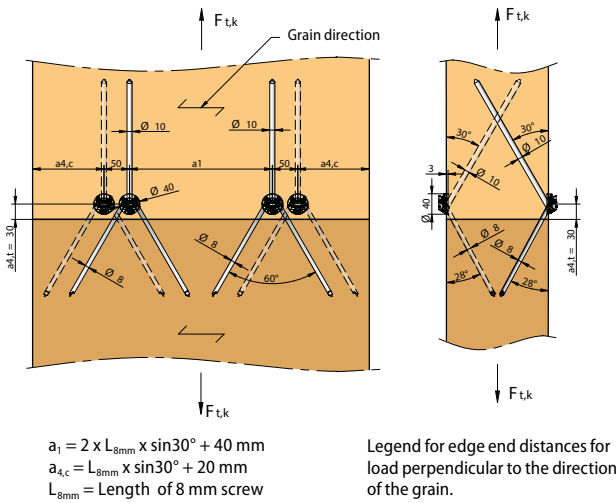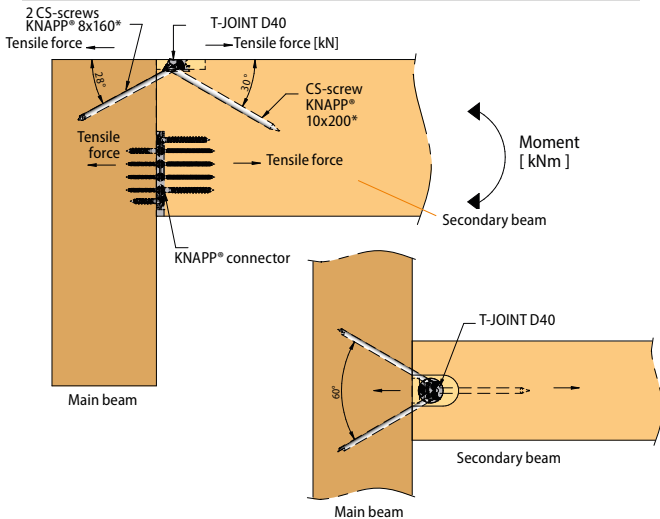## T-JOINT D40

| T-JOINT D40/W30 | |
|---|---|
| Art.-No. Z404 | KNAPP® T-JOINT Ø 40mm, 30° screw angle<br>**Fixing:** for tension and bending joints of two timber components by means of diagonal screw connection from both sides. |
| | Recommended screws:<br>KNAPP® CS-screws 8x120 mm with reinforced shaft (Art.-No. Z670),<br>KNAPP® CS-screws 8x160 mm with reinforced shaft (Art.-No. Z673),<br>KNAPP® CS-screws 8x200 mm with reinforced shaft (Art.-No. Z671) or<br>KNAPP® CS-screws 8x240 mm with reinforced shaft (Art.-No. Z672)<br>**Application:** 2 pieces are required for pre-assembly of the T-JOINT D40. |
| | KNAPP® CS-screws 10x200 mm with reinforced shaft (Art.-No. Z583) or<br>KNAPP® CS-screws 10x300 mm with reinforced shaft (Art.-No. Z651) |

## Application examples and connection details of T-JOINT D40 W30

### Assembly of 2 CLT wall elements



$a_1 = 2 \times L_{8mm} \times \sin 30° + 40$ mm
$a_{4,c} = L_{8mm} \times \sin 30° + 20$ mm
$L_{8mm}$ = Length of 8 mm screw

Legend for edge end distances for load perpendicular to the direction of the grain.

$a_2 = 2 \times L_{8mm} \times \sin 30° + 40$ mm
$a_{4,c} = L_{8mm} \times \sin 30° + 20$ mm
$L_{8mm}$ = Length of 8 mm screw

Legend for edge end distances for load parallel to the direction of the grain.

### Main beam - secondary beam connection



### Post and beam connection
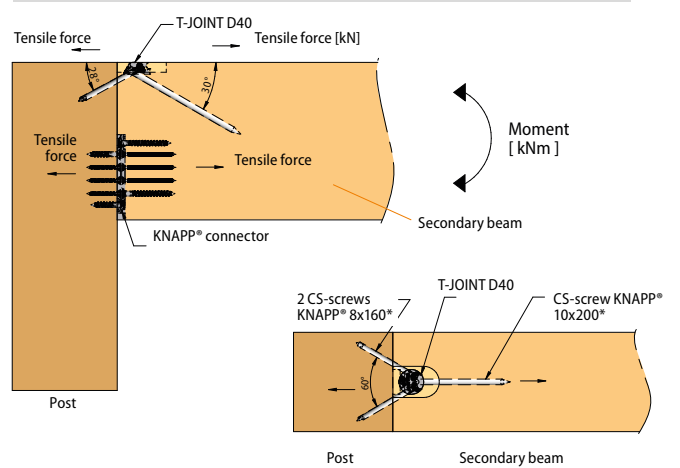


### Tensile connection of CLT floor to wall
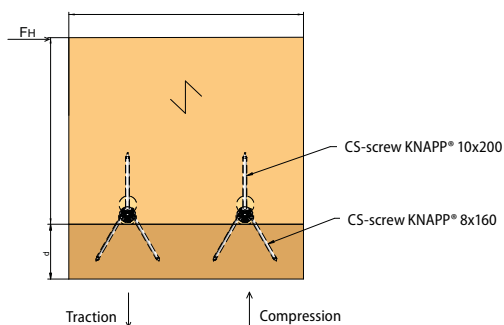


### Bending joint of CLT ceiling elements
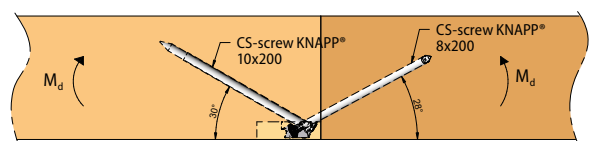
# Meet our partner

▌ **Applications: for fixing indoor and outdoor posts and railings,**
for staircases, verandas, terraces and balconies

## ZIPBOLT™    UT POST ANCHOR

**Post connector**

Art.-No. Z381

**NEW**
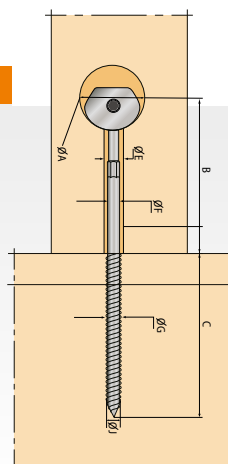
G = 13,5 ▌ J = +/- 10 mm
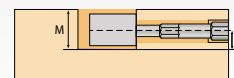
| M | Height | X | Ø A | B | C | Ø F | E |
|---|--------|---|-----|---|---|-----|---|
| > 28 mm | 260 mm | 14 mm | 35 mm | 125 mm | 143 mm | 11 mm | 13 mm |

| | |
|---|---|
| **Applications:** | Fixing staircase posts. |
| **Advantages:** | Fast and easily installed by using a T40 Torx Bit and a cordless drill. |
| **Suitable materials:** | All kind of solid wood materials. |
| **Installation:** | Pre-drill holes using plunge router or CNC. |
| **Mounting:** | Insert connector parts into holes and assemble. |
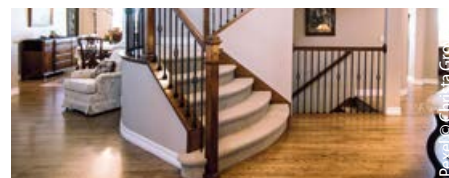
## ZIPBOLT™    XT POST ANCHOR

**External post       connector**

Art.-No.Z379

**NEW**
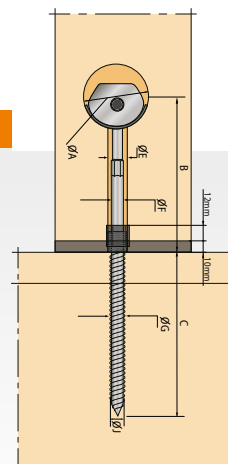
G = 13,5 ▌ J = +/- 10 mm
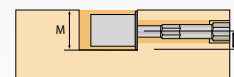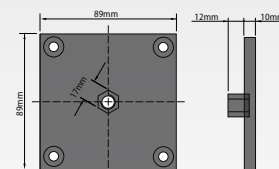
| M | Height | X | Ø A | B | C | Ø F | E |
|---|--------|---|-----|---|---|-----|---|
| 37 mm | 260 mm | 18 mm | 38 mm | 124 mm | 130 mm | 11mm | 16 mm |

| | |
|---|---|
| **Applications:** | Connection for external posts on terraces and verandas. |
| **Advantages:** | Fast and easily installed by using a 6mm hex bit and a cordless drill. |
| **Suitable materials:** | All kind of solid wood materials. |
| **Installation:** | Pre-drill holes using plunge router or CNC. |
| **Mounting:** | Insert connector parts into holes and assemble. |

**Find these systems and many other solutions in our catalogue of assemblies for fittings, interior and exterior joinery, staircases and landscaping.**

# Timber peg connector made of solid hardwood

## Timber construction nail, connecting up to 11,4 kN*

I Timber width from 80 mm
I Drilling in the factory or on site
I Sustainable and durable
I Sophisticated natural look
I Force-locking and self-tightening connection
I Two to three steps pre-lockable and self-centring
I Metal-free connection

# MATEO

**Available in 1 size and 2 types of wood.**

**Find all the resistance data on our website.**

* $F_{2,Rk}$ characteristic value with MATEO ash timber peg on CLT.

**KNAPP®**
connectors.com

Installation example: CLT walls installation.

© Holz Lengauer

# MATEO

❙ **Applications: visible connection in ecological house construction**
❙ **Connections: wood-wood, solid wood, wood-based materials e.g. CLT**
❙ **Areas of application: traditional house building, renovation**
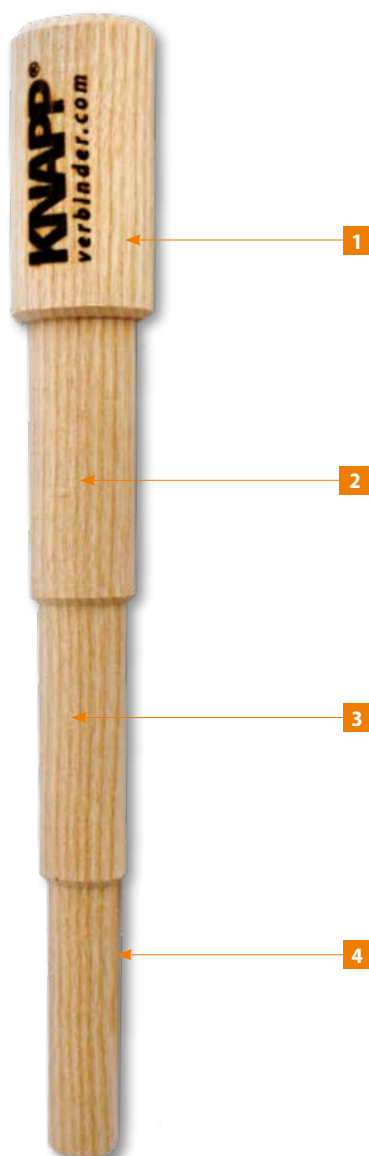


| | |
|---|---|
| **1** | Ø 40 round nail head |
| **2** | Stepped shaft (1st step Ø 30) |
| **3** | Woodturned (2nd step Ø 25) |
| **4** | Solid hardwood (3rd step Ø 20) |

The MATEO wooden peg is available made of ash (Art.-No. K304) and beech (Art.-No. K303).

**Ash:** tough and ductile (deformable) load-bearing up to 0.8 tonnes (transverse to grain direction $F_2$).

**Beech:** even higher load-bearing capacity up to 1 ton (see load table on the next pages)

Dimensionally stable at 7-8 % moisture content.

After installation, the peg expands and holds the components firmly together. Glued with waterproof glue, higher pull-out values can be achieved and the connection can be secured additionally.

AUSTRIA

MATEO

# MATEO

## Options of application

(Dimensions in mm)

**4 steps**

$d_1$ = Shear zone Ø30

20

120

( 100 )

On edge

**3 steps**

$d_1$ = Shear zone Ø25

20

100

( 80 )

Cut the protruding part to th edge
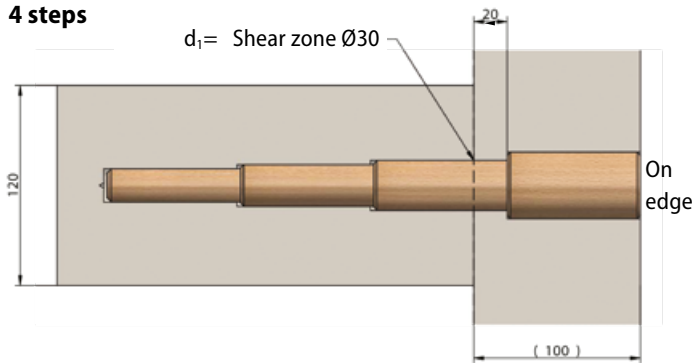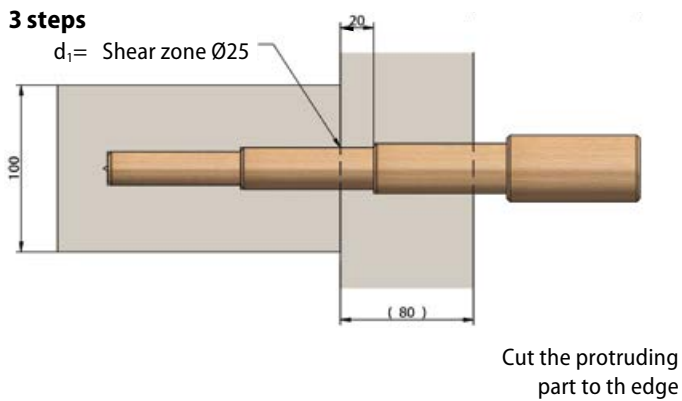
## Application examples

End connections
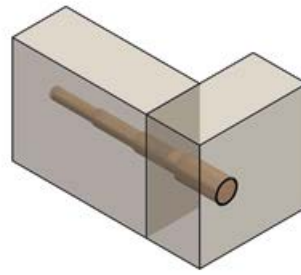
Corner connection
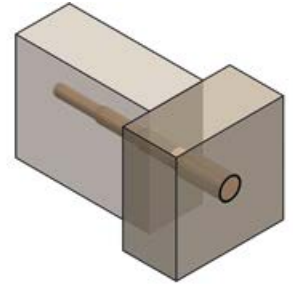
Double tie joints

Butt joints

## Measurements

Art.-No. K303 and K304

Art.-No. Z093

Ø 40

80 mm

Ø 30

80 mm

320 mm

Ø 25

80 mm

Ø 20

80 mm

HS stepped drill

For CNC systems, we can match the drills according to your needs.
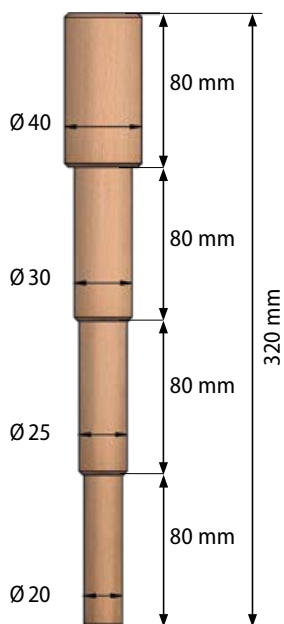
## Minimum distances

$d_1$

$a_{2,c}$

$a_{2,c}$
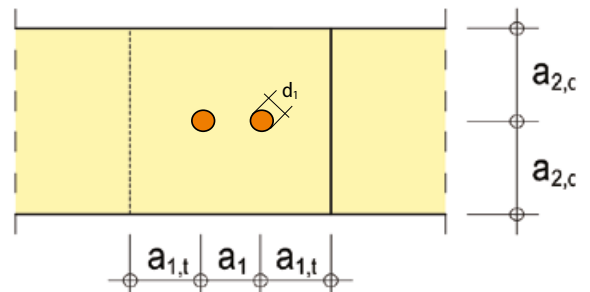
$a_{1,t}$  $a_1$  $a_{1,t}$

Intervals : $a_{1,t} = a_1 = a_{2,c} = 2 \times d_1$

$d_1$ = Mateo shear zone diameter..

# MATEO

## Tested shear zones at Ø 25 and 30 mm

Ø 40

Shear zone

Ø 30

Shear zone

Ø 25

Ø 20
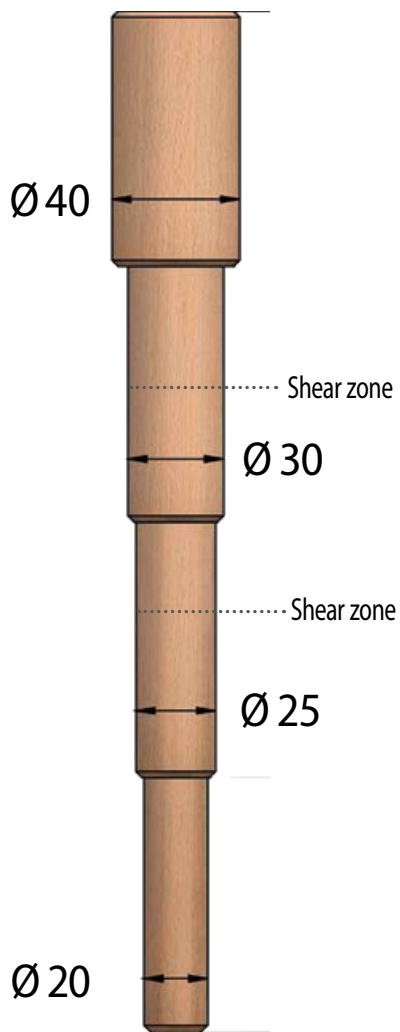
## Loadbearing capacities on shear force of side wood/end grain

| Timber grade | Wood species | Ø $d_1$ Shear zone [mm] | $F_{2,Rk}$ [kN] | Min. wood thickness [mm] |
|---|---|---|---|---|
| C24 | Ash Beech | 30 | 9,8 10,5 | 80 100 |
| GL24h | Ash Beech | 30 | 10,3 11,0 | 80 100 |
| BSPH | Ash Beech | 30 | 11,4 12,2 | 70 80 |

| Timber grade | Wood species | Ø $d_1$ Shear zone [mm] | $F_{2,Rk}$ [kN] | Min. wood thickness [mm] |
|---|---|---|---|---|
| C24 | Ash Beech | 25 | 7,0 7,6 | 70 70 |
| GL24h | Ash Beech | 25 | 7,4 7,9 | 70 70 |
| BSPH | Ash Beech | 25 | 8,2 8,8 | 60 60 |

**The $F_{45,Rk}$ depends on the width of the secondary beam, for smaller width its value will be smaller.**

Source of the calculation formulas: Blaß, H.J.; Ernst, H.; Werner, H.
*"Connections with wooden pins - Investigations on load-bearing capacity"* p. 630-631.

$F_{2,Rk}$

$F_{45,Rk}$
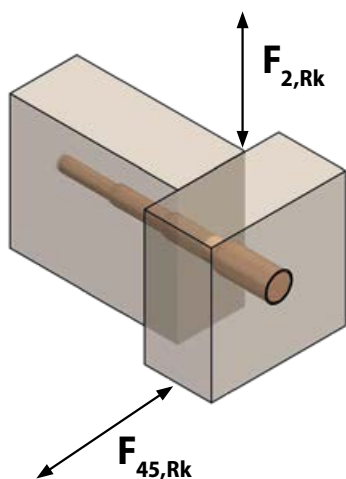
## Installation



Manual drilling using a stepped drill bit or industrial drilling on a CNC machine



Insert the peg up to the nail head



Drive in until it stops



Cut and sand the excess part

# Outdoor connectors

I Invisible fastening systems for terraces, cladding and wall cladding indoors and out

Garden furniture built with KNAPP® dowels

Pergola sunshade with UNO 30

Terrace built with QUATRO 65

## Overview of Knapp solutions for outdoor use :

The following items are available in our catalogue for interior and exterior fittings, window construction and wood structures

### QUATRO 65

Made of highly resistant composite plastic

**Quatro 65/25**
Art.-No.K081

**Quatro 65/30**
Art.-No.K080

QUATRO  Page 78

### Z-DECK

Terrace connector made of inox

Art.-No. K082

Z-DECK  Page 79

### ZIPBOLT™
### Exterior Slipfix

For outdoor handrails

Art.-No.Z374

SLIPFIX  Page 37

### UNO 30 (Garniture)

Inox hook system

Art.-No.K120
UNO 30 Set

Art.-No.K120/B
UNO 30 (connector only)

UNO 30

Page 22

### DUO 30 inox A5

Inox A5 hook connector

Art.-No.K350

Art.-No.K350/P
Mini Pack

Art.-No.K121
Goupille de verrouillage A2 (option)

DUO30 INOX

Page 21
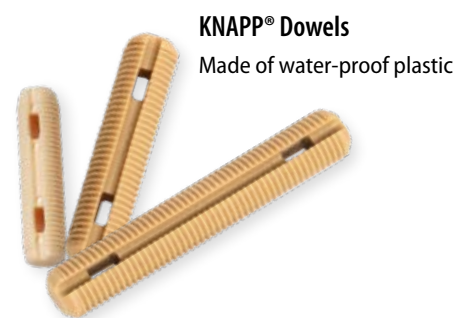
### KNAPP® Dowels

Made of water-proof plastic

Art.-No.K066
6x28 mm

Art.-No.K067
8x36 mm

Art.-No.K169
8x50 mm

KNAPP DOWEL

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### ▶▶▶ On-site consultation

For international requests, we are also available via video call or through our business partners. All contact details are available on our website:

**www.knapp-connectors.com/en/contact/**

### ▶▶▶ Contact

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**info@knapp-connectors.com**

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All brochures, assembly instructions, CAD drawings and many details can be downloaded after registration on our website.

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