



Version CAN 4.0

Beam Hanger Design Guide

LSD for Canada

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Beam Hanger Design Guide

Limit States Design for Canada



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Mass Timber Hardware Specialists



At MTC Solutions, our core focus is to supply structural hardware for modern mass timber applications in commercial, industrial, and residential projects. Our pride lies in collaborating with leading industry experts to offer design solutions and tools for code-compliant, sustainable buildings, continuously pushing the boundaries of the North American construction industry.

Our in-house team of mass timber specialists support professionals in designing customized connections that cater to the specific requirements of each project, resulting in truly innovative and cost-efficient solutions. With industry-recognized expertise and tested & proven solutions, we stand at the forefront of the industry, driving progress and innovation in mass timber construction.



Expertise

We provide our customers with the knowledge and tools necessary to construct cutting-edge, code-compliant mass timber projects while pushing the boundaries of the North American construction industry.



Commitment

We are dedicated to making your project a success, offering support from design and installation assistance to fast and precise delivery of high-quality products.

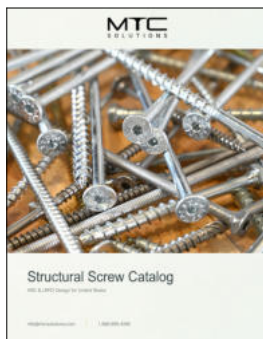


Products Tailored for North America

We partner with leading research facilities across North America to ensure that our products are tested and customized to meet the unique needs of the market, including seismic considerations and solutions for large post-and-beam structures in various climates.

Find Your Connection Solution

MTC Solutions provides the right tools to design code-compliant buildings, educating the mass timber industry on connection solutions.



Structural Screw
Catalog



Structural Screw Connection
Design Guide



Structural Fasteners



Accessories



Beam Hanger
Design Guide



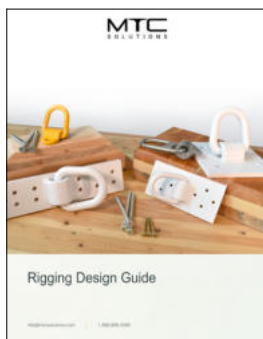
Beam Hangers



Connector
Design Guide



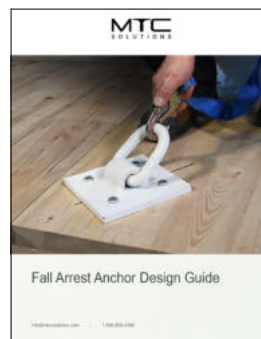
Connectors



Rigging
Design Guide



Rigging Devices



Fall Arrest Anchor
Design Guide



Fall Arrest



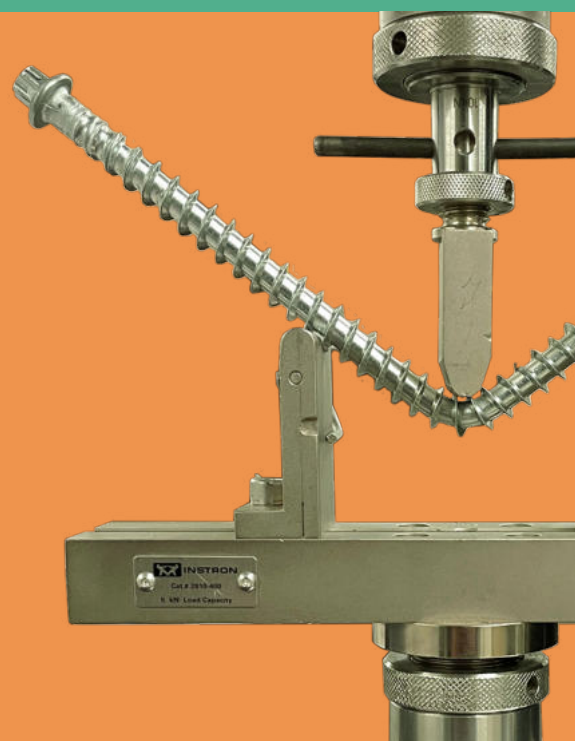
**WHO
ARE WE?**

YOUR MASS TIMBER HARDWARE SUPPLIER

Rely on our distribution team to deliver your North American projects with speed and accuracy.

LEADING WITH INNOVATION & RESEARCH

We are leading the mass timber industry with cutting-edge connection solutions and through partnerships with renowned research facilities.



WE MAKE YOU THE EXPERT

Learn about the right solutions for your projects and mass timber connections with our technical resources & support team!

CONNECTION DESIGN SUPPORT

Reach out to our technical team for design support, from early design stages to ongoing iterative changes. We help you find the most efficient connection solutions.

MANUFACTURERS' HELP DESK

Use our comprehensive & practical resources to find the most cost-effective solutions for your structural elements.



TESTED & PROVEN SOLUTIONS

Count on MTC Solutions' 10+ years of expertise, providing tested & proven, ICC-approved solutions, support, and resources.



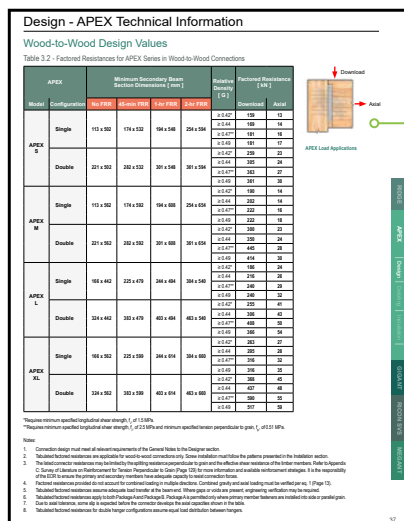
General Information

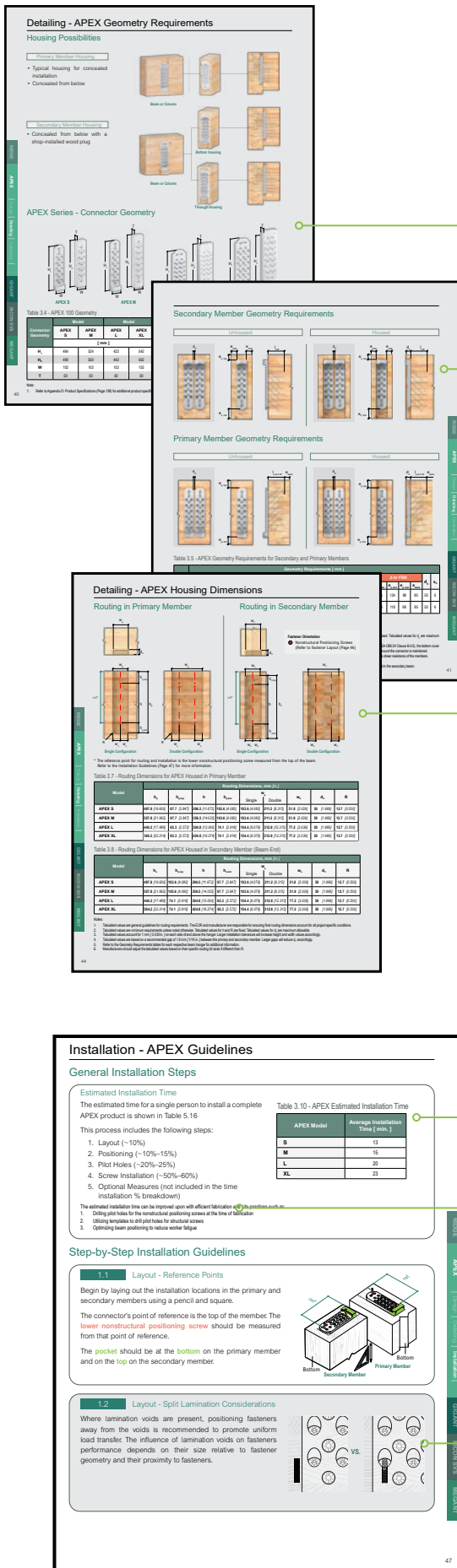
Overview

This sidebar outlines the design information, detailing requirements, and installation guidelines included in each product subsection.

This table provides an overview of the hardware package required for a beam hanger connection, including the number of plates, fasteners for both primary and secondary members, and installation times.

This table provides the factored resistances for connectors based on connection configurations and relative densities. It also provides minimum secondary beam sizes for various fire-resistance ratings (FRR).







General Notes to the Designer

1. Factored resistances are derived in accordance with CSA O86:24.
2. Unless noted otherwise, factored resistances provided assume normal load duration, dry service conditions, and untreated wood members ($K_D = 1.0$, $K_{SF} = 1.0$, and $K_T = 1.0$). Connections with conditions that vary from this must be multiplied by all applicable modification factors per CSA O86:24; however, factored resistances shall not be increased for short-term load duration.
3. Connectors in combination with carbon steel fasteners are to be used only in dry service conditions ($K_{SF} = 1.0$).
4. During construction, mass timber elements intended for dry service conditions may experience temporary surface wetting, including localized pooling, which may cause the moisture content (MC) of the timber to exceed 19%. Based on testing, MTC A3K electroplated carbon steel fasteners with intact, undamaged coating may withstand up to three weeks of continuous wetting above the fiber saturation point (FSP). Exposure beyond this duration may result in corrosion damage, and the service life of the fastener may become compromised. A moisture management plan should be implemented on site, and the design must incorporate appropriate detailing to accommodate dimensional changes in the wood associated with wetting and drying.
5. Tabulated specified resistances apply to connections exposed to sustained temperatures below 50°C, except for occasional exposures up to 65°C.
6. Factored resistances provided are valid only when using the listed GIGANT SK screws with GIGANT connectors and the listed MTC-FTC / MTC-PTC screws with RICON S VS, MEGANT, RIDGE and APEX connectors.
7. Connectors are to be centered with the resultant vertical force, with the plates installed symmetrically about the vertical axis. Where this condition is not met, horizontal eccentricities need to be specified and the resulting rotational forces accounted for. Tabulated axial capacities assume no horizontal eccentricities.
8. Appropriate lateral restraint should be provided for lateral stability against rotation. If subjected to rotational forces, connectors must be designed accordingly, with the Engineer of Record (EOR) specifying any necessary additional measures.
9. A pilot hole is a short, starter hole intended to reduce installation torque and wandering of the screw. Pilot holes may be used to facilitate fastener installation with greater precision. Pilot hole diameters shall not exceed the minor diameter, D_m , of the fastener.
10. A hole is considered predrilled if its length matches the entire embedment of the fastener. Predrilling is required when installing connectors into Parallel Strand Lumber (PSL) and the edge of laminated veneer products to reduce the risk of splitting.
11. Installation must respect all minimum beam size requirements, including fastener geometry requirements and fire-resistance rating (FRR) requirements.
12. Within this guide, the term "primary member" refers to the supporting member (beam or column), and the term "secondary beam" refers to the supported beam, typically with the connector installed into the end grain.
13. Minimum beam sizes presented are based on geometry and FRR requirements. Factored resistances of the connector may exceed the capacity of the wood member. The EOR must ensure that all possible stress limits for the wood members, such as the shear capacity, flexural capacity, deflection limits, and other material properties, are not exceeded while maintaining a continuous load path. See Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain (Page 129) for more information on brittle failure mode resistance and reinforcement.
14. Minimum dimensions for beams with no fire-resistance rating (FRR) are based on minimum fastener end and edge distances. Minimum member dimensions for GIGANT, RICON S VS, and MEGANT connections with an FRR are determined in accordance with CSA



O86:24. Minimum member dimensions for APEX and RIDGE connections with an FRR are based on a combination of CSA O86:24 provisions and fire-test results. Member sizes satisfying an FRR assume a maximum 3.2 mm [1/8 in.] gap and that any void below the connector in the routing has been filled with a wood plug.

15. Tabulated beam depths are for reference purposes only. Note that tolerances for finished glulam dimensions provided in the CSA-O122 manufacturing standard may not ensure the squareness and depth required for proper field installation. An undersize up to 6 mm in depth and 2 mm in width may be required. Verify all finished glulam dimensions with the timber provider.
16. When side grain or beam-end conditions cause the splitting resistance of the wood perpendicular to grain to be exceeded, reinforcement must be added to ensure the connection's structural integrity. The EOR is responsible for the design of any required reinforcing screws. Refer to Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain section (Page 129) for more information.
17. For relative densities, G, assigned to timber products, refer to CSA O86:24 or the manufacturer's published recommendations for equivalent relative density, as applicable. Unless otherwise noted, all other timber strength properties used in the design of the connection are assumed to be those applicable to the timber product in accordance with CSA O86:24.
18. Overall connection performance is governed by both the connector system (including fasteners and connector plates) and the local wood substrate. Lamination voids and other manufacturing defects may influence load transfer. Where possible, fasteners should be positioned away from lamination voids. Where this is not feasible, connection performance may require engineering evaluation to verify adequate load transfer.
19. Factored resistances provided do not account for

combined loading in multiple directions. Combined shear (download or uplift) and axial (tension) loading must be verified using the following interaction equation:

$$\left(\frac{V_f}{V_r}\right)^2 + \left(\frac{T_f}{T_r}\right)^2 \leq 1.0 \quad (\text{eq. 1})$$

Where V_f and T_f are factored loads (shear and axial/withdrawal), and V_r and T_r are the corresponding factored resistances.

Fastener Designation Update

To reflect improvements in our quality-control program, some screw designations used in this guide have been updated. While the fasteners themselves remain unchanged, MTC Solutions now applies an enhanced quality-verification process—specifically additional screening related to hydrogen-embrittlement resistance. The updated naming convention identifies fasteners that have undergone this added level of verification, ensuring clarity and consistency across all MTC technical documents.

All factored resistances remain valid for both the legacy and the current designations.

Table 1.1 - Fastener Designation Updates

Legacy Designation	Current Designation	Description
ASSY VG CSK	MTC-FTC	Fully Threaded (FT), Countersunk (C) head
ASSY VG CYL	MTC-FTCY	Fully Threaded (FT), Cylinder (CY) head
ASSY ECOFAST	MTC-PTC	Partially Threaded (PT), Countersunk (C) head

Example: MTC-FTC-10x200 (metric) or MTC-FTC-3/8x7-7/8" (imperial)

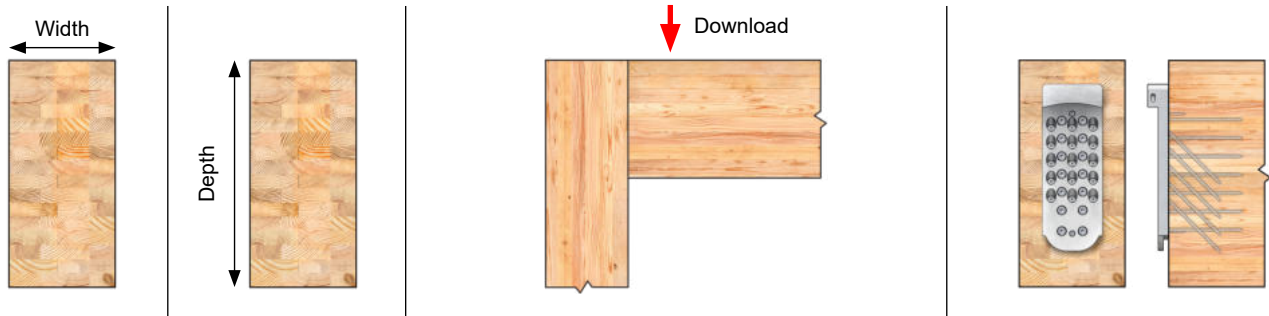


General Notes to the Installer

1. Refer to detailed installation guidelines within each product chapter for additional information.
2. Connectors and carbon steel fasteners are intended for dry service conditions. During construction, avoid prolonged exposure to rain or standing water. Temporary wetting may occur; however, continuous wetting for more than three weeks may lead to corrosion and reduced fastener performance. Proper moisture protection must be implemented on site, including covering materials, preventing water pooling, and allowing components to dry as needed.
3. Use a drill equipped with a feather (variable-speed) trigger to ensure proper torque management and mitigate the risk of overtightening. Although impact drills are not expressly prohibited, their use is discouraged due to increased risk of overtightening. If an impact drill is utilized, limit its use to short screws and maintain a continuous drive without pausing. For more information on drill selection, refer to the Installation Guidelines within each product section.
4. GIGANT connectors must be installed with the listed GIGANT SK screws. RICON S VS, MEGANT, RIDGE, and APEX connectors must be installed with the listed MTC-FTC / MTC-PTC screws. Substitution of fasteners is not permitted.
5. If splitting of a wood member or fastener damage is observed prior to or during installation of the fasteners, the installation process must be stopped, and the Engineer of Record (EOR) must be contacted immediately to provide appropriate site instructions to rectify the issue.
6. A pilot hole is a short, starter hole intended to reduce installation torque and wandering of the screw. Pilot holes may be used to facilitate fastener installation with greater precision. Pilot holes shall be 25 mm deep and their diameters shall not exceed the minor diameter, D_m , of the fastener.
7. For fasteners installed in a countersunk hole, a pilot hole should be drilled using the Predrilling Jig to ensure the correct penetration angle, proper seating of the fastener head, and to minimize the risk of the screw offsetting and the threads catching on the steel plate during installation.
8. A hole is considered predrilled if its length matches the entire embedment of the fastener. Predrilling is required when installing connectors into Parallel Strand Lumber (PSL) and the edge of laminated veneer products to reduce the risk of splitting.
9. Screws should be fully driven in an uninterrupted process, from tip insertion to head seating. If necessary, a torque wrench may be used to complete installation immediately after initial insertion of the screw.

Beam Hanger Selection Tool

The following pre-selection table helps the designer choose the correct beam hanger system. It lists the factored resistances for each system as well as the minimum beam width and depth. More details on a specific beam hanger system can be found on the pages referenced in the table. Additional requirements, such as those relating to geometry and special connections, must also be taken into consideration where applicable.



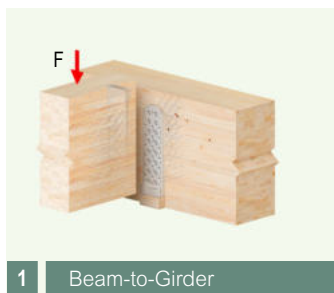
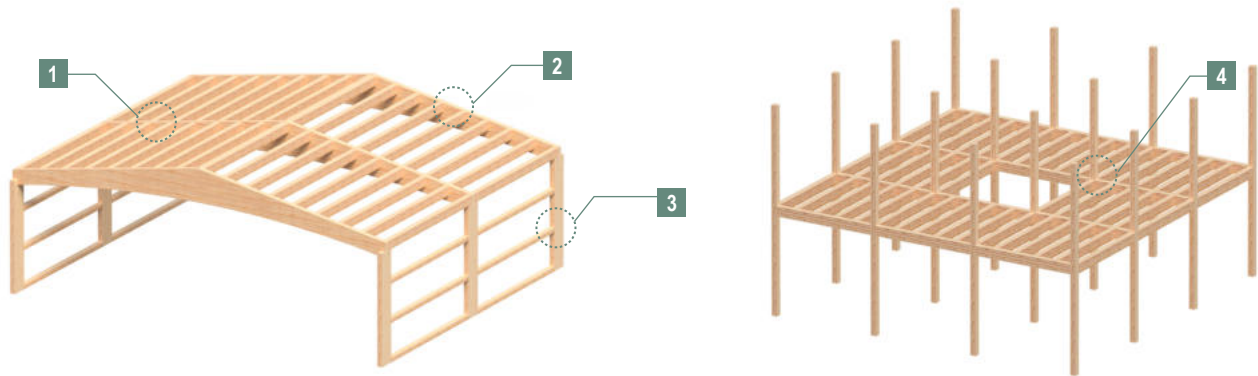
Minimum Beam Width	Minimum Beam Depth	Factored Resistance		Connector	
mm [in.]	mm [in.]	kN		Model	Page
100 [3-15/16]	160 [6-5/16]	8		GIGANT 120 x 40	52
	180 [7-3/32]	11		GIGANT 150 x 40	52
	220 [8-21/32]	16		GIGANT 180 x 40	52
92 [3-5/8]	186 [7-5/16]	24		RICON S VS 140 x 60	66
	246 [9-11/16]	38		RICON S VS 200 x 60	66
120 [4-23/32]	260 [10-1/4]	59		RICON S VS 200 x 80	66
	320 [12-19/32]	67		RICON S VS 290 x 80	66
	430 [16-15/16]	129		RICON S VS XL 390 x 80	66
112 [4-13/32]	215 [8-1/2]	40		RIDGE XS	21
	254 [10]	73		RIDGE S	21
	293 [11-1/2]	98		RIDGE M	21
	332 [12-11/16]	128		RIDGE L	21
	401 [15-25/32]	151		RIDGE XL	21
89 [3-1/2]	530 [20-7/8]	83		MEGANT 430 x 60	93
128 [5-1/32]	376 [14-13/16]	73		MEGANT 310 x 100	93
	496 [19-17/32]	115		MEGANT 430 x 100	93
178 [7]	376 [14-13/16]	94		MEGANT 310 x 150	93
	496 [19-17/32]	147		MEGANT 430 x 150	93
113 [4-7/16]	502 [19-27/32]	181		APEX S	37
	562 [22-1/8]	222		APEX M	37
166 [6-17/32]	444 [17 15/32]	240		APEX L	37
	562 [22-1/8]	316		APEX XL	37

Notes:

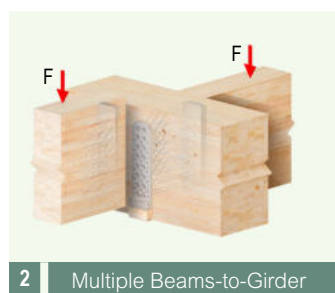
1. Tabulated factored resistances are only valid for Limit States Design in Canada. This table is a pre-selection tool. Refer to each respective connector section and CSA O86:24 for design guidelines.
2. Tabulated factored resistances are only valid for use in $G \geq 0.49$ in standard-term loading ($K_D = 1.0$). Refer to each respective connector section for additional values.
3. Tabulated factored resistances are for a single connector. Refer to individual product chapters for double connector configuration capacities.
4. Tabulated minimum beam sizes are based on geometry requirements for the connector and fasteners and do not account for the fire-resistance rating (FRR) or capacity of the wood members. The EOR is responsible for verifying stress limits for the wood members. See product chapters for minimum beam size requirements for various FRR.

Installation Configurations

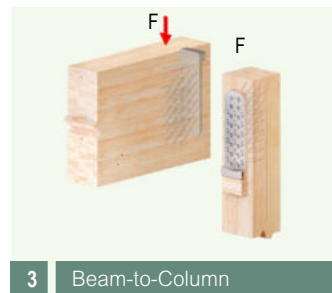
Beam Hanger Connection Applications



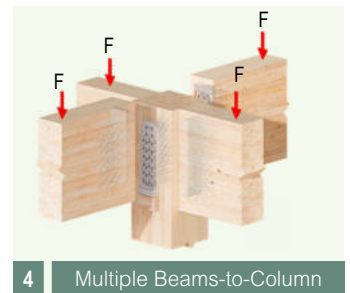
1 Beam-to-Girder



2 Multiple Beams-to-Girder

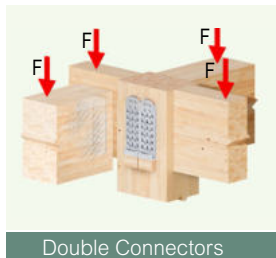


3 Beam-to-Column



4 Multiple Beams-to-Column

Alternative Connection Applications



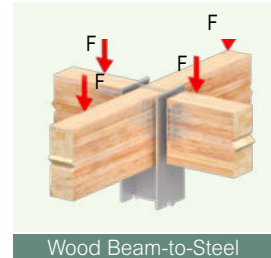
Double Connectors



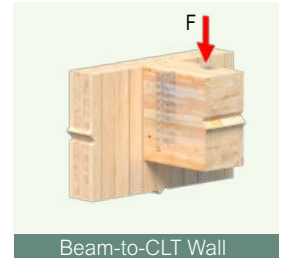
Skewed Configuration



Sloped Configuration



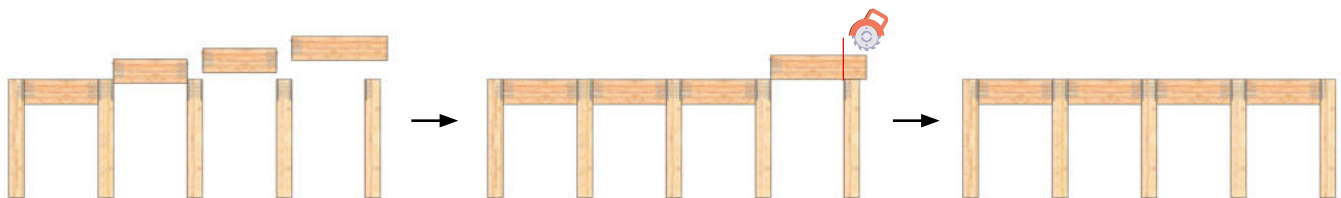
Wood Beam-to-Steel



Beam-to-CLT Wall

Installation Sequencing Recommendations

Installation sequencing is important, especially for buildings with multiple bays of post-and-beam framing. It is recommended to install beams starting from one end of the building and progress along the column line. The last beam can be produced slightly over length and cut to size on-site to help mitigate any dimensional tolerance challenges.





Pineview Valley Elementary

Kamloops, British Columbia

RIDGE

Pre-Engineered Connection System

The RIDGE provides an easy-to-install, concealed solution for mass timber beam-to-column and beam-to-beam connections. Developed, tested, and manufactured in Canada, RIDGE delivers reliable structural performance across a broad range of everyday design loads while offering generous construction tolerances and simple, efficient installation.



Efficient Load Transfer

Provides reliable load transfer across a wide range of mass timber applications with an optimized fastener layout that makes efficient use of each fastener.



Robust Installation Tolerances

Built-in axial, horizontal, and rotational tolerances (2.6 mm, 3.2mm, and $\pm 0.5^\circ$) enable true drop-in installation, accommodating variation and misalignments with a secure fit



Efficient Logistics & Reliable Supply

Locally manufactured in Canada and the U.S. for shorter lead times, reduced delay risk, and a more responsive supply chain—helping projects stay on schedule



Simple, Fast, Drop-In Installation

Easy installation from identical plates and a pre-engineered screw pattern, faster installs, and tolerance-friendly drop-in fit—all contributing to a safer job site and lower labor costs



Fire-Resistance-Rated

2-hr fire-resistance-rated connection configurations based on CSA O86:24 and supporting fire test results.

Design

- Wood-to-Wood Design Values
- Positioning Considerations for Reinforcement
- Skewed Connection Configuration

Detailing

- Geometry Requirements
- Connector Interaction Geometry
- Housing Details

Installation

- Installation Tolerances
- Tool Requirements
- Fastener Layout
- Installation Guidelines

STANDARDS

ASTM D7147

CSA O86:24

Canadian Engineered. Unrivalled Strength.

RIDGE expands MTC's pre-engineered connection offering with a versatile solution designed for the load demands encountered across a wide range of mass timber projects. **Engineered, tested, and manufactured in Canada**, RIDGE brings the installation simplicity, construction tolerances, and reliable performance of MTC's newest connection systems to this important range of applications.

Rigorously tested and designed to CSA O86:24, RIDGE is now the new state-of-the-art beam-to-column and beam-to-girder connection for mass timber, available on demand.

This new product represents a commitment from MTC Solutions to the industry: to provide more locally manufactured products. This approach changes the game for Canadian mass timber projects by improving project costs, enhancing supply chain reliability, and reducing the environmental impact.

American Made, Tested & Proven

The RIDGE beam hanger is also proudly **manufactured in the USA** from high-grade aluminum, offering American projects a decisive advantage by solving critical supply chain challenges.

This system eliminates tariff uncertainty and drastically reduces procurement lead times with a high-performance connector available locally and on demand. The result is significant cost savings, unwavering supply chain reliability, and the uncompromising quality of American manufacturing.



RIDGE Overview



Table 2.1 - RIDGE Hardware Package Installation Overview

RIDGE Model	Plate Qty.	Fasteners						Installation Time
		Primary Member (Package A OR B)				Secondary Member		
		Type MTC-FTC				Type MTC-FTC		min.
		Package A Mixed Length	Qty.	Package B Uniform Length	Qty.	Type	Qty.	
RIDGE XS	2	8 x 120 mm Horizontal Screws	6	8 x 160 mm Horizontal & Inclined Screws	9	8 x 160 mm Horizontal & Inclined Screws	9	11
		8 x 160 mm Inclined Screws	3					
RIDGE S	2	8 x 120 mm Horizontal Screws	8	8 x 160 mm Horizontal & Inclined Screws	14	8 x 160 mm Horizontal & Inclined Screws	14	15
		8 x 160 mm Inclined Screws	6					
RIDGE M	2	8 x 120 mm Horizontal Screws	10	8 x 160 mm Horizontal & Inclined Screws	19	8 x 160 mm Horizontal & Inclined Screws	19	19
		8 x 160 mm Inclined Screws	9					
RIDGE L	2	8 x 120 mm Horizontal Screws	12	8 x 160 mm Horizontal & Inclined Screws	24	8 x 160 mm Horizontal & Inclined Screws	24	23
		8 x 160 mm Inclined Screws	12					
RIDGE XL	2	8 x 120 mm Horizontal Screws	6	8 x 160 mm Horizontal & Inclined Screws	25	8 x 160 mm Horizontal & Inclined Screws	25	24
		8 x 160 mm Inclined Screws	19					

Notes:

- Subsequent tabulated capacities in this chapter assume connectors are installed with MTC-FTC (see Table 1.1 on Page 13) fasteners specified in this table and in accordance with CCMC 13677-R.
- Packages A and B provide the same factored resistance. Package A is permitted only where the primary member fasteners are installed into side or parallel grain. Where the primary member fasteners are installed into end grain, Package B is required.
- The estimated installation time is based on a time study and includes steps for layout and positioning, installation of nonstructural positioning screws, drilling a 25 mm [1 in.] deep pilot hole for each fastener, and structural screw installation for both plates. Refer to Page 47 for more information.
- Each product kit includes four 6 x 60 mm [1/4" x 2-3/8"] MTC-PTC (see Table 1.1 on Page 13) nonstructural positioning screws.



Product Kit Details



MTC-FTC

RIDGE Plates

Design - RIDGE Technical Information

Wood-to-Wood Design Values

Table 2.2 - Factored Resistances for RIDGE Series in Wood-to-Wood Connections

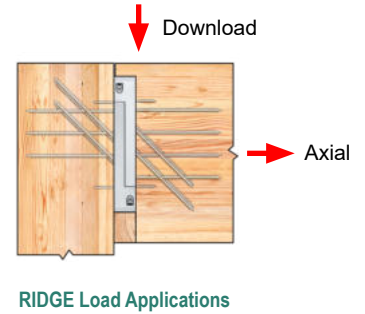
RIDGE		Minimum Secondary Beam Section Dimensions [mm]				Relative Density [G]	Factored Resistance [kN]	
Model	Configuration	No FRR	45-min FRR	1-hr FRR	2-hr FRR		Download	Axial
RIDGE XS	Single	112 x 215	175 x 241	175 x 256	265 x 304	≥ 0.42*	30	14
						≥ 0.44	32	15
						≥ 0.47**	36	17
						≥ 0.49	40	18
	Double	208 x 215	253 x 241	271 x 256	337 x 304	≥ 0.42*	57	24
						≥ 0.44	64	25
						≥ 0.47**	73	29
						≥ 0.49	79	31
RIDGE S	Single	112 x 254	175 x 280	175 x 296	265 x 343	≥ 0.42*	56	15
						≥ 0.44	60	16
						≥ 0.47**	68	18
						≥ 0.49	73	20
	Double	208 x 254	253 x 280	271 x 296	337 x 343	≥ 0.42*	82	26
						≥ 0.44	101	27
						≥ 0.47**	135	31
						≥ 0.49	121	34
RIDGE M	Single	112 x 293	175 x 320	175 x 336	265 x 382	≥ 0.42*	74	16
						≥ 0.44	79	17
						≥ 0.47**	90	19
						≥ 0.49	98	21
	Double	208 x 293	253 x 320	271 x 336	337 x 382	≥ 0.42*	106	27
						≥ 0.44	129	29
						≥ 0.47**	172	33
						≥ 0.49	154	36
RIDGE L	Single	112 x 332	175 x 360	175 x 376	265 x 421	≥ 0.42*	98	17
						≥ 0.44	103	17
						≥ 0.47**	118	20
						≥ 0.49	128	22
	Double	208 x 332	253 x 360	271 x 376	337 x 421	≥ 0.42*	131	28
						≥ 0.44	156	30
						≥ 0.47**	208	34
						≥ 0.49	186	37
RIDGE XL	Single	112 x 401	175 x 429	175 x 445	265 x 489	≥ 0.42*	115	18
						≥ 0.44	122	19
						≥ 0.47**	139	21
						≥ 0.49	151	23
	Double	208 x 401	253 x 429	271 x 445	337 x 489	≥ 0.42*	171	30
						≥ 0.44	202	32
						≥ 0.47**	271	36
						≥ 0.49	240	39

*Requires minimum specified longitudinal shear strength, f_v , of 1.5 MPa.

**Requires minimum specified longitudinal shear strength, f_v , of 2.5 MPa and minimum specified tension perpendicular to grain, f_{tp} , of 0.51 MPa.

Notes:

- Connection design must meet all relevant requirements of the General Notes to the Designer section.
- Tabulated factored resistances are applicable for wood-to-wood connections only. Screw installation must follow the patterns presented in the Installation section.
- The listed connector resistances may be limited by the splitting resistance perpendicular to grain and the effective shear resistance of the timber members. Refer to Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain (Page 129) for more information and available reinforcement strategies. It is the responsibility of the EOR to ensure the primary and secondary members have adequate capacity to resist connection forces.
- Factored resistances provided do not account for combined loading in multiple directions. Combined gravity and axial loading must be verified per eq. 1 (Page 13).
- Tabulated factored resistances assume adequate load transfer at the beam end. Where gaps or voids are present, engineering verification may be required.
- Tabulated factored resistances apply to both Package A and Package B. Package A is permitted only where primary member fasteners are installed into side or parallel grain.
- Due to axial tolerance, some slip is expected before the connector develops the tabulated axial factored resistances shown.
- Tabulated factored resistances for double hanger configurations assume equal load distribution between hangers.



RIDGE

Design

Detailing

Installation

APEX

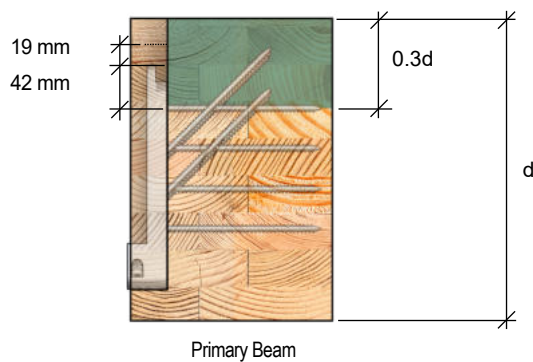
GIGANT

RICON SYS

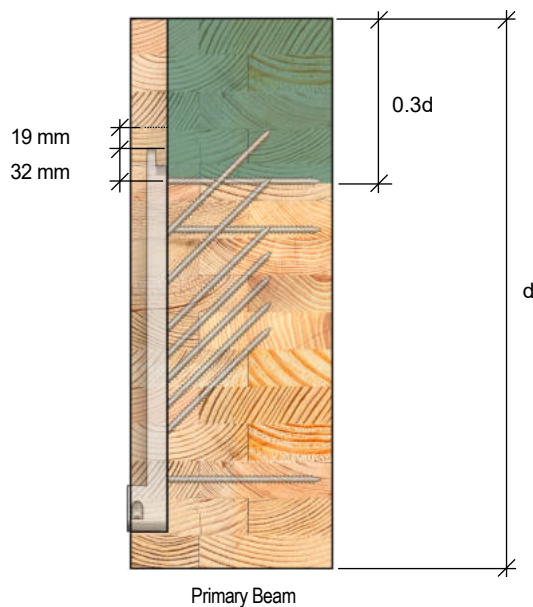
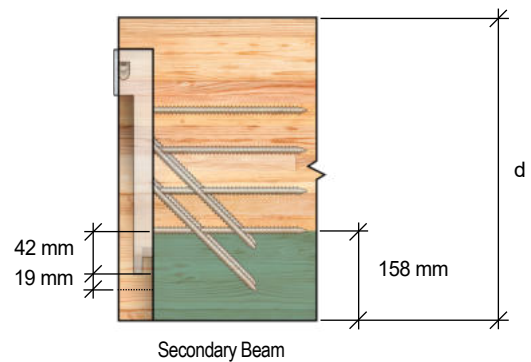
MEGANT

Positioning Considerations for Reinforcement

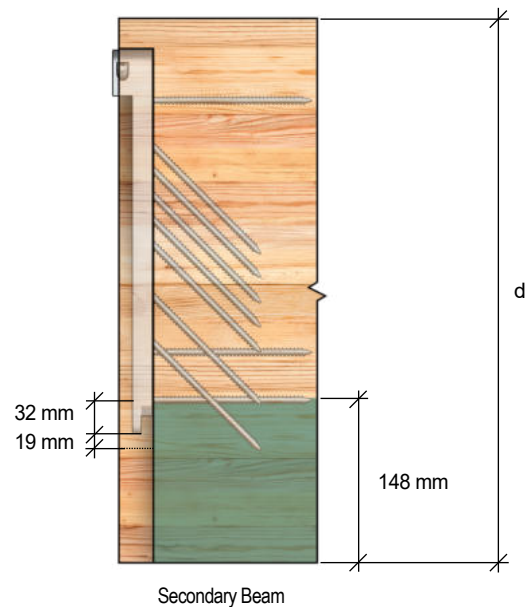
The hanger placement relative to the height of the beam can impact the need for reinforcement. Connectors in the primary beam should have insertion point of the uppermost fastener in the top 30% of the member depth ($0.3d$), as shown below. Connectors in the secondary beam should have the insertion point of the lowermost fastener within 158 mm of the bottom of the beam for the RIDGE XS, S, M, and L models and within 148 mm of the bottom of the beam for the RIDGE XL. This is in alignment with 98 mm wood cover to the hanger for fire protection. Outside of these zones, the primary and secondary beams should be checked for splitting to determine if reinforcement is required. Note that these requirements do not apply to columns. For further information, refer to Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain (Page 130).



RIDGE XS, S, M, and L



RIDGE XL



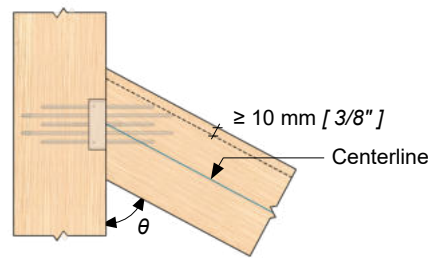
Design - RIDGE Sloped and Skewed Configurations

Skewed Connection Configuration

For RIDGE connectors installed in skewed beams, the secondary beam may be skewed at an angle, θ , as shown below. The width of the beam must ensure that a minimum distance of 10 mm [3/8 in.] is maintained between the edge of the secondary member and the tips of the fasteners, and the geometry requirements noted in the Detailing section (Page 24) of this chapter must be satisfied. Under these conditions, the factored resistance of the connector is not reduced. The connector must be aligned with the centerline of the beam. Where the connector is installed eccentrically, the resulting effects must be accounted for by the Engineer of Record.



Skewed Configuration: Isometric View



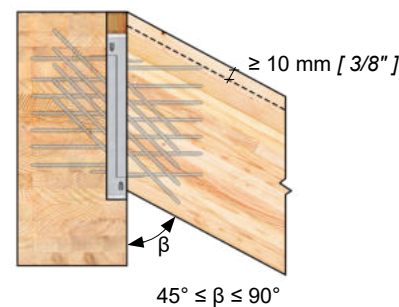
Skewed Configuration: Top View

Sloped Connection Configurations

RIDGE connectors in sloped configurations must account for the angle of the secondary member relative to the angle of the screws. The RIDGE utilizes screws installed at a 45° angle from the shear plane. As the slope of the secondary member changes, the angle between the fasteners and the wood grain will change, affecting the withdrawal capacity of the screws. As a result, the slope of the secondary member is limited to 45° to 90°. A reduction factor, R_p , must be applied to the tabulated factored download resistances provided in Table 2.2 (Page 21) based on the slope of the secondary beam, as shown in Table 2.3 below. A minimum of 10 mm [3/8 in.] must be maintained between the fastener tip and the edge of the joist.



Sloped Configuration: Isometric View



Sloped Configuration: Side View

Table 2.3 - Reduction Factor, R_p , for RIDGE Series in Sloped Connection Configuration

Slope of Secondary Member, β	$\beta = 90^\circ$	$\beta = 85^\circ$	$\beta = 80^\circ$	$\beta = 75^\circ$	$\beta = 70^\circ$	$\beta = 65^\circ$	$\beta = 60^\circ$	$\beta = 55^\circ$	$\beta = 50^\circ$	$\beta = 45^\circ$
XS, S, M, and L	1.0	0.98	0.96	0.96	0.94	0.92	0.91	0.89	0.88	0.82
XL	1.0	0.98	0.96	0.94	0.91	0.89	0.86	0.84	0.82	0.75

1. Values may be linearly interpolated.

Detailing - RIDGE Geometry Requirements

Housing Possibilities

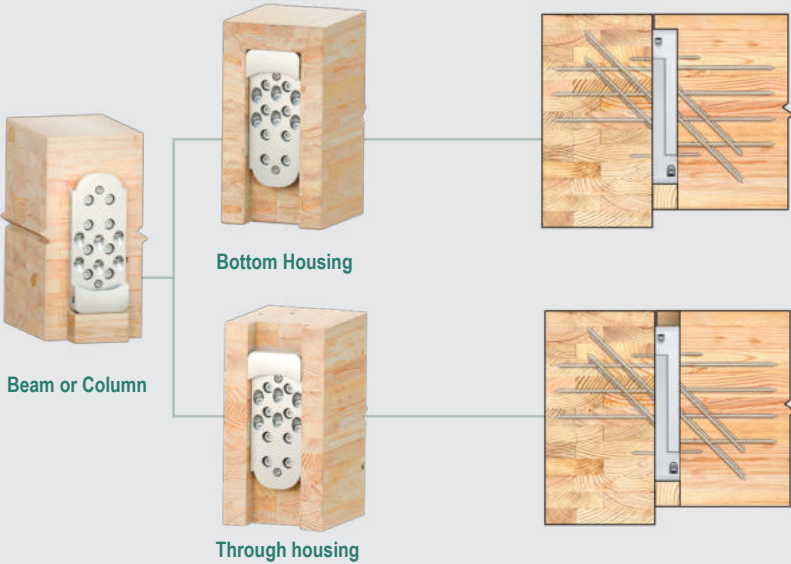
Primary Member Housing

- Typical housing for concealed installation
- Concealed from below



Secondary Member Housing

- Concealed from below with a shop-installed wood plug



RIDGE Series - Connector Geometry

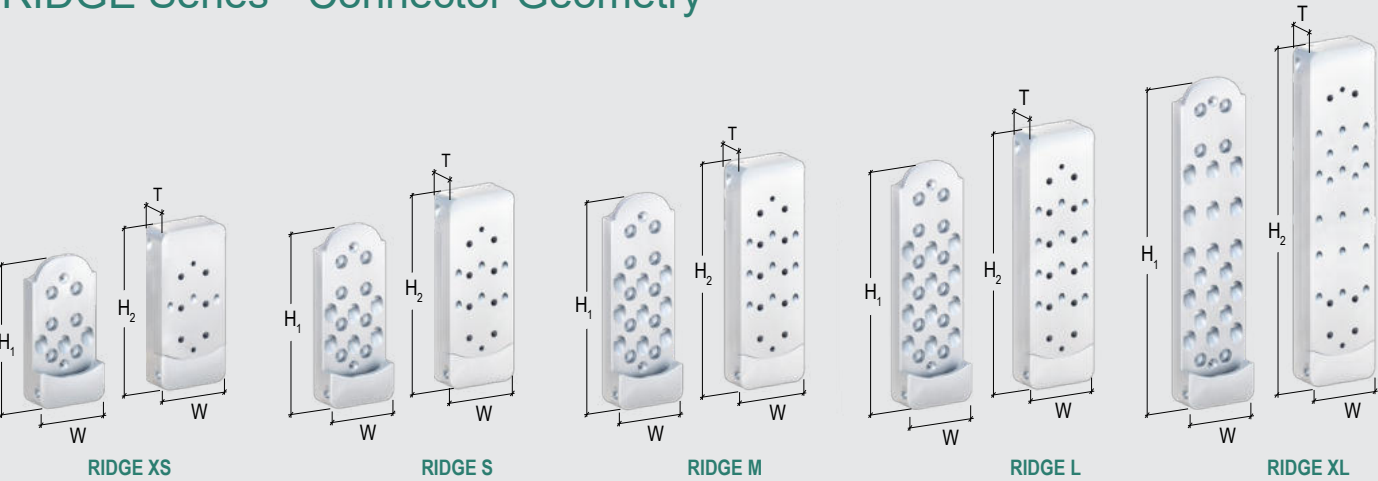


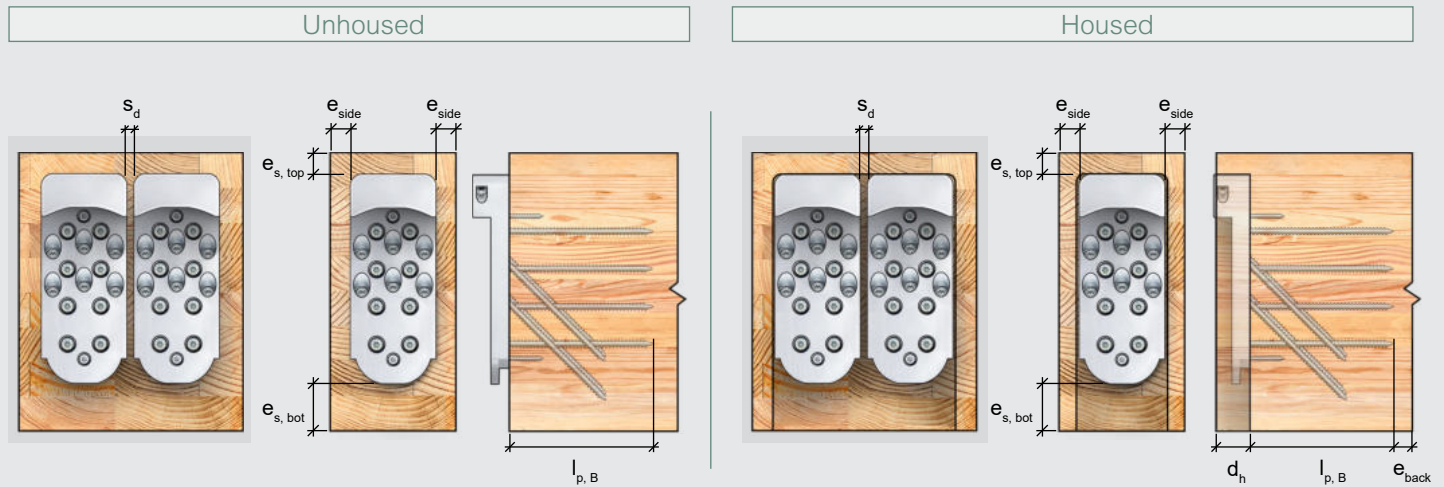
Table 2.4 - RIDGE Geometry

Connector Geometry	Model				
	RIDGE XS	RIDGE S	RIDGE M	RIDGE L	RIDGE XL
	[mm]				
H ₁	178	217	256	295	362
H ₂	197	236	275	314	381
W	88	88	88	88	88
T	38	38	38	38	38

Note:

1. Refer to Appendix D: Product Specifications (Page 138) for additional product specifications.

Secondary Member Geometry Requirements



Primary Member Geometry Requirements

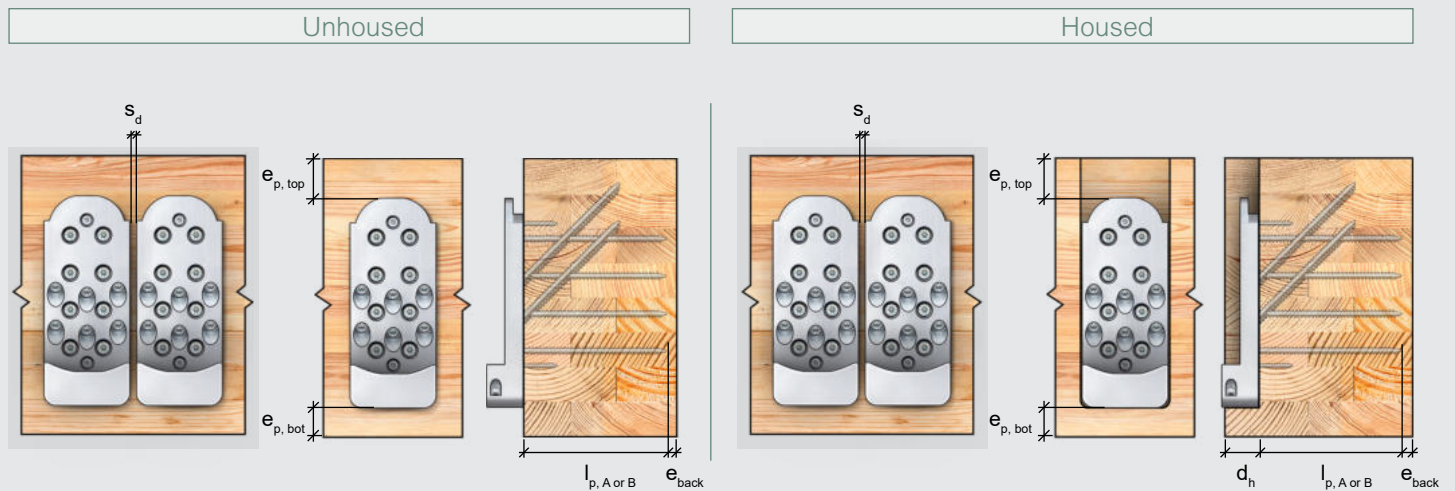


Table 2.5 - RIDGE Geometry Requirements for Secondary and Primary Member

RIDGE	Geometry Requirements [mm]																				d _h	s _d
	I _p [*]		e _{s,top}	e _{p,top}	No FRR				45-min FRR				1-hr FRR				2-hr FRR					
	A	B			e _{side}	e _{s,bot}	e _{p,bot}	e _{back}	e _{side}	e _{s,bot}	e _{p,bot}	e _{back}	e _{side}	e _{s,bot}	e _{p,bot}	e _{back}	e _{side}	e _{s,bot}	e _{p,bot}	e _{back}		
ALL MODELS	110	150	10	29	12	29	10	10	44	54	35	35	44	70	51	44	89	117	98	77	38	8

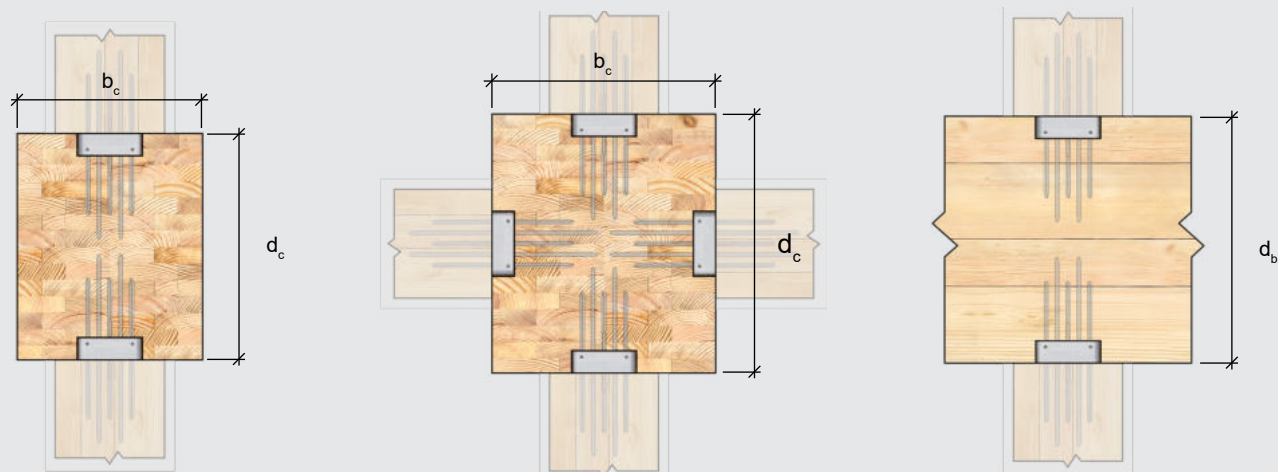
*Refer to Table 2.1 (Page 20) for hardware package options.

Notes:

- Connection design must meet all relevant requirements of the General Notes to the Designer section.
- Tabulated values presented are the minimum required unless noted otherwise. Tabulated values for I_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap between the primary and secondary member of 1.6 mm [1/16 in.]. Larger gaps will reduce d_h accordingly.
- For single-connector configurations with an FRR, the tabulated side and bottom cover dimensions are based on standard CSA O122:25 beam widths. Due to the corner rounding effect (CSA O86:24 Clause B.4.5), these dimensions are interdependent; alternate width and depth combinations may be used provided the required fire-protection cover around the connector is maintained.
- Values for e_{side} are applicable for side cover for both secondary beams and columns.
- Values for e_{p, top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary

Detailing - RIDGE Connector Interaction Geometry

Geometry Requirements for Multiple Beam Hangers on a Column or Beam



A

Hangers on Opposing Faces
of a Column

B

Hanger on Each Face
of a Column

C

Hangers on Opposing Faces
of a Beam

Table 2.6 - Minimum Member Dimensions for Multiple RIDGE Connectors

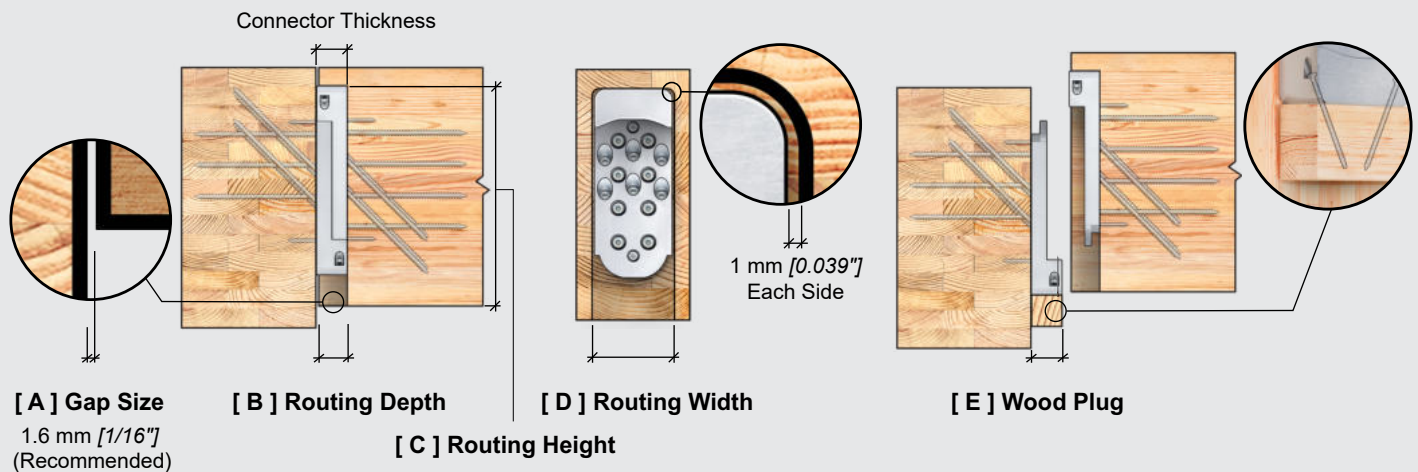
RIDGE	Primary Member Fastener Package	Minimum Column Section Dimensions, $b_c \times d_c$ [mm x mm]								Minimum Beam Width, d_b [mm]
		A Hangers on Opposing Faces of a Column				B Hangers on Each Face of a Column				C Hangers on Opposing Faces of a Beam
		No FRR	45-min FRR	1-hr FRR	2-hr FRR	No FRR	45-min FRR	1-hr FRR	2-hr FRR	Any FRR
ALL MODELS	Package A	112 x 308	175 x 308	175 x 308	265 x 308	308 x 385	308 x 385	308 x 385	308 x 385	308
	Package B	112 x 388	175 x 388	175 x 388	265 x 388	388 x 465	388 x 465	388 x 465	388 x 465	388

Notes:

1. Tabulated column section dimensions are minimum values based on a 12.7 mm [1/2 in.] clearance between screw tips, minimum edge and end distances, and minimum wood cover requirements for FRR. Refer to Geometry Requirements for further details.
2. It is the responsibility of the EOR to ensure the primary and secondary members have adequate capacity to resist connection forces.
3. Tabulated column section dimensions assume hangers are centered within each column face and are housed in the column as shown.
4. Tabulated dimensions assume connectors are housed in the primary member. Where connectors are housed in the secondary member, the applicable minimum primary member dimension may be reduced by the housing depth, d_h , provided in Table 2.5 for each connector face.

Detailing - RIDGE Housing Details

Housing and Surface Detailing



Parallel Surface:

The members must be parallel at the location of the connection to ensure proper hanger alignment and load transfer.

[A] Gap Size:

The gap size between wood members balances installation ease and fire performance, with larger gaps simplifying installation but reducing fire protection. A gap of 1.6 mm [1/16 in.] is recommended for proper installation to allow the secondary member to slide into place. The gap should be no more than 3.2 mm [1/8 in.] to address fire protection considerations. For more information, refer to Appendix A: Fire Protection (Page 121).

[B] Routing Depth:

The routing depth is the depth of the housing, d_h , noted in the Geometry Requirements and Routing Details sections. This depth takes into account the thickness of the connector and the gap between members (recommended 1.6 mm [1/16 in.] herein—larger gaps will reduce d_h accordingly).

[C] Routing Height:

The routing height must be coordinated with the Engineer of Record. The height of the connector in the beam section has an impact on connector performance. Refer to Positioning Considerations for Reinforcement (Page 6) for further information.

[D] Routing Width:

It is recommended to allow a clearance of 1 mm [0.039 in.] on each side of the connector. For all RIDGE series, the recommended routing width is 90 mm [3.543 in.].

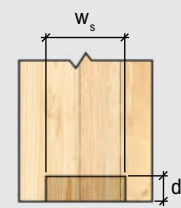
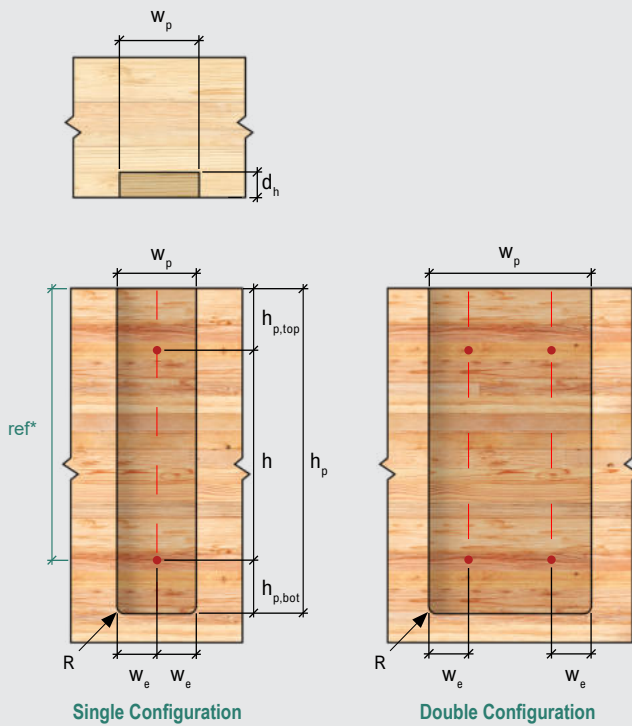
[E] Wood Plug:

The width of the wood plug should be 88 mm [3.465 in.] for all RIDGE models.

Detailing - RIDGE Housing Dimensions

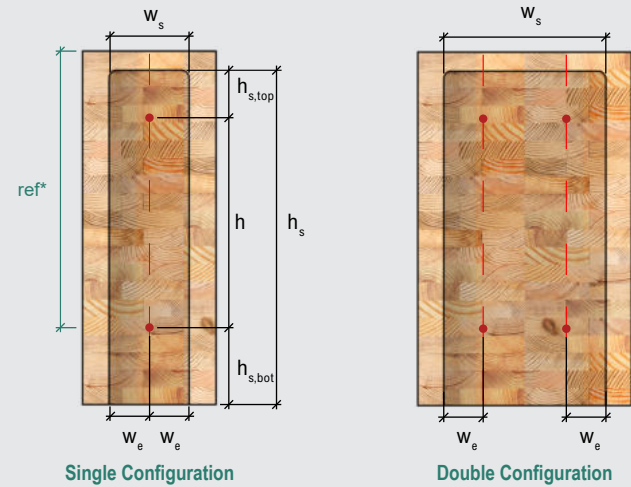
Routing in Primary Member

Routing in Secondary Member



Fastener Orientation

- Nonstructural Positioning Screws (Refer to Fastener Layout (Page 34))



* The reference point for routing and installation is the lower nonstructural positioning screw measured from the top of the beam. Refer to the Installation Guidelines (Page 31) for more information.

Table 2.7 - Routing Dimensions for RIDGE Housed in Primary Member

Model	Routing Dimensions, mm [in.]								
	h_p	$h_{p,top}$	h	$h_{p,bot}$	w_p		w_e	d_h	R
					Single	Double			
RIDGE XS	207.3 [8.160]	54.4 [2.141]	108.9 [4.288]	44.0 [1.732]	90.0 [3.543]	186.0 [7.323]	45.0 [1.772]	37.7 [1.484]	12.7 [0.500]
RIDGE S	246.3 [9.696]	54.4 [2.141]	147.9 [5.823]	44.0 [1.732]	90.0 [3.543]	186.0 [7.323]	45.0 [1.772]	37.7 [1.484]	12.7 [0.500]
RIDGE M	285.3 [11.231]	54.4 [2.141]	186.9 [7.358]	44.0 [1.732]	90.0 [3.543]	186.0 [7.323]	45.0 [1.772]	37.7 [1.484]	12.7 [0.500]
RIDGE L	324.3 [12.767]	54.4 [2.141]	225.9 [8.894]	44.0 [1.732]	90.0 [3.543]	186.0 [7.323]	45.0 [1.772]	37.7 [1.484]	12.7 [0.500]
RIDGE XL	391.9 [15.427]	54.5 [2.144]	293.9 [11.551]	44.0 [1.732]	90.0 [3.543]	186.0 [7.323]	45.0 [1.772]	37.7 [1.484]	12.7 [0.500]

Table 2.8 - Routing Dimensions for RIDGE Housed in Secondary Member (Beam-End)

Model	Routing Dimensions, mm [in.]								
	h_s	$h_{s,top}$	h	$h_{s,bot}$	w_s		w_e	d_h	R
					Single	Double			
RIDGE XS	207.3 [8.160]	74.1 [2.918]	60.8 [2.934]	72.4 [2.849]	90.0 [3.543]	186.0 [7.323]	45.0 [1.772]	37.7 [1.484]	12.7 [0.500]
RIDGE S	246.3 [9.696]	74.1 [2.918]	99.8 [3.929]	72.4 [2.849]	90.0 [3.543]	186.0 [7.323]	45.0 [1.772]	37.7 [1.484]	12.7 [0.500]
RIDGE M	285.3 [11.231]	74.1 [2.918]	138.8 [5.465]	72.4 [2.849]	90.0 [3.543]	186.0 [7.323]	45.0 [1.772]	37.7 [1.484]	12.7 [0.500]
RIDGE L	324.3 [12.767]	74.1 [2.918]	177.8 [7.000]	72.4 [2.849]	90.0 [3.543]	186.0 [7.323]	45.0 [1.772]	37.7 [1.484]	12.7 [0.500]
RIDGE XL	391.9 [15.427]	74.1 [2.918]	244.4 [9.623]	73.3 [2.887]	90.0 [3.543]	186.0 [7.323]	45.0 [1.772]	37.7 [1.484]	12.7 [0.500]

Notes:

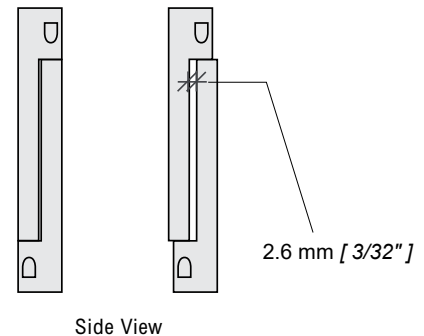
1. Tabulated values are general guidelines for routing requirements. The EOR and manufacturer are responsible for ensuring final routing dimensions account for all project-specific conditions.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for h and R are fixed. Tabulated values for d_h are maximum allowable.
3. Tabulated values account for 1 mm [0.039 in.] on each side of and above the hanger. Larger installation tolerances will increase height and width values accordingly.
4. Tabulated values are based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
5. Refer to the Geometry Requirements tables for each respective beam hanger for additional information.
6. Manufacturers should adjust the tabulated values based on their specific routing bit sizes if different than R .

Installation - RIDGE Tolerances

Assembly Tolerances

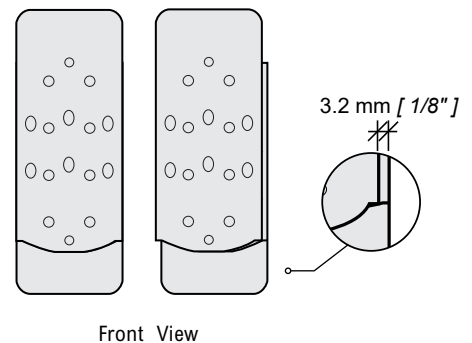
Axial Tolerance

The RIDGE connector provides 2.6 mm [3/32 in.] of axial tolerance, giving crews the flexibility needed for quick, drop-in installations. This is achieved without compromising the tight gaps essential for fire rating resistance while maintaining the clean aesthetics of mass timber, and ensuring a secure and fully seated connection.



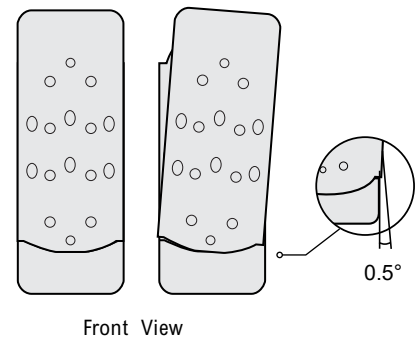
Horizontal Tolerance

Mass timber glulam beams typically span from 4 m [13 ft.] to 25 m [82 ft.], and in the most extreme cases, can go up to 46 m [164 ft.] long. With these lengths in mind, it's easy to understand why it is critical that a beam hanger system allows for horizontal tolerance to accommodate minor misalignments between supporting members. The RIDGE offers 3.2 mm [1/8 in.] of horizontal tolerance.



Rotational Tolerance

Following the same design principle as our horizontal tolerance, we have engineered a rotational tolerance of 0.5° to accommodate potential minor misalignments between supporting members.

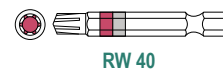


Installation - RIDGE General Requirements

Tool Requirements

Tools - Use the Correct Bit

MTC Solutions fasteners should only be driven using RW bits, or appropriately sized star bits. This ensures good centering and positioning with optimal torque transmission. For the RIDGE, use an RW 40 bit for the 8 mm [5/16 in.] screws.



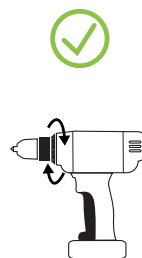
RW 40

Tools - Use the Correct Drill

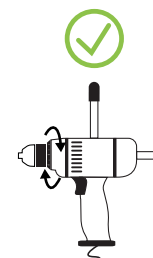
Use low-RPM, high-torque drills equipped with a feather (variable speed) trigger to install fasteners. Avoid excessive acceleration and deceleration during the drive-in process. Do not overtorque fasteners. Although impact drills are not expressly prohibited, their use is discouraged - particularly for beam hanger systems - due to an increased risk of overtightening. Use the appropriate drill chuck size according to the fastener.

Table 2.9 - Recommended Torque, Drill Bits, and Power Drill

Nominal Fastener Diameter [D]	HSS Drill Bit Size	Power Drill Voltage	Allowable Insertion Torque
mm [in.]	mm [in.]	V	N · m [lb. · ft.]
8 [5/16]	5 [3/16]	20	16.67 [12.30]



Cordless Clutched Drill



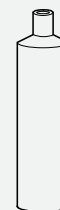
Double Handle Drill



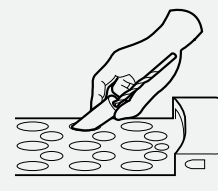
Impact Drill

Tools - RIDGE Predrilling Jig

The RIDGE Predrilling Jig ensures precise alignment of the RIDGE inclined fasteners. It guides the drill bit to create an accurate pilot hole, and ensures proper fastener seating. The hole in the jig accommodates standard imperial and metric drill bit diameters. For the 8 mm [5/16 in.] inclined fasteners, pilot holes 5 mm [3/16 in.] in diameter and 25 mm [1 in.] long are recommended.



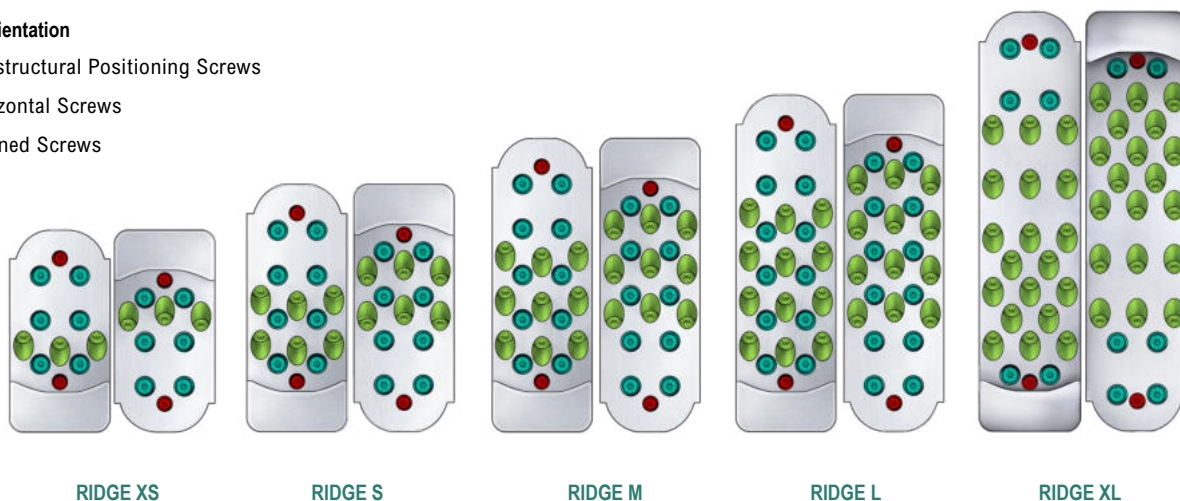
RIDGE Predrilling Jig



Fastener Layout

Fastener Orientation

- Nonstructural Positioning Screws
- Horizontal Screws
- Inclined Screws



RIDGE XS

RIDGE S

RIDGE M

RIDGE L

RIDGE XL

Installation - RIDGE Guidelines

General Installation Steps

Estimated Installation Time

The estimated time for a single person to install a complete RIDGE product is shown in Table 2.10

This process includes the following steps:

1. Layout (~10%)
2. Positioning (~10%–15%)
3. Pilot Holes (~25%–30%)
4. Screw Installation (~45%–50%)
5. Optional Measures (not included in the time installation % breakdown)

The estimated installation time can be improved upon with efficient fabrication and site practices such as:

1. Drilling pilot holes for the nonstructural positioning screws at the time of fabrication
2. Utilizing templates to drill pilot holes for structural screws
3. Optimizing beam positioning to reduce worker fatigue

Table 2.10 - RIDGE Estimated Installation Time

RIDGE Model	Average Installation Time [min.]
XS	11
S	15
M	19
L	23
XL	24

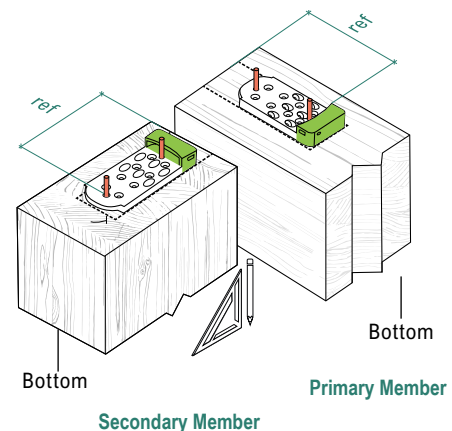
Step-by-Step Installation Guidelines

1.1 Layout - Reference Points

Begin by laying out the installation locations in the primary and secondary members using a pencil and square.

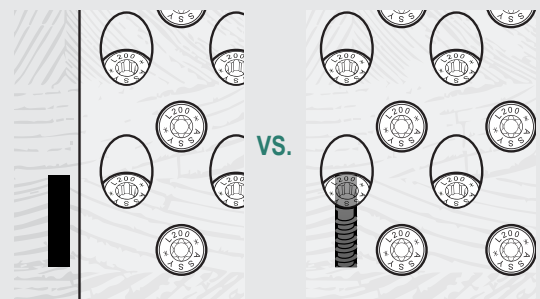
The connector's point of reference is the top of the member. The **lower nonstructural positioning screw** should be measured from that point of reference (ref).

The **pocket** should be at the **bottom** on the primary member and on the **top** on the secondary member.



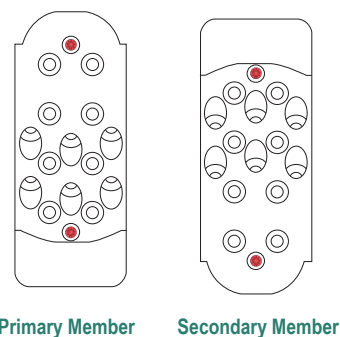
1.2 Layout - Split Lamination Considerations

Where lamination voids are present, positioning fasteners away from the voids is recommended to promote uniform load transfer. The influence of lamination voids on fasteners performance depends on their size relative to fastener geometry and their proximity to fasteners.



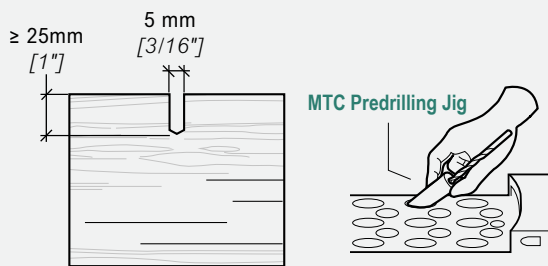
2.1 Positioning - Nonstructural Positioning Screw Installation

Positioning screws ensure accurate placement of the RIDGE connector. To improve accuracy and reduce time, it is recommended to predrill the nonstructural positioning screw locations during member fabrication. Install one nonstructural positioning screw into the hole highlighted at the top of the plate. Check to ensure alignment is maintained and then install the second nonstructural positioning screw into the hole highlighted at the bottom of the plate.



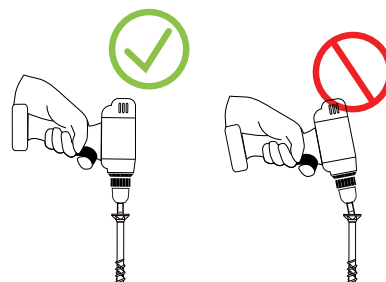
3.1 Pilot Holes - Recommendations

Pilot holes are optional; however, they facilitate screw thread engagement, help reduce splitting risks, ensure a proper penetration path, reduce screw wandering, and reduce insertion torque. For the structural fasteners used with the RIDGE series, pilot holes 5 mm [3/16 in.] in diameter and 25 mm [1 in.] in length are recommended. The use of RIDGE Predrilling Jig for the inclined screws is recommended to ensure proper hole placement.



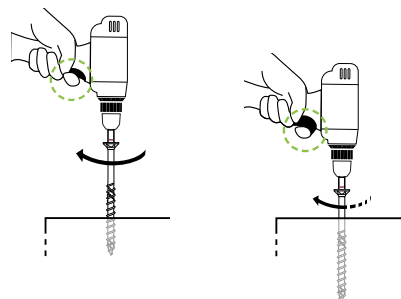
4.1 Screw Installation - Align Drill Bit Axis

Align the driver bit axis parallel to the fastener axis during installation to allow proper torque transmission and to avoid stripping.



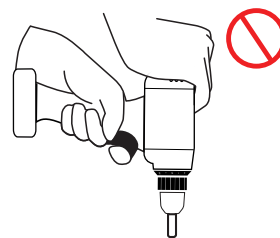
4.2 Screw Installation - Decrease RPM

To avoid overtightening the screw, decrease the rotation speed about 13 mm [1/2 in.] away from the final installed position. This is crucial to prevent wood crushing due to overtightening, which can impact beam hanger tolerances, potentially impeding overall connection assembly. This is especially important when using an impact drill.



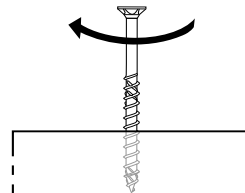
4.3 Screw Installation - Drill Pressure

Do not apply excessive pressure on the drill while driving the fastener to prevent fastener buckling or deviation during installation. Only apply the required force or use the recommended holder case to eliminate cam-out effects.



4.4 Screw Installation - One-Step Process

To avoid increased torque peaks caused by stopping and restarting the drive-in process, install the screw in one run until the head is lightly seated against the side member. If necessary, a torque wrench may be used to complete installation immediately after the screw has been driven.



4.5 Screw Installation - Structural Screws

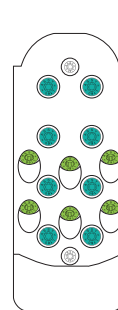
Install the structural screws from the top down, beginning with the horizontal screws. In the primary member, install the 8 × 120 mm [5/16" × 4-3/4"] MTC-FTC horizontal screws for Package A or 8 × 160 mm [5/16" × 6-1/4"] MTC-FTC horizontal screws for Package B (Refer to Table 1.1 on Page 20). In the secondary member, install the 8 × 160 mm [5/16" × 6-1/4"] MTC-FTC horizontal screws. Once all horizontal screws are installed, install the 8 × 160 mm [5/16" × 6-1/4"] MTC-FTC screws in all inclined holes, again working from the top down.



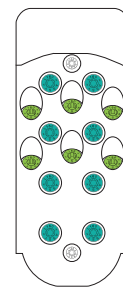
Horizontal Screws



45° Inclined Screws



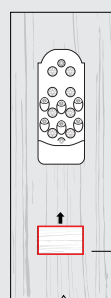
Primary Member



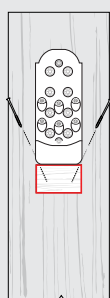
Secondary Member

5.1 Optional Measures - Pre-Installed Wood Plug

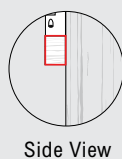
Where connectors are housed in the secondary beam, it is recommended to seal the void in the routing below the connector for aesthetics and fire protection. The RIDGE system is equipped with 5.5 mm [7/32 in.] diameter diagonal holes so that a wood plug may be pre-installed on the non-routed member in the shop or on site before the secondary beam is lifted into place. The wood plug can be installed with #10 wood screws that are 38 to 51 mm [1-1/2 to 2 in.] long.



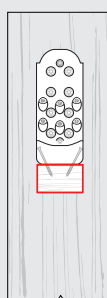
Primary Member



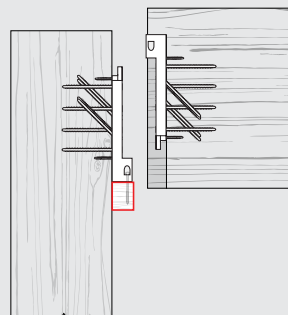
Primary Member



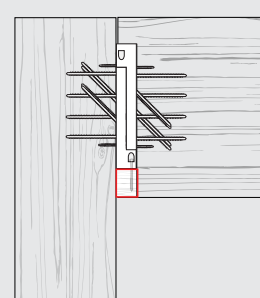
Side View



Primary Member



Primary Member



Primary Member

APEX

Pre-Engineered Connection System

The APEX is a pre-engineered beam-to-column and beam-to-beam concealed connector designed for mass timber applications. Developed through extensive testing and iterative design, and engineered, manufactured, and tested in North America, APEX delivers high load capacity while accommodating construction tolerances and providing a reliable, high-performance connection.



Exceptional Load Capacity

High off-the-shelf capacities, making longer spans and heavier loads easily attainable



Fire-Resistance-Rated

Fully-loaded, 2-hr tested FRR in accordance with CAN/ULC-S101 and ASTM E119



Interstory Drift Performance-Tested

Drift performance exceeding 4% while loaded verified through quasi-static rotational testing—supporting seismic design loads



Robust Installation Tolerances

Built-in axial, horizontal, and rotational tolerances (± 3.2 mm and $\pm 0.5^\circ$) enable true drop-in installation, accommodating variation and misalignments with a secure fit



Efficient Logistics & Reliable Supply

Locally manufactured in Canada and the U.S. for shorter lead times, reduced delay risk, and a more responsive supply chain—helping projects stay on schedule



Simple, Fast, Drop-In Installation

Easy installation from identical plates and a pre-engineered screw pattern, faster installs, and tolerance-friendly drop-in fit—all contributing to a safer job site and lower labor costs

Design

- Wood-to-Wood Design Values
- Seismic Performance
- Positioning Considerations for Reinforcement
- Sloped and Skewed Configurations

Detailing

- APEX 100 Series Geometry Requirements
- APEX 150 Series Geometry Requirements
- Connector Interaction Geometry
- Housing Details and Dimensions

Installation

- APEX Tolerances
- Tool Requirements
- Fastener Layout
- Installation Guidelines

STANDARDS AND CERTIFICATIONS

ASTM E119 and
CAN/ULC-S101

ASTM D7147

CSA O86:24



Canadian Engineered. Unrivalled Strength.

The new standard in mass timber connections is here, and it's proudly **Canadian engineered, manufactured, and tested**. The APEX beam hanger is the result of fifteen years of expertise and four years of dedicated research and development by our MTC engineering team, focused on innovation and growth.

Rigorously tested and designed to CSA O86:24, APEX is now the new state-of-the-art beam-to-column and beam-to-girder connection for mass timber, available on demand.

This new product represents a commitment from MTC Solutions to the industry: to provide more locally manufactured products. This approach changes the game for Canadian mass timber projects by improving project costs, enhancing supply chain reliability, and reducing the environmental impact.

American Made, Tested & Proven

The APEX beam hanger is also proudly **manufactured in the USA** from high-grade aluminum, offering American projects a decisive advantage by solving critical supply chain challenges.

This system eliminates tariff uncertainty and drastically reduces procurement lead times with a high-performance connector available locally and on demand. The result is significant cost savings, unwavering supply chain reliability, and the uncompromising quality of American manufacturing.



APEX Overview

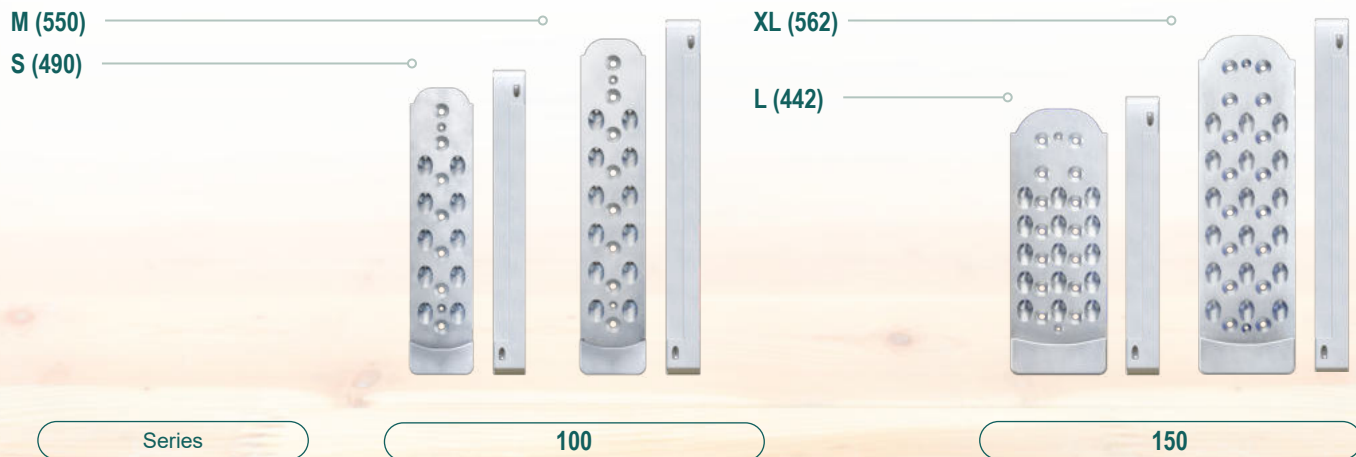


Table 3.1 - APEX Hardware Package Installation Overview

APEX		Plate Qty.	Fasteners						Installation Time
			Primary Member (Package A OR B)				Secondary Member		
			Type MTC-FTC				Type MTC-FTC		
Series	Model		Package A Mixed Length	Qty.	Package B Uniform Length	Qty.	Type	Qty.	min.
100	APEX S	2	10 x 160 mm Horizontal Screws	7	10 x 200 mm Horizontal & Inclined Screws	17	10 x 200 mm Horizontal & Inclined Screws	17	13
			10 x 200 mm Inclined Screws	10					
	APEX M	2	10 x 160 mm Horizontal Screws	8	10 x 200 mm Horizontal & Inclined Screws	20	10 x 200 mm Horizontal & Inclined Screws	20	15
			10 x 200 mm Inclined Screws	12					
150	APEX L	2	10 x 160 mm Horizontal Screws	14	10 x 200 mm Horizontal & Inclined Screws	29	10 x 200 mm Horizontal & Inclined Screws	29	20
			10 x 200 mm Inclined Screws	15					
	APEX XL	2	10 x 160 mm Horizontal Screws	16	10 x 200 mm Horizontal & Inclined Screws	34	10 x 200 mm Horizontal & Inclined Screws	34	23
			10 x 200 mm Inclined Screws	18					

Notes:

- Subsequent tabulated capacities in this chapter assume connectors are installed with MTC-FTC (see Table 1.1 on Page 13) fasteners specified in this table and in accordance with CCMC 13677-R.
- Packages A and B provide the same factored resistance. Package A is permitted only where the primary member fasteners are installed into side or parallel grain. Where the primary member fasteners are installed into end grain, Package B is required.
- The estimated installation time is based on a time study and includes steps for layout and positioning, installation of nonstructural positioning screws, drilling a 25 mm [1 in.] deep pilot hole for each fastener, and structural screw installation for both plates. Refer to Page 47 for more information.
- Each product kit includes four 6 x 80 mm [1/4" x 3-1/8"] MTC-PTC (see Table 1.1 on Page 13) nonstructural positioning screws.



Product Kit Details

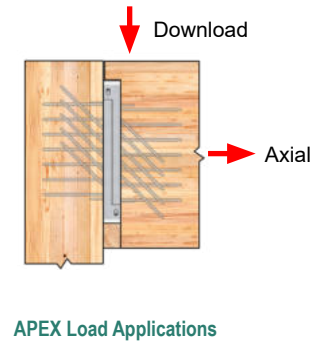


Design - APEX Technical Information

Wood-to-Wood Design Values

Table 3.2 - Factored Resistances for APEX Series in Wood-to-Wood Connections

APEX		Minimum Secondary Beam Section Dimensions [mm]				Relative Density [G]	Factored Resistance [kN]	
Model	Configuration	No FRR	45-min FRR	1-hr FRR	2-hr FRR		Download	Axial
APEX S	Single	113 x 502	174 x 532	194 x 548	254 x 594	≥ 0.42*	159	13
						≥ 0.44	169	14
						≥ 0.47**	181	16
						≥ 0.49	181	17
	Double	221 x 502	282 x 532	301 x 548	361 x 594	≥ 0.42*	259	23
						≥ 0.44	305	24
						≥ 0.47**	363	27
						≥ 0.49	361	30
APEX M	Single	113 x 562	174 x 592	194 x 608	254 x 654	≥ 0.42*	190	14
						≥ 0.44	202	14
						≥ 0.47**	222	16
						≥ 0.49	222	18
	Double	221 x 562	282 x 592	301 x 608	361 x 654	≥ 0.42*	300	23
						≥ 0.44	350	24
						≥ 0.47**	445	28
						≥ 0.49	414	30
APEX L	Single	166 x 442	225 x 479	244 x 494	304 x 540	≥ 0.42*	186	24
						≥ 0.44	216	26
						≥ 0.47**	240	29
						≥ 0.49	240	32
	Double	324 x 442	383 x 479	403 x 494	463 x 540	≥ 0.42*	255	41
						≥ 0.44	306	43
						≥ 0.47**	408	50
						≥ 0.49	366	54
APEX XL	Single	166 x 562	225 x 599	244 x 614	304 x 660	≥ 0.42*	263	27
						≥ 0.44	295	28
						≥ 0.47**	316	32
						≥ 0.49	316	35
	Double	324 x 562	383 x 599	403 x 614	463 x 660	≥ 0.42*	368	45
						≥ 0.44	437	48
						≥ 0.47**	590	55
						≥ 0.49	517	59



*Requires minimum specified longitudinal shear strength, f_v , of 1.5 MPa.

**Requires minimum specified longitudinal shear strength, f_v , of 2.5 MPa and minimum specified tension perpendicular to grain, $f_{\perp}$, of 0.51 MPa.

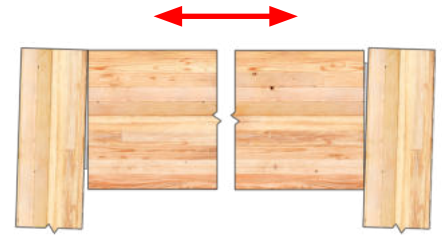
Notes:

- Connection design must meet all relevant requirements of the General Notes to the Designer section.
- Tabulated factored resistances are applicable for wood-to-wood connections only. Screw installation must follow the patterns presented in the Installation section.
- The listed connector resistances may be limited by the splitting resistance perpendicular to grain and the effective shear resistance of the timber members. Refer to Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain (Page 129) for more information and available reinforcement strategies. It is the responsibility of the EOR to ensure the primary and secondary members have adequate capacity to resist connection forces.
- Factored resistances provided do not account for combined loading in multiple directions. Combined gravity and axial loading must be verified per eq. 1 (Page 13).
- Tabulated factored resistances assume adequate load transfer at the beam end. Where gaps or voids are present, engineering verification may be required.
- Tabulated factored resistances apply to both Package A and Package B. Package A is permitted only where primary member fasteners are installed into side or parallel grain.
- Due to axial tolerance, some slip is expected before the connector develops the axial capacities shown in the table.
- Tabulated factored resistances for double hanger configurations assume equal load distribution between hangers.

APEX Seismic Performance

MTC has conducted extensive quasi-static and component testing on the APEX connector. The results have demonstrated its robust performance under drift and axial demands.

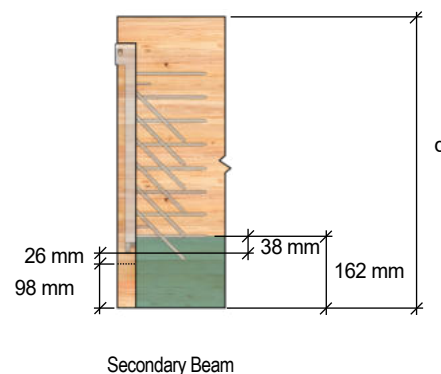
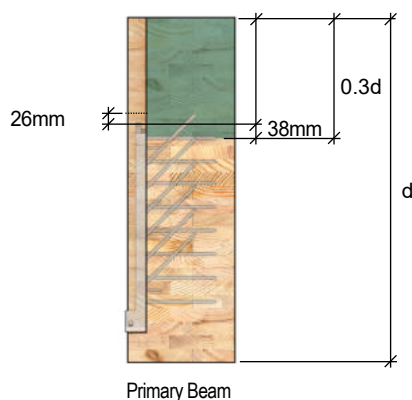
- The APEX can accommodate drifts of over 4% while fully loaded, satisfying the drift limits specified in NBCC 2024 Clause 4.1.18.13.
- The APEX connector maintains axial load-transfer capacity while carrying full download to ensure the structural integrity of the connection is maintained during a wind or seismic event.



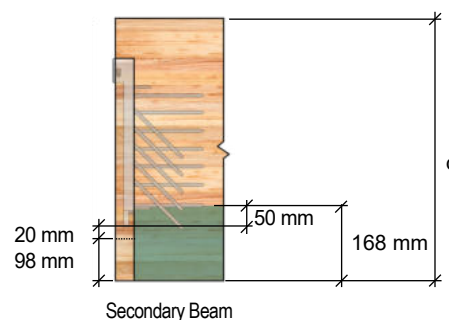
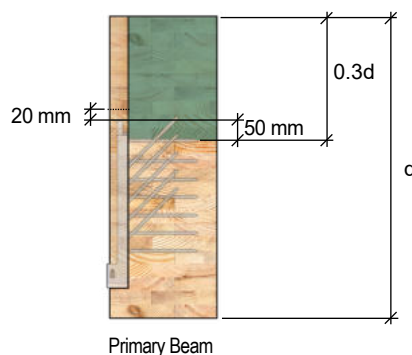
These results demonstrate the APEX connector's ability to accommodate seismic demands while maintaining connection integrity. However, the APEX is not intended to be used as part of the Lateral Force Resisting System (LFRS). Contact MTC Technical Support for additional details for accommodating seismic loads in your design.

Positioning Considerations for Reinforcement

The hanger placement relative to the height of the beam can impact the need for reinforcement. Connectors in the primary beam should have the insertion point of the uppermost fastener in the top 30% of the member depth ($0.3d$), as shown below. Connectors in the secondary beam should have the insertion point of the lower most fastener within 162 mm of the bottom of the beam for APEX 100 Series and 168 mm of the bottom of the beam for APEX 150 Series. This is in alignment with 98 mm wood cover to the hanger for fire protection. Outside of these zones, the primary and secondary beams should be checked for splitting to determine if reinforcement is required. Note that these requirements do not apply to columns. For further information, refer to Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain (Page 129).



APEX 100 series



APEX 150 series

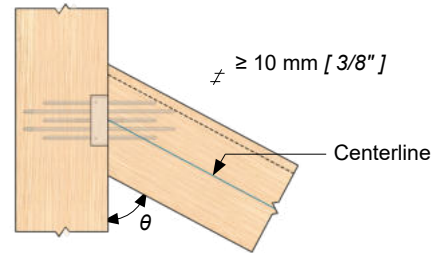
Design - APEX Sloped and Skewed Configurations

Skewed Connection Configuration

For APEX connectors installed in skewed beams, the secondary beam may be skewed at an angle, θ , as shown below. The width of the beam must ensure that a minimum distance of 10 mm [3/8 in.] is maintained between the joist edge and the tips of the fasteners, and all geometry requirements noted in the Detailing section (Page 40) of this chapter must be satisfied. Under these conditions, the factored resistance of the connector is not reduced. The connector must be aligned with the centerline of the joist; otherwise, eccentricities and resulting moments must be accounted for by the Engineer of Record.



Skewed Configuration: Isometric View



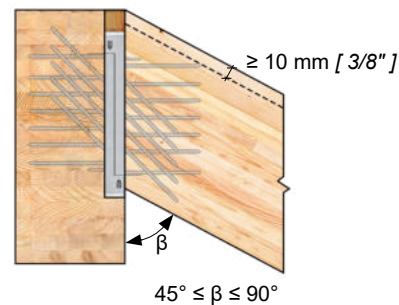
Skewed Configuration: Top View

Sloped Connection Configurations

APEX connectors in sloped configurations must account for the angle of the secondary member relative to the angle of the screws. The APEX utilizes screws installed at a 45° angle from the shear plane. As the slope of the secondary member changes, the angle between the fasteners and the wood grain will change, affecting the withdrawal capacity of the screws. As a result, the slope of the secondary member is limited to 45° to 90°. A reduction factor, R_p , must be applied to the tabulated factored download resistances provided in Table 3.2 (Page 37) based on the slope of the secondary beam, as shown in Table 3.3 below. A minimum of 10 mm [3/8 in.] must be maintained between the fastener tip and the edge of the joist.



Sloped Configuration: Isometric View



Sloped Configuration: Side View

Table 3.3 - Reduction Factor, R_p , for APEX Series in Sloped Connection Configuration

Slope of Secondary Member, β	$\beta = 90^\circ$	$\beta = 85^\circ$	$\beta = 80^\circ$	$\beta = 75^\circ$	$\beta = 70^\circ$	$\beta = 65^\circ$	$\beta = 60^\circ$	$\beta = 55^\circ$	$\beta = 50^\circ$	$\beta = 45^\circ$
R_p	1.0	0.98	0.97	0.95	0.94	0.93	0.93	0.92	0.91	0.84

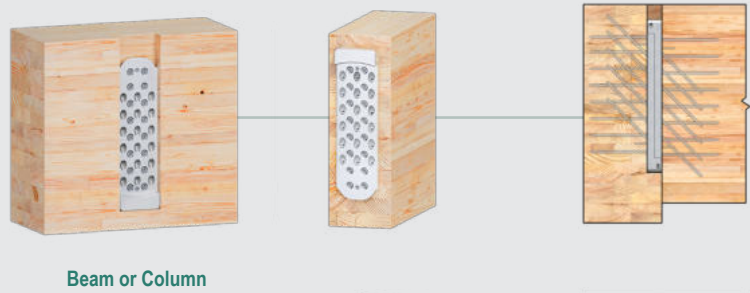
1. Values may be linearly interpolated.

Detailing - APEX Geometry Requirements

Housing Possibilities

Primary Member Housing

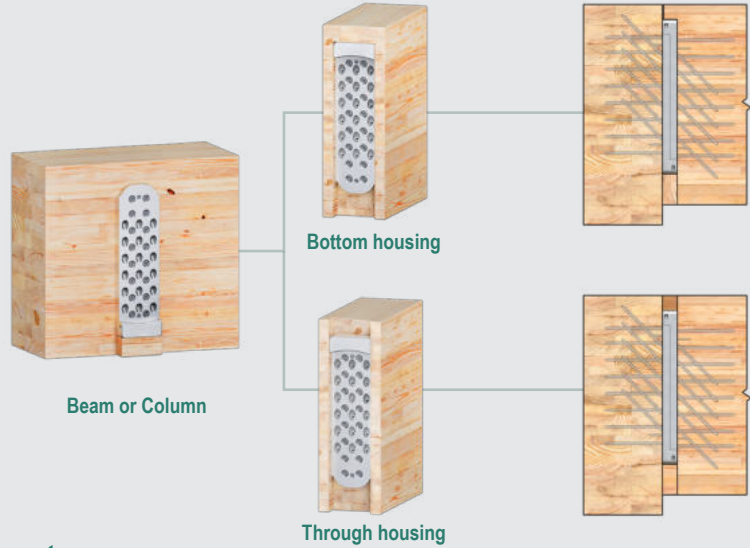
- Typical housing for concealed installation
- Concealed from below



Beam or Column

Secondary Member Housing

- Concealed from below with a shop-installed wood plug

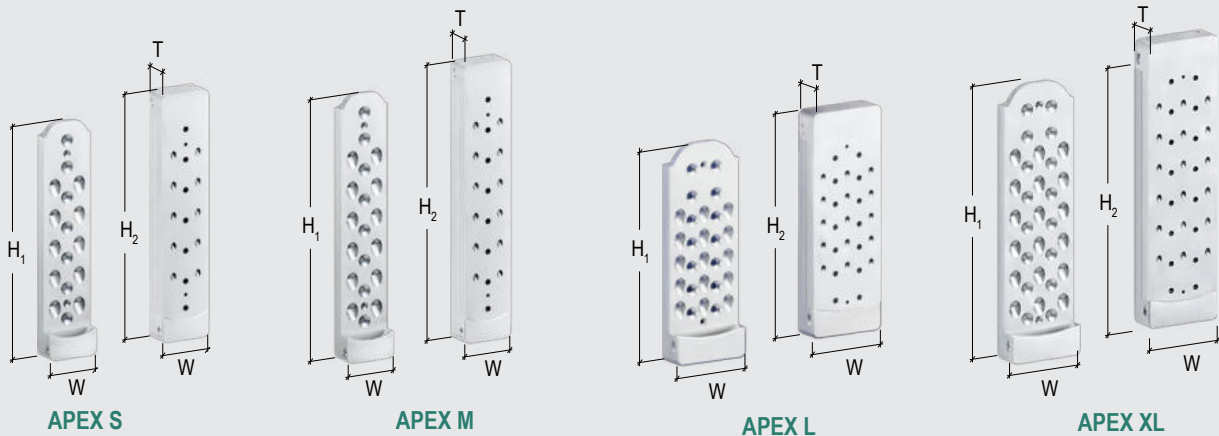


Bottom housing

Beam or Column

Through housing

APEX Series - Connector Geometry



APEX S

APEX M

APEX L

APEX XL

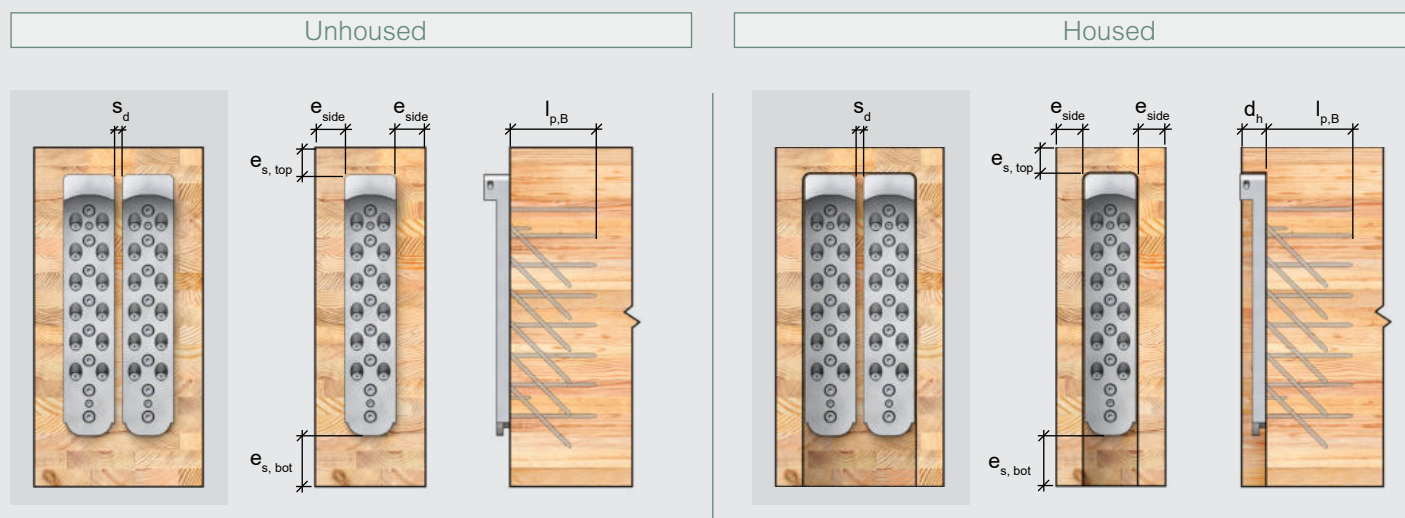
Table 3.4 - APEX 100 Geometry

Connector Geometry	Model		Model	
	APEX S	APEX M	APEX L	APEX XL
	[mm]			
H ₁	464	524	422	542
H ₂	490	550	442	562
W	102	102	152	152
T	50	50	50	50

Note:

1. Refer to Appendix D: Product Specifications (Page 138) for additional product specifications.

Secondary Member Geometry Requirements



Primary Member Geometry Requirements

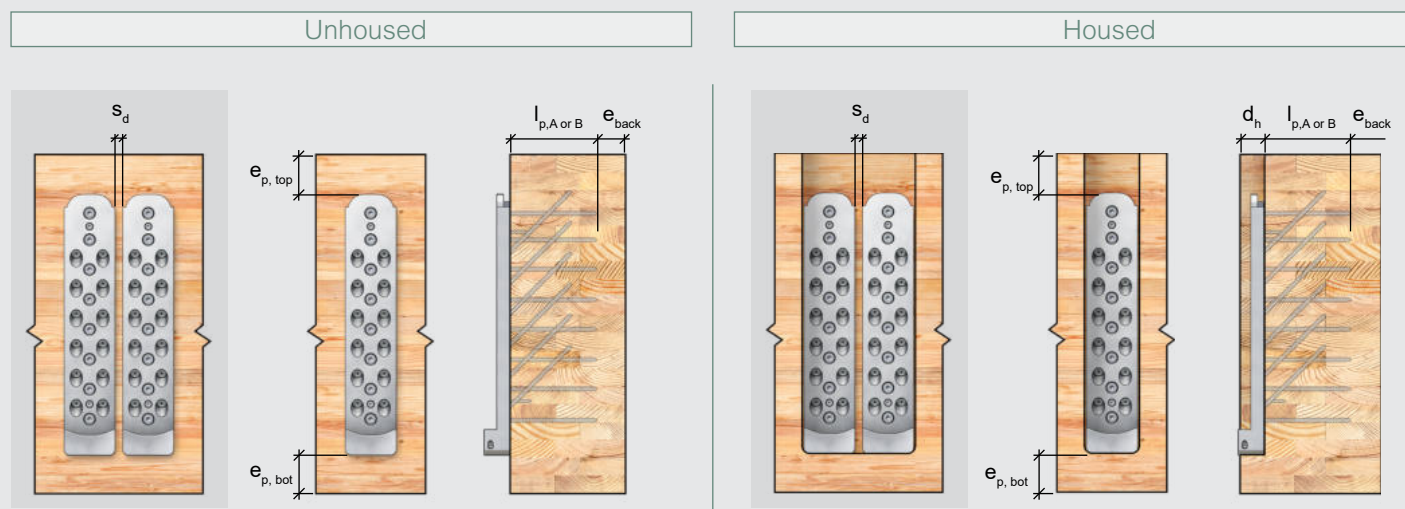


Table 3.5 - APEX Geometry Requirements for Secondary and Primary Members

Model Series	Geometry Requirements [mm]																				d _h	s _d
	I _p [*]		e _{s, top}	e _{p, top}	No FRR				45-min FRR				1-hr FRR				2-hr FRR					
	A	B			e _{side}	e _{s, bot}	e _{p, bot}	e _{back}	e _{side}	e _{s, bot}	e _{p, bot}	e _{back}	e _{side}	e _{s, bot}	e _{p, bot}	e _{back}	e _{side}	e _{s, bot}	e _{p, bot}	e _{back}		
APEX 100	136	176	7	33	6	33	7	10	36	62	36	36	46	78	52	46	76	124	98	85	50	6
APEX 150	136	176	0	20	7	33	0	10	36	56	36	36	46	72	52	46	76	118	98	85	50	6

* Refer to Table 3.1 (Page 36) for hardware package options.

Notes:

- Connection design must meet all relevant requirements of the General Notes to the Designer section.
- Tabulated values presented are the minimum required unless noted otherwise. Tabulated values for I_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap between the primary and secondary member of 1.6 mm [1/16 in.]. Larger gaps will reduce d_h accordingly.
- For single-connector configurations with an FRR, the tabulated side cover dimensions are the minimum required. Due to the corner rounding effect (CSA O86:24 Clause B.4.5), the bottom cover dimensions are dependent on the width of the beam; alternate width and depth combinations may be used provided the required fire-protection cover around the connector is maintained.
- Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance as well as the effective shear resistance of the members.
- Values for e_{side} are applicable for side cover for both secondary beams and columns.
- Values for e_{p,bot} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam.

Detailing - APEX Connector Interaction Geometry

Geometry Requirements for Multiple Beam Hangers on a Column or Beam

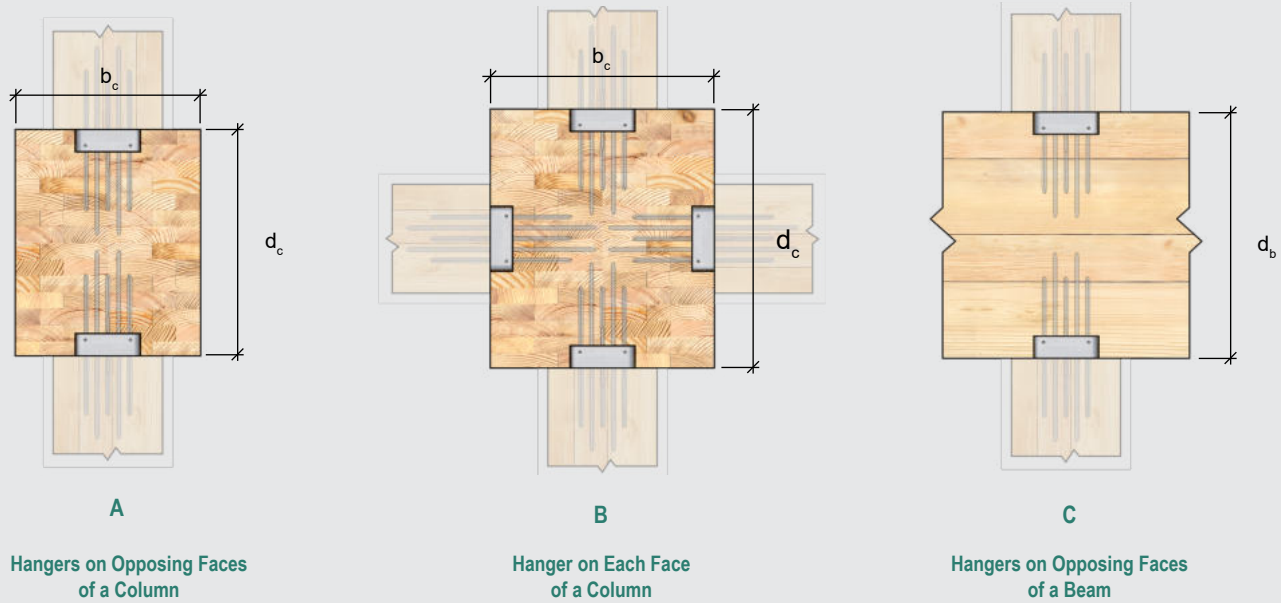


Table 3.6 - Minimum Column Sizes for Multiple APEX Connectors

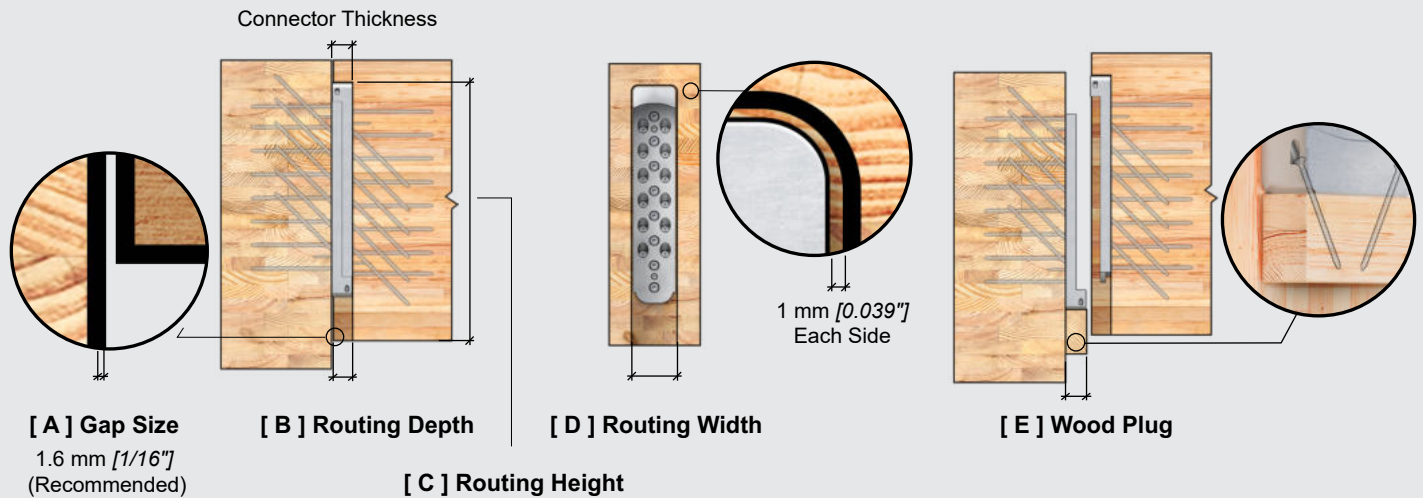
Model Series	Primary Member Fastener Package	Minimum Column Section Dimensions, $b_c \times d_c$ [mm x mm]								Minimum Beam Width, d_b [mm]
		A Hangers on Opposing Faces of a Column				B Hangers on Each Face of a Column				C Hangers on Opposing Face of a Beam
		No FRR	45-min FRR	1-hr FRR	2-hr FRR	No FRR	45-min FRR	1-hr FRR	2-hr FRR	Any FRR
APEX 100	Package A	113 x 386	174 x 386	194 x 386	254 x 386	386 x 451	386 x 451	386 x 451	386 x 451	386
	Package B	113 x 466	174 x 466	194 x 466	254 x 466	466 x 531	466 x 531	466 x 531	466 x 531	466
APEX 150	Package A	166 x 386	225 x 386	244 x 386	304 x 386	386 x 504	386 x 504	386 x 504	386 x 504	386
	Package B	166 x 466	225 x 466	244 x 466	304 x 466	466 x 584	466 x 584	466 x 584	466 x 584	466

Notes:

1. Tabulated column section dimensions are minimum values based on a 12.7 mm [1/2 in.] clearance between screw tips, minimum edge and end distances, and minimum wood cover requirements for FRR. Refer to Geometry Requirements for further details.
2. It is the responsibility of the EOR to ensure the primary and secondary members have adequate capacity to resist connection forces.
3. Tabulated dimensions assume connectors are housed in the primary member. Where connectors are housed in the secondary member, the applicable minimum primary member dimension may be reduced by the housing depth, d_{hp} , provided in Table 3.5 for each connector face.

Detailing - APEX Housing Details

Housing and Surface Detailing



Parallel Surface:

The members must be parallel at the location of the connection to ensure proper hanger alignment and load transfer.

[A] Gap Size:

The gap size between wood members balances installation ease and fire performance, with larger gaps simplifying installation but reducing fire protection. A gap of 1.6 mm [1/16 in.] is recommended for proper installation to allow the secondary member to slide into place. The gap should be no more than 3.2 mm [1/8 in.] to address fire protection considerations. For more information, refer to Appendix A: Fire Protection (Page 121).

[B] Routing Depth:

The routing depth is the depth of the housing, d_h , noted in the Geometry Requirements and Routing Details sections. This depth takes into account the thickness of the connector and the gap between members (recommended 1.6 mm [1/16 in.] herein—larger gaps will reduce d_h accordingly).

[C] Routing Height:

The routing height must be coordinated with the Engineer of Record. The height of the connector in the beam section has an impact on connector performance. Refer to Positioning Considerations for Reinforcement (Page 6) for further information.

[D] Routing Width:

It is recommended to allow a clearance of 1 mm [0.039 in.] on each side of the connector:

- APEX 100 Series: 103.6 mm [4.079 in.]
- APEX 150 Series: 154.4 mm [6.079 in.]

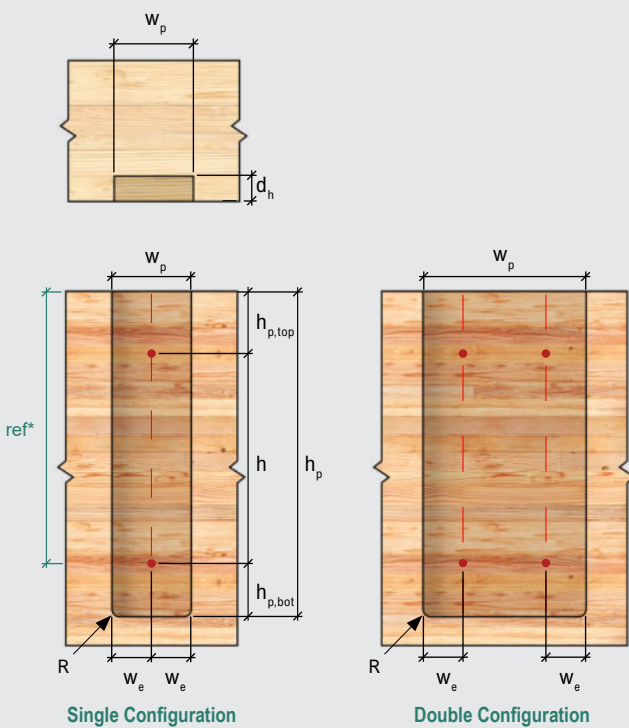
[E] Wood Plug:

The width of the wood plug should correspond to the width of the hanger (see Table 3.4 on page 40).

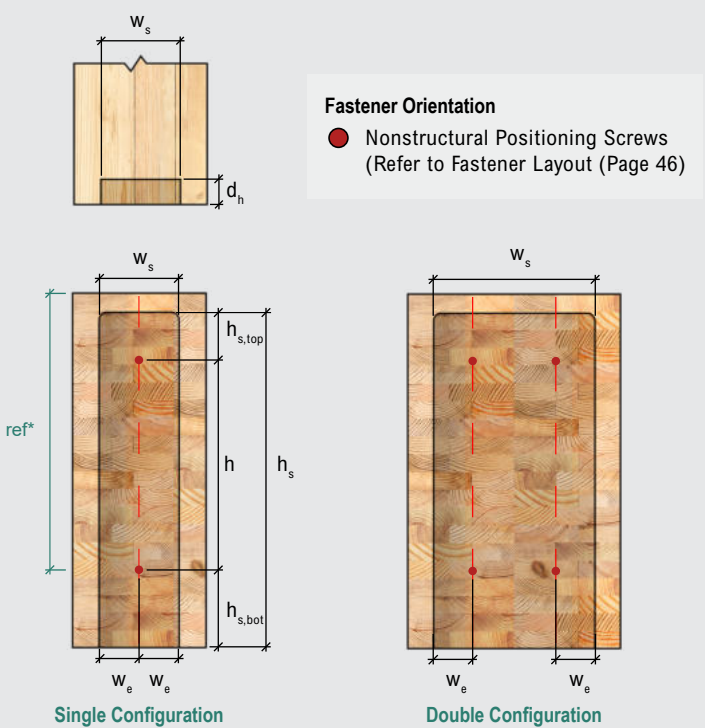
- APEX 100 Series: 102 mm [4.016 in.]
- APEX 150 Series: 152 mm [5.984 in.]

Detailing - APEX Housing Dimensions

Routing in Primary Member



Routing in Secondary Member



* The reference point for routing and installation is the lower nonstructural positioning screw measured from the top of the beam. Refer to the Installation - APEX Guidelines section (Page 47) for more information.

Table 3.7 - Routing Dimensions for APEX Housed in Primary Member

Model	Routing Dimensions, mm [in.]								
	h _p	h _{p,top}	h	h _{p,bot}	w _p		w _e	d _h	R
					Single	Double			
APEX S	497.8 [19.600]	97.7 [3.847]	296.5 [11.673]	103.6 [4.080]	103.6 [4.080]	211.2 [8.315]	51.8 [2.039]	50 [1.969]	12.7 [0.500]
APEX M	557.8 [21.962]	97.7 [3.847]	356.5 [14.035]	103.6 [4.080]	103.6 [4.080]	211.2 [8.315]	51.8 [2.039]	50 [1.969]	12.7 [0.500]
APEX L	444.2 [17.489]	65.3 [2.572]	304.8 [12.000]	74.1 [2.918]	154.4 [6.079]	312.8 [12.315]	77.2 [3.039]	50 [1.969]	12.7 [0.500]
APEX XL	564.2 [22.214]	65.3 [2.572]	424.8 [16.274]	74.1 [2.918]	154.4 [6.079]	312.8 [12.315]	77.2 [3.039]	50 [1.969]	12.7 [0.500]

Table 3.8 - Routing Dimensions for APEX Housed in Secondary Member (Beam-End)

Model	Routing Dimensions, mm [in.]								
	h _s	h _{s,top}	h	h _{s,bot}	w _s		w _e	d _h	R
					Single	Double			
APEX S	497.8 [19.600]	103.6 [4.080]	296.5 [11.673]	97.7 [3.847]	103.6 [4.079]	211.2 [8.315]	51.8 [2.039]	50 [1.969]	12.7 [0.500]
APEX M	557.8 [21.962]	103.6 [4.080]	356.5 [14.035]	97.7 [3.847]	103.6 [4.079]	211.2 [8.315]	51.8 [2.039]	50 [1.969]	12.7 [0.500]
APEX L	444.2 [17.489]	74.1 [2.918]	304.8 [12.000]	65.3 [2.572]	154.4 [6.079]	312.8 [12.315]	77.2 [3.039]	50 [1.969]	12.7 [0.500]
APEX XL	564.2 [22.214]	74.1 [2.918]	424.8 [16.274]	65.3 [2.572]	154.4 [6.079]	312.8 [12.315]	77.2 [3.039]	50 [1.969]	12.7 [0.500]

Notes:

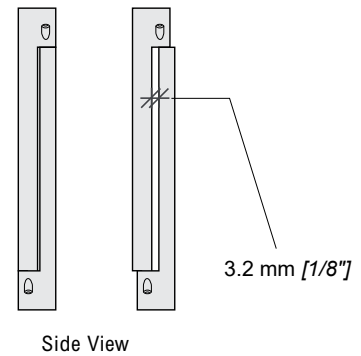
1. Tabulated values are general guidelines for routing requirements. The EOR and manufacturer are responsible for ensuring final routing dimensions account for all project-specific conditions.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for h and R are fixed. Tabulated values for d_h are maximum allowable.
3. Tabulated values account for 1 mm [0.039 in.] on each side of and above the hanger. Larger installation tolerances will increase height and width values accordingly.
4. Tabulated values are based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
5. Refer to the Geometry Requirements tables for each respective beam hanger for additional information.
6. Manufacturers should adjust the tabulated values based on their specific routing bit sizes if different than R.

Installation - APEX Tolerances

Assembly Tolerances

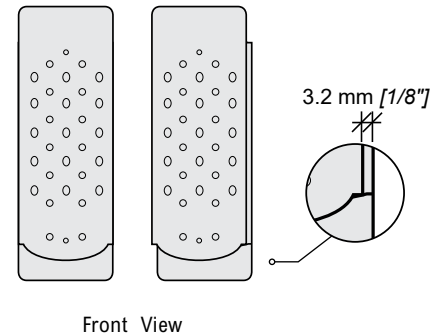
Axial Tolerance

The APEX connector provides 3.2 mm [1/8 in.] of axial tolerance, giving crews the flexibility needed for quick, drop-in installations. This is achieved without compromising the tight gaps essential for fire rating resistance while maintaining the clean aesthetics of mass timber, and ensuring a secure and fully seated connection.



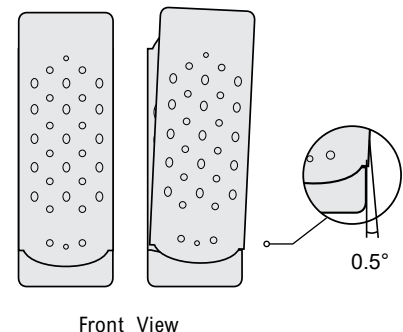
Horizontal Tolerance

Mass timber glulam beams typically span from 4 m [13 ft.] to 25 m [82 ft.], and in the most extreme cases, can go up to 46 m [164 ft.] long. With these lengths in mind, it's easy to understand why it is critical that a beam hanger system allows for horizontal tolerance to accommodate minor misalignments between supporting members. The APEX offers 3.2 mm [1/8 in.] of horizontal tolerance.



Rotational Tolerance

Following the same design principle as our horizontal tolerance, we have engineered a rotational tolerance of 0.5° to accommodate potential minor misalignments between supporting members.

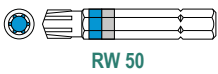


Installation - APEX General Requirements

Tool Requirements

Tools - Use the Correct Bit

MTC Solutions fasteners should only be driven using RW bits, or appropriately sized star bits. This ensures good centering and positioning with optimal torque transmission. For the APEX, use an RW 50 bit for the 10 mm [3/8 in.] screws.

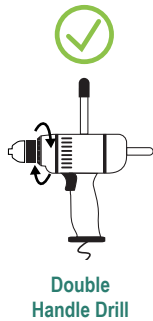
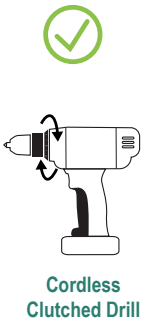


Tools - Use the Correct Drill

Use low-RPM, high-torque drills equipped with a feather (variable speed) trigger to install fasteners. Avoid excessive acceleration and deceleration during the drive-in process. Do not overtorque fasteners. Although impact drills are not expressly prohibited, their use is discouraged - particularly for beam hanger systems - due to an increased risk of overtorquing. Use the appropriate drill chuck size according to the fastener.

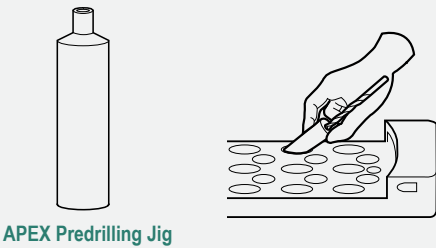
Table 3.9 - Recommended Torque, Drill Bits, and Power Drill

Nominal Fastener Diameter [D]		HSS Drill Bit Size		Power Drill Voltage	Allowable Insertion Torque
mm	[in.]	mm	[in.]	V	N · m [lb. · ft.]
10	[3/8]	6.4	[1/4]	60	30.00 [22.13]



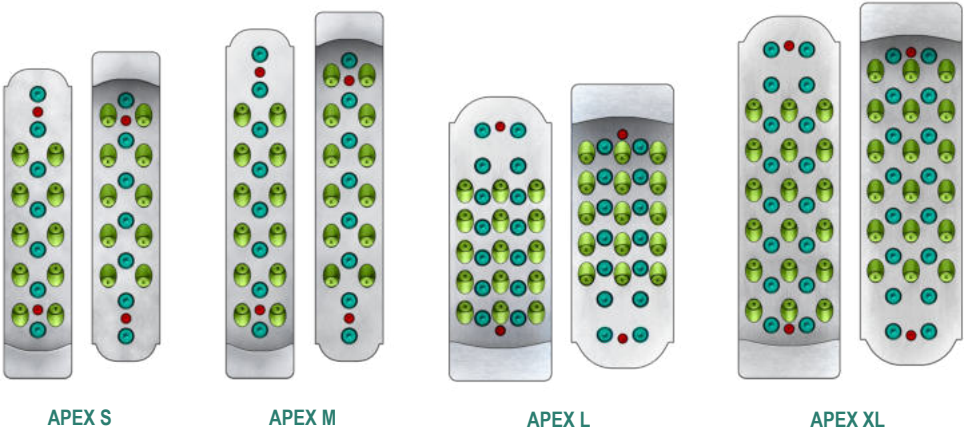
Tools - APEX Predrilling Jig

The APEX Predrilling Jig ensures precise alignment of the APEX inclined fasteners. It guides the drill bit to create an accurate pilot hole, and ensures proper fastener seating. The hole in the jig accommodates standard imperial and metric drill bit diameters. For the 10 mm [3/8 in.] inclined fasteners, pilot holes 6.4 mm [1/4 in.] in diameter and 25 mm [1 in.] long are recommended.



Fastener Layout

- Fastener Orientation**
- Nonstructural Positioning Screws
 - Horizontal Screws
 - Inclined Screws



Installation - APEX Guidelines

General Installation Steps

Estimated Installation Time

The estimated time for a single person to install a complete APEX product is shown in Table 3.10

This process includes the following steps:

1. Layout (~10%)
2. Positioning (~10%–15%)
3. Pilot Holes (~20%–25%)
4. Screw Installation (~50%–60%)
5. Optional Measures (not included in the time installation % breakdown)

The estimated installation time can be improved upon with efficient fabrication and site practices such as:

1. Drilling pilot holes for the nonstructural positioning screws at the time of fabrication
2. Utilizing templates to drill pilot holes for structural screws
3. Optimizing beam positioning to reduce worker fatigue

Table 3.10 - APEX Estimated Installation Time

APEX Model	Average Installation Time [min.]
S	13
M	15
L	20
XL	23

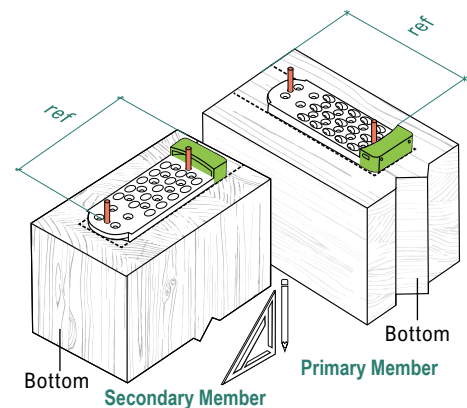
Step-by-Step Installation Guidelines

1.1 Layout - Reference Points

Begin by laying out the installation locations in the primary and secondary members using a pencil and square.

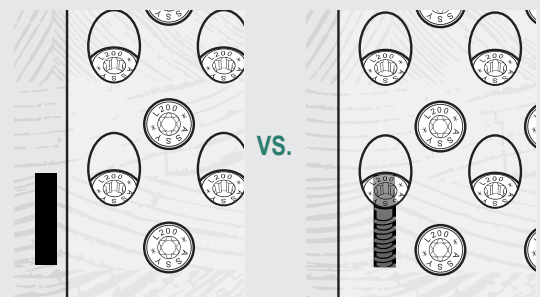
The connector's point of reference is the top of the member. The **lower nonstructural positioning screw** should be measured from that point of reference (ref).

The **pocket** should be at the **bottom** on the primary member and on the **top** on the secondary member.



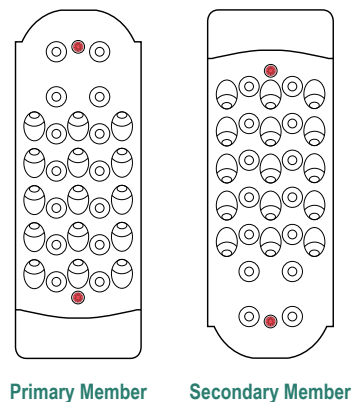
1.2 Layout - Split Lamination Considerations

Where lamination voids are present, positioning fasteners away from the void is recommended to promote uniform load transfer. The influence of lamination voids on fasteners performance depends on their size relative to fastener geometry and their proximity to fasteners.



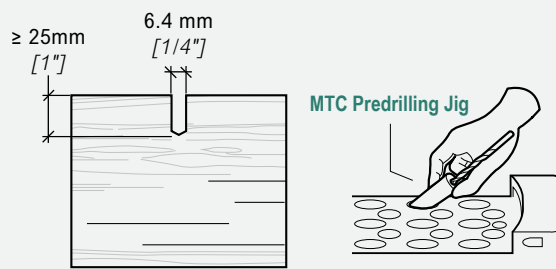
2.1 Positioning - Nonstructural Positioning Screw Installation

Positioning screws ensure accurate placement of the APEX connector. To improve accuracy and reduce time, it is recommended to predrill the nonstructural positioning screw locations during member fabrication. Install one nonstructural positioning screw into the hole highlighted at the top of the plate. Check to ensure alignment is maintained and then install the second nonstructural positioning screw into the hole highlighted at the bottom of the plate.



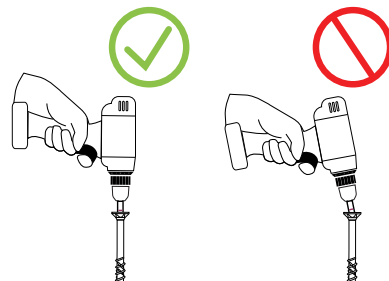
3.1 Pilot Holes - Recommendations

Pilot holes are optional; however, they facilitate screw thread engagement, help reduce splitting risks, ensure a proper penetration path, reduce screw wandering, and reduce insertion torque. For the structural fasteners used with the APEX series, pilot holes 6.4 mm [1/4 in.] in diameter and 25 mm [1 in.] in length are recommended. The use of APEX Predrilling Jig for the inclined screws is recommended to ensure proper hole placement.



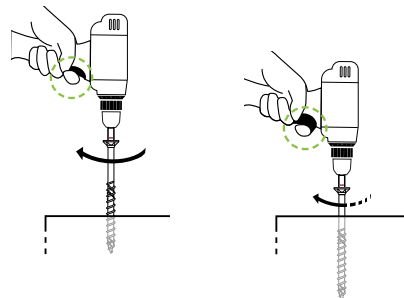
4.1 Screw Installation - Align Drill Bit Axis

Align the driver bit axis parallel to the fastener axis during installation to allow proper torque transmission and to avoid stripping.



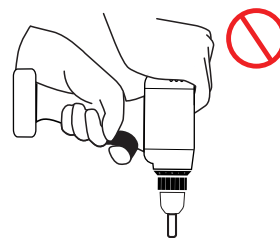
4.2 Screw Installation - Decrease RPM

To avoid overtightening the screw, decrease the rotation speed about 13 mm [1/2 in.] away from the final installed position. This is crucial to prevent wood crushing due to overtightening, which can impact beam hanger tolerances, potentially impeding overall connection assembly. This is especially important when using an impact drill.



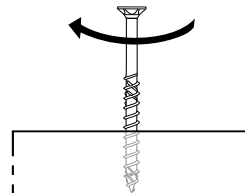
4.3 Screw Installation - Drill Pressure

Do not apply excessive pressure on the drill while driving the fastener to prevent fastener buckling or deviation during installation. Only apply the required force or use the recommended holder case to eliminate cam-out effects.



4.4 Screw Installation - One-Step Process

To avoid increased torque peaks caused by stopping and restarting the drive-in process, install the screw in one run until the head is lightly seated against the side member. If necessary, a torque wrench may be used to complete installation immediately after the screw has been driven.



4.5 Screw Installation - Structural Screws

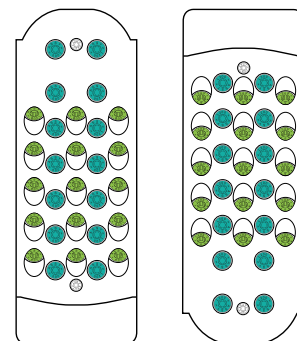
Install the structural screws from the top down, beginning with the horizontal screws. In the primary member, install the 10 × 160 mm [3/8" × 6-1/4"] MTC-FTC horizontal screws for Package A or 10 × 200 mm [3/8" × 7-7/8"] MTC-FTC horizontal screws for Package B (Refer to Table 3.1 on Page 36). In the secondary member, install the 10 × 200 mm [3/8" × 7-7/8"] MTC-FTC horizontal screws. Once all horizontal screws are installed, install the 10 × 200 mm [3/8" × 7-7/8"] MTC-FTC screws in all inclined holes, again working from the top down.



Horizontal Screws



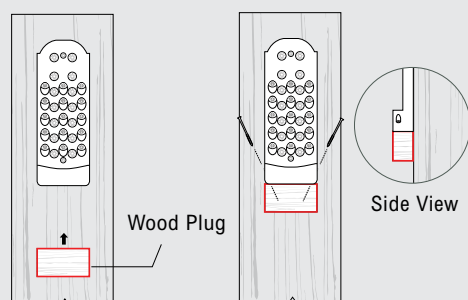
45° Inclined Screws



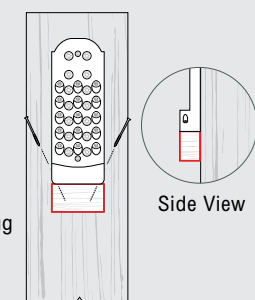
Primary Member Secondary Member

5.1 Optional Measures - Pre-Installed Wood Plug

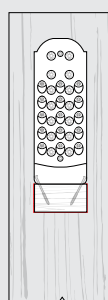
Where connectors are housed in the secondary beam, it is recommended to seal the void in the routing below the connector for aesthetics and fire protection. The APEX system is equipped with 5.5 mm [7/32 in.] diameter diagonal holes so that a wood plug may be pre-installed on the non-routed member in the shop or on site before the secondary beam is lifted into place. The wood plug can be installed with #10 wood screws that are 38 to 51 mm [1-1/2 to 2 in.] long.



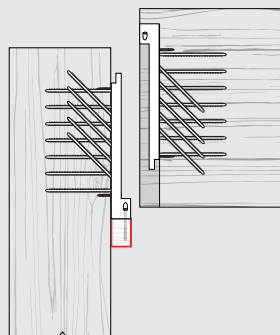
Primary Member



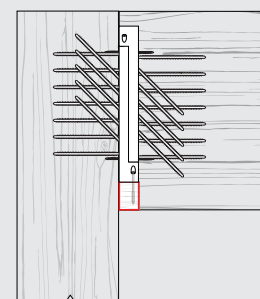
Primary Member



Primary Member



Primary Member



Primary Member

GIGANT

Pre-Engineered Connection System

The GIGANT is a pre-engineered system for beam-to-column and beam-to-beam connections. Manufactured from mild steel, it consists of two identical parts and is suitable for use in timber framing, log home building, and mass and heavy timber construction. Easy to install with structural screws perpendicular to its plates, the GIGANT can be fully concealed or visible.



Pre-Installable

Pre-installable in a controlled shop environment for a faster on-site installation



Drop-in Installation

A fast, streamlined & repeatable installation process that significantly enhances efficiency



Timber Frame

Best used in timber framing & log home building



Fully Concealable

Easy to conceal connections, enhancing architectural wood features

Design



- Wood-to-Wood Design Values
- Positioning Considerations for Reinforcement

Detailing



- GIGANT Geometry Requirements
- Additional Detailing Considerations
- Housing Details and Dimensions

Installation



- Installation Configurations
- Tool Requirements
- Fastener Layout
- Installation Guidelines

STANDARDS AND CERTIFICATIONS

CSA O86:24



ETA-10/0189 2019

GIGANT Overview



Table 4.1 - GIGANT Hardware Package Installation Overview

GIGANT		Plate Qty.	Fasteners				Installation Time
			Primary Member		Secondary Member		
Series	Model		Type	Qty.	Type	Qty.	min.
40	GIGANT 120 x 40	2	GIGANT SK 10 x 80 mm	3	GIGANT SK 10 x 120 mm	3	4
	GIGANT 150 x 40	2	GIGANT SK 10 x 80 mm	4	GIGANT SK 10 x 120 mm	4	5
	GIGANT 180 x 40	2	GIGANT SK 10 x 80 mm	6	GIGANT SK 10 x 120 mm	6	5

- Notes:
- Subsequent tabulated capacities in this chapter assume connectors are installed with fasteners specified in this table.
 - The estimated installation time is based on a time study and includes steps for layout and positioning and structural screw installation for both plates. Refer to the General Installation Steps (Page 60) for more information.



Product Kit Details



GIGANT SK

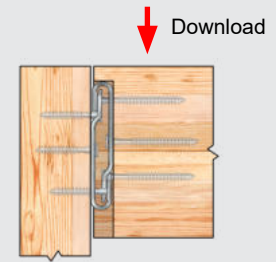
GIGANT Plates

Design - GIGANT Technical Information

Wood-to-Wood Design Values

Table 4.2 - Factored Resistances for GIGANT in Wood-to-Wood Connections

Model	Minimum Secondary Beam Section Dimensions [mm]				Relative Density [G]	Factored Download Resistance [kN]
	No FRR	45-min FRR	1-hr FRR	2-hr FRR		
GIGANT 120 x 40	100 x 160	113 x 183	132 x 200	210 x 268	≥ 0.42	8
					≥ 0.44	8
					≥ 0.47	8
					≥ 0.49	8
GIGANT 150 x 40	100 x 180	113 x 209	132 x 226	210 x 294	≥ 0.42	11
					≥ 0.44	11
					≥ 0.47	11
					≥ 0.49	11
GIGANT 180 x 40	100 x 220	113 x 245	132 x 262	210 x 330	≥ 0.42	16
					≥ 0.44	16
					≥ 0.47	16
					≥ 0.49	16



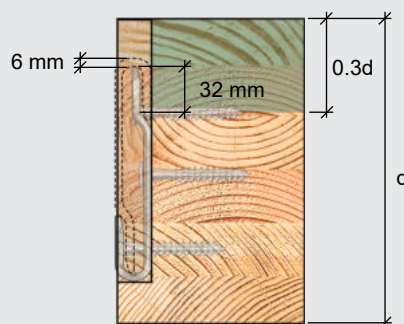
GIGANT Load Applications

Notes:

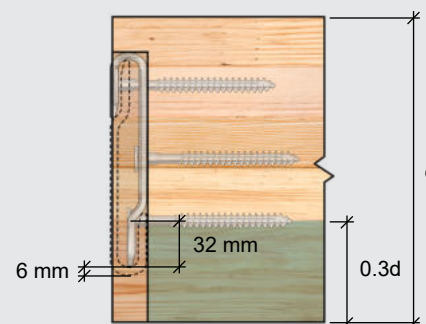
1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated factored resistances are applicable for wood-to-wood connections only. Screw installation must follow the patterns presented in the Installation section.
3. The listed connector resistances may be limited by the splitting resistance perpendicular to grain and the effective shear resistance of the timber members. Refer to Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain (Page 129) for more information and available reinforcement strategies. It is the responsibility of the EOR to ensure the primary and secondary members have adequate capacity to resist connection forces.

Positioning Considerations for Reinforcement

The hanger placement relative to the height of the beam can impact the need for reinforcement. Connectors in the primary beam should have the uppermost fastener in the top 30% of the member depth (0.3d), as shown in the left figure. Connectors in the secondary beam should have the lowermost fastener in the bottom 30%, as shown in the right figure. Outside of these zones, the primary and secondary beams should be checked for splitting to determine if reinforcement is required. Note that these requirements do not apply to columns. For further information, refer to Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain (Page 129)



Primary Beam



Secondary Beam

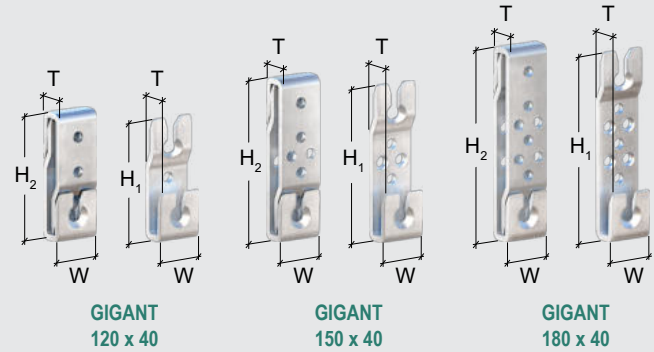
Detailing - GIGANT Geometry Requirements

GIGANT Series - Connector Geometry

Table 4.3 - GIGANT Geometry

Connector Geometry	Model		
	GIGANT 120 x 40	GIGANT 150 x 40	GIGANT 180 x 40
	[mm]		
H ₁	112	144	176
H ₂	118	150	182
W	40	40	40
T	26	26	26

Note: Refer to Appendix D: Product Specifications (Page 138) for additional product specifications.



Secondary Member Geometry Requirements

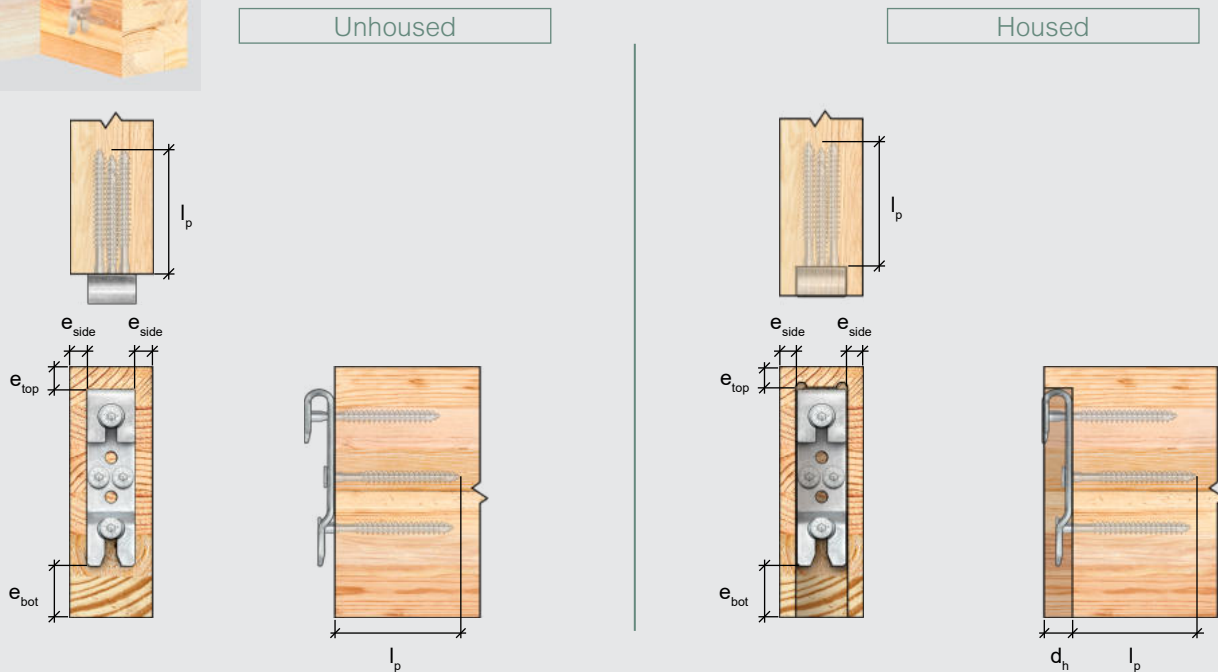


Table 4.4 - GIGANT Geometry Requirements for Secondary Member

Model	Geometry Requirements [mm]										
	l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h
			e _{side}	e _{bot}	e _{side}	e _{bot}	e _{side}	e _{bot}	e _{side}	e _{bot}	
GIGANT 120 x 40	110	21	30	27	36	50	46	67	85	135	25
GIGANT 150 x 40	110	15	30	21	36	50	46	67	85	135	25
GIGANT 180 x 40	110	19	30	25	36	50	46	67	85	135	25

Notes:

- Connection design must meet all relevant requirements of the General Notes to the Designer section.
- Tabulated values are minimum requirements unless noted otherwise. Tabulated values for l_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
- Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance as well as the effective shear resistance of the member.

RIDGE

APEX

GIGANT

Design

Detailing

Installation

RICON SYS

MEGANT

Primary Member Geometry Requirements - Beam/Girder



Unhoused

Housed

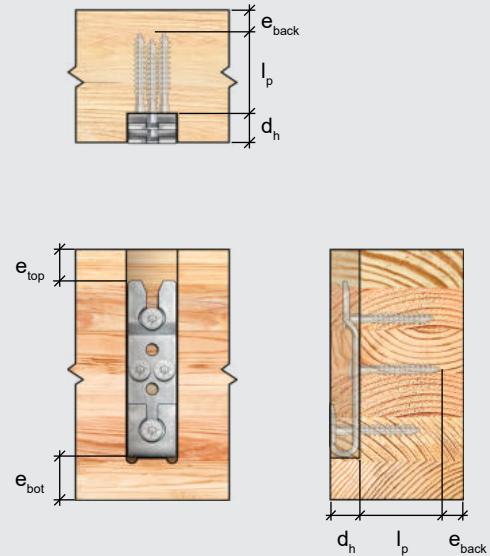
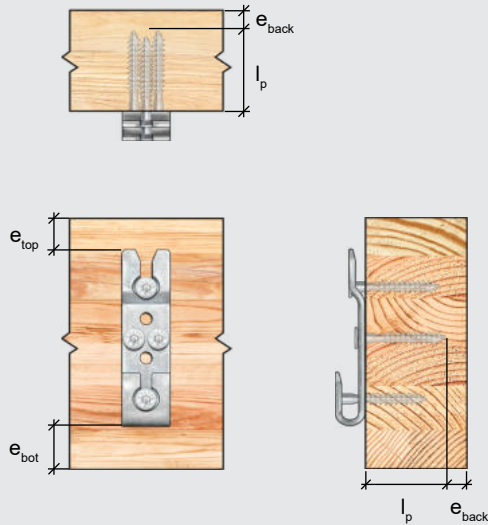


Table 4.5 - GIGANT Geometry Requirements for Primary Member (Beam/Girder)

Model	Geometry Requirements [mm]										
	l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h
			e _{bot}	e _{back}	e _{bot}	e _{back}	e _{bot}	e _{back}	e _{bot}	e _{back}	
GIGANT 120 x 40	70	27	21	10	44	36	61	46	129	85	25
GIGANT 150 x 40	70	21	15	10	44	36	61	46	129	85	25
GIGANT 180 x 40	70	25	19	10	44	36	61	46	129	85	25

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for l_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Values for e_{top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam.
4. Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance, as well as the effective shear resistance of the member.



Primary Member Geometry Requirements - Column

Unhoused

Housed

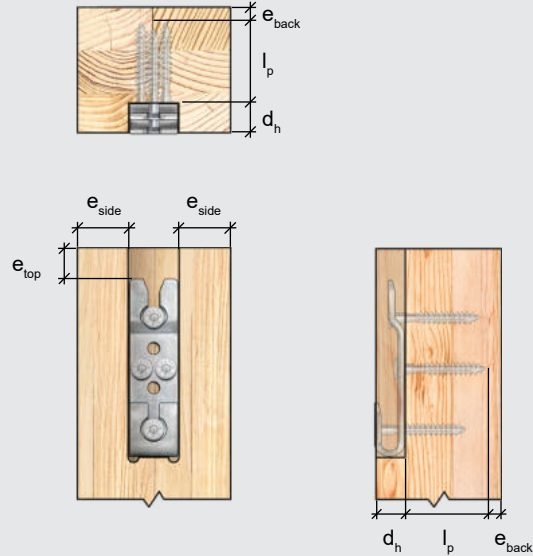
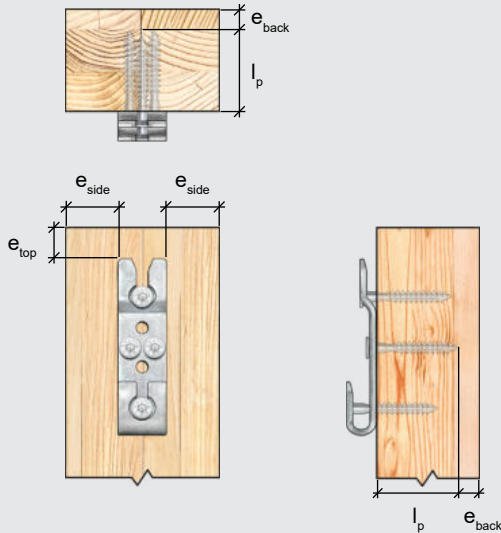


Table 4.6 - GIGANT Geometry Requirements for Primary Member (Column)

Model	Geometry Requirements [mm]										
	l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h
			e _{side}	e _{back}	e _{side}	e _{back}	e _{side}	e _{back}	e _{side}	e _{back}	
GIGANT 120 x 40	70	27	30	10	36	36	46	46	85	85	25
GIGANT 150 x 40	70	21	30	10	36	36	46	46	85	85	25
GIGANT 180 x 40	70	25	30	10	36	36	46	46	85	85	25

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for l_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Values for e_{top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam.

RIDGE

APEX

GIGANT

Design

Detailing

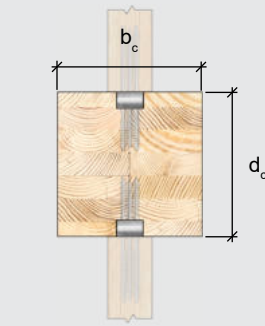
Installation

RICON SYS

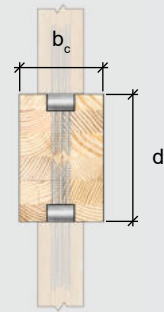
MEGANT

Detailing - GIGANT Additional Considerations

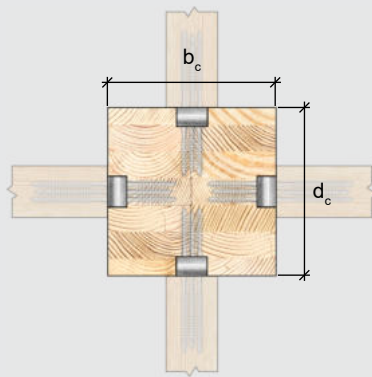
Geometry Requirements for Columns with Multiple Beam Hangers



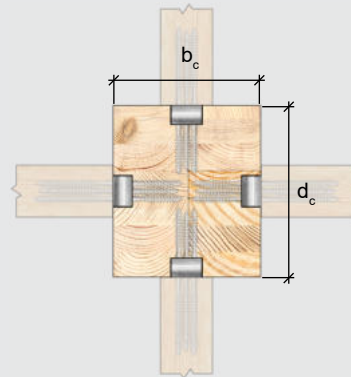
A
Hangers on Opposing Faces
of a Square Column



B
Hangers on Opposing Faces
of a Rectangular Column



C
Hanger on Each Face
of a Square Column



D
Hanger on Each Face
of a Rectangular Column

Table 4.7 - Minimum Column Sizes for Multiple GIGANT Connectors

Model	Minimum Column Section Dimensions, $b_c \times d_c$ [mm x mm]							
	A Hangers on Opposing Faces of a Square Column				B Hangers on Opposing Faces of a Rectangular Column			
	No FRR	45-min FRR	1-hr FRR	2-hr FRR	No FRR	45-min FRR	1-hr FRR	2-hr FRR
GIGANT 120 x 40	203 x 203	203 x 203	203 x 203	210 x 210	100 x 203	113 x 203	132 x 203	210 x 203
GIGANT 150 x 40	203 x 203	203 x 203	203 x 203	210 x 210	100 x 203	113 x 203	132 x 203	210 x 203
GIGANT 180 x 40	203 x 203	203 x 203	203 x 203	210 x 210	100 x 203	113 x 203	132 x 203	210 x 203

Model	Minimum Column Section Dimensions, $b_c \times d_c$ [mm x mm]							
	C Hanger on Each Face of a Square Column				D Hangers on Each Face of a Rectangular Column			
	No FRR	45-min FRR	1-hr FRR	2-hr FRR	No FRR	45-min FRR	1-hr FRR	2-hr FRR
GIGANT 120 x 40	215 x 215	215 x 215	215 x 215	215 x 215	203 x 215	203 x 215	203 x 215	203 x 215
GIGANT 150 x 40	235 x 235	235 x 235	235 x 235	235 x 235	203 x 235	203 x 235	203 x 235	203 x 235
GIGANT 180 x 40	235 x 235	235 x 235	235 x 235	235 x 235	203 x 235	203 x 235	203 x 235	203 x 235

Notes:

1. Tabulated column section dimensions are minimum values based on a 12.7 mm [1/2 in.] clearance between screw tips, minimum edge and end distances, and minimum wood cover requirements for FRR. Refer to Geometry Requirements for further details.
2. It is the responsibility of the EOR to ensure the primary and secondary members have adequate capacity to resist connection forces.
3. Tabulated column section dimensions assume hangers are centered within each column face and are housed in the column as shown.

Detailing - GIGANT Housing Details

Housing Possibilities

Primary Beam Housing

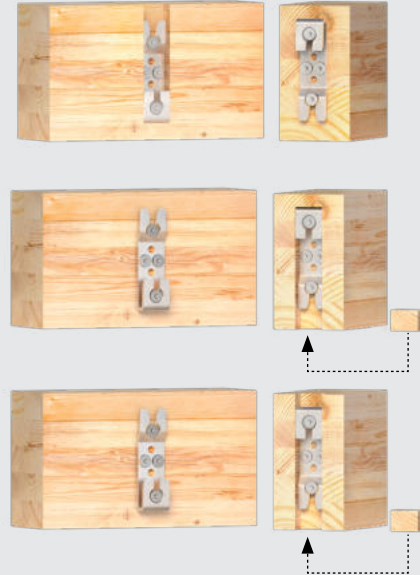
- Most common housing for concealed installation
- Concealed from below

Secondary Beam Housing

- Joist housing from bottom up
- Concealed from below with a wood plug

Secondary Beam Through Housing

- Full-depth housing in joist
- Concealed from below with a wood plug
- May simplify fabrication



Housing and Surface Detailing



Surface-Mounted



Housed in Primary Member
(Column)



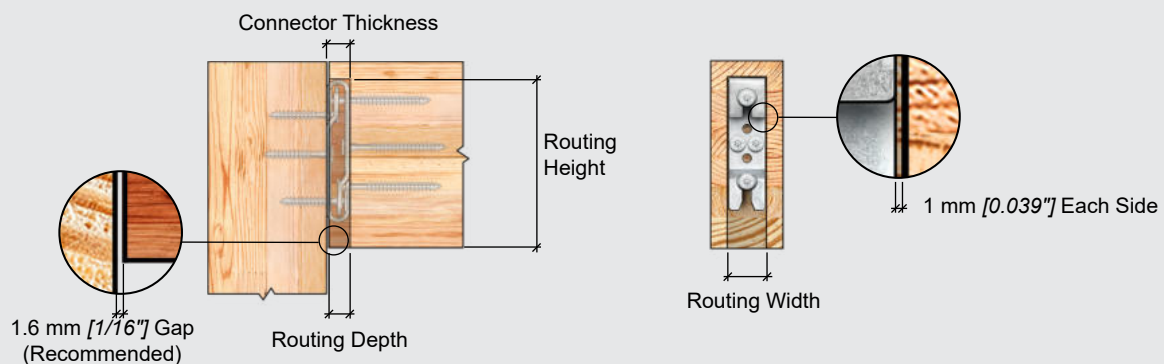
Housed in Primary Member
(Girder)



Housed in Secondary Member
(Joist or Purlin)

Parallel Surface: The members must be parallel at the location of the connection to ensure proper hanger alignment and load transfer.

Gap Size: The gap size between wood members balances installation ease and fire performance, with larger gaps simplifying installation but reducing fire protection. A gap of 1.6 mm [1/16 in.] is recommended for proper installation to allow the secondary member to slide into place. The gap should be no more than 3.2 mm [1/8 in.] to address fire protection considerations. For more information, refer to Appendix A: Fire Protection (Page 121).



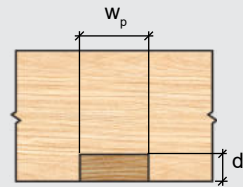
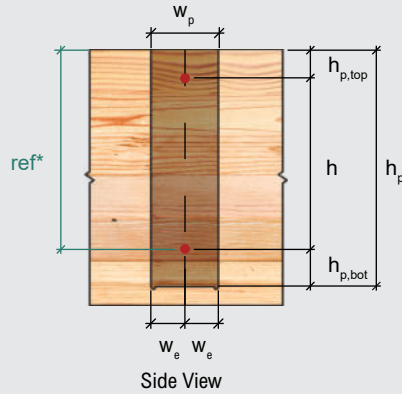
Routing Depth: The routing depth is the depth of the housing, d_h , noted in the Geometry Requirements and Routing Details sections. This depth takes into account the thickness of the connector and the gap between members (recommended 1.6 mm [1/16 in.] herein—larger gaps will reduce d_h accordingly).

Routing Width: It is recommended to allow a clearance of 1 mm [0.039 in.] on each side of the connector, resulting in a routing width of 42 mm [1.654 in.] for the GIGANT connector.

Routing Height: The routing height must be coordinated with the EOR. The height of the connector in the beam section has an impact on connector performance. Refer to Positioning Considerations for Reinforcement (Page 52) for further information.

Detailing - GIGANT Housing Dimensions

Routing in Primary Member



Top View

Fastener Orientation

- Structural Positioning Screws
(Refer to Fastener Layout on Page 59)

* The reference point for routing and installation is the lower structural positioning screw measured from the top of the beam. Refer to the Installation Guidelines (Page 60) for more information.

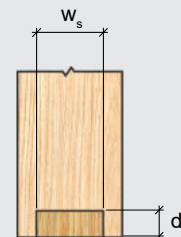
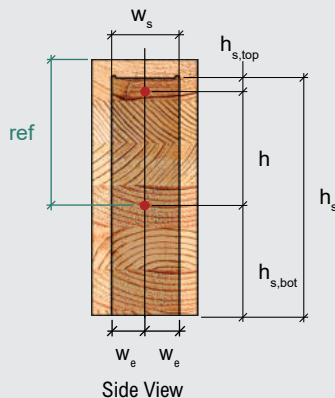
Table 4.8 - Routing Dimensions for GIGANT Housed in Primary Member

Model	Routing Dimensions, mm [in.]						
	h_p	$h_{p,top}$	h	$h_{p,bot}$	w_p	w_e	d_h
GIGANT 120 x 40	140 [5.512]	59 [2.323]	57 [2.244]	24 [0.945]	42 [1.654]	21 [0.827]	25 [0.981]
GIGANT 150 x 40	166 [6.535]	53 [2.087]	89 [3.504]	24 [0.945]	42 [1.654]	21 [0.827]	25 [0.981]
GIGANT 180 x 40	202 [7.953]	57 [2.244]	121 [4.764]	24 [0.945]	42 [1.654]	21 [0.827]	25 [0.981]

Notes:

1. Tabulated values are general guidelines for routing requirements. The EOR and fabricator are responsible for ensuring final routing dimensions account for all project-specific conditions.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for h are fixed. Tabulated values for d_h are maximum allowable.
3. Tabulated values account for 1 mm [0.039 in.] on each side of and below the hanger. Larger installation tolerances will increase height and width values accordingly.
4. Tabulated values are based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
5. Refer to the Geometry Requirements tables for each respective beam hanger for additional information.
6. Tabulated values assume square corners. Manufacturers should adjust these values based on their specific routing bit sizes. In order to account for the round corner created by routing tools, 6 mm [1/4 in.] overrun is permitted at the inside corners as indicated on the image above.

Routing in Secondary Member



Top View

Table 4.9 - Routing Dimensions for GIGANT Housed in Secondary Member (Beam-End)

Model	Routing Dimensions, mm [in.]						
	h_s	$h_{s,top}$	h	$h_{s,bot}$	w_s	w_e	d_h
GIGANT 120 x 40	140 [5.512]	24 [0.945]	57 [2.244]	59 [2.323]	42 [1.654]	21 [0.827]	25 [0.981]
GIGANT 150 x 40	166 [6.535]	24 [0.945]	89 [3.504]	53 [2.087]	42 [1.654]	21 [0.827]	25 [0.981]
GIGANT 180 x 40	202 [7.953]	24 [0.945]	121 [4.764]	57 [2.244]	42 [1.654]	21 [0.827]	25 [0.981]

Notes:

1. Tabulated values are general guidelines for routing requirements. The EOR and fabricator are responsible for ensuring final routing dimensions account for all project-specific conditions.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for h are fixed. Tabulated values for d_h are maximum allowable.
3. Tabulated values account for 1 mm [0.039 in.] on each side of and above the hanger. Larger installation tolerances will increase height and width values accordingly.
4. Tabulated values are based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
5. Refer to the Geometry Requirements tables for each respective beam hanger for additional information.
6. Tabulated values assume square corners. Manufacturers should adjust these values based on their specific routing bit sizes. In order to account for the round corner created by routing tools, 6 mm [1/4 in.] overrun is permitted at the inside corners as indicated on the image above.

Installation - GIGANT General Requirements

Tool Requirements

Tools - Use the Correct Bit

Fasteners should only be driven using appropriately sized star bits. This ensures good centering and positioning with optimal torque transmission.

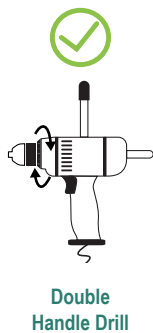
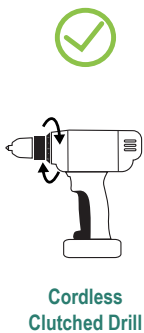


Tools - Use the Correct Drill

Use low-RPM, high-torque drills equipped with a feather (variable speed) trigger to install fasteners. Avoid excessive acceleration and deceleration during the drive-in process. Do not overtorque fasteners. Although impact drills are not expressly prohibited, their use is discouraged - particularly for beam hanger systems - due to an increased risk of overtorquing. Use the appropriate drill chuck size according to the fastener.

Table 4.10 - Recommended Torque, Drill Bits, and Power Drill

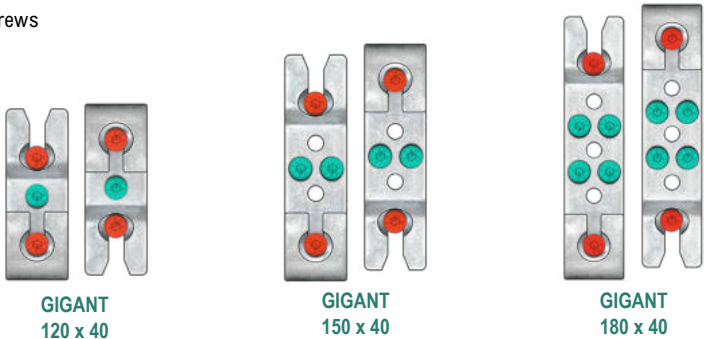
Nominal Fastener Diameter [D]		HSS Drill Bit Size	Power Drill Voltage	Allowable Insertion Torque	
mm	[in.]	mm [in.]	V	N · m	[lb. ft.]
10	[3/8]	6 [1/4]	60	30.0	[22.13]



Fastener Layout

Fastener Orientation

- Structural Positioning Screws
- Horizontal Screws



Installation - GIGANT Guidelines

General Installation Steps

Estimated Installation Time

The estimated time for a single person to install a complete GIGANT product is shown in Table 2.11. The process includes the following steps:

1. Layout (~25%–30%)
2. Positioning (~40%–50%)
3. Screw Installation (~20%–30%)
4. Optional Measures (not included in the time installation % breakdown)

The estimated installation time can be improved upon with efficient fabrication and site practices such as:

1. Drilling pilot holes for the structural positioning screws at the time of fabrication
2. Utilizing templates to drill pilot holes for structural screws
3. Optimizing beam positioning to reduce worker fatigue

Table 4.11 - GIGANT Estimated Installation Times

Model	Average Installation Time [min.]
GIGANT 120 x 40	4
GIGANT 150 x 40	5
GIGANT 180 x 40	5

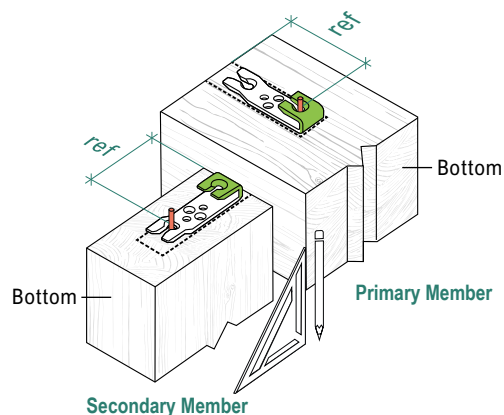
Step-by-Step Installation Guidelines

1.1 Layout - Reference Points

Begin by laying out the installation locations in the primary and secondary members using a pencil and square.

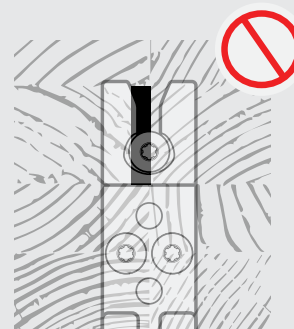
The connector's point of reference is the top of the member. The **lower structural positioning screw** should be measured from that point of reference (ref).

The **hook** should be at the **bottom** on the primary member and on the **top** on the secondary member. The structural fasteners will act as collar bolts when installed.



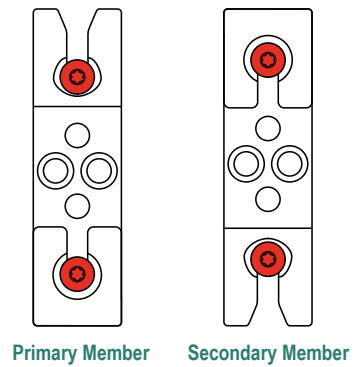
1.2 Layout - Split Lamination Considerations

It is recommended that gaps in split lamination glulam beams be tight at the time of manufacturing. Gaps between adjacent plies may occur due to wood shrinkage. Such gaps are not compatible with GIGANT installation.



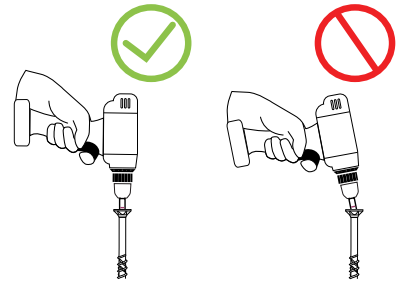
2.1 Positioning - Structural Positioning Screw Installation

Structural positioning screws ensure accurate placement of the GIGANT connector. Install one structural positioning screw into the center hole at the top of the plate for the primary member and into the bottom of the plate for the secondary member. Check to ensure alignment is maintained, and then install another structural positioning screw into the center hole at the opposite end of the plate. Ensure the screw is not overdriven so the connector does not bend.



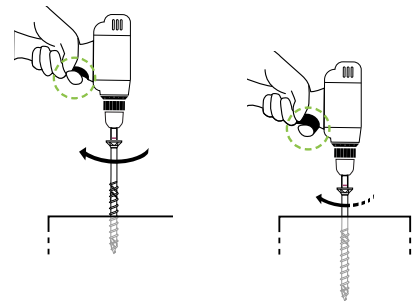
3.1 Screw Installation - Align Drill Bit Axis

Align the drive bit axis parallel to the fastener axis during installation to allow proper torque transmission and to avoid stripping.



3.2 Screw Installation - Decrease RPM

To avoid overtightening the screw, decrease the rotation speed about 12.7 mm [1/2. in.] away from the final installed position. This is crucial to prevent wood crushing due to overtightening, which can impact beam hanger tolerances, potentially impeding overall connection assembly. This is especially important when using an impact drill.



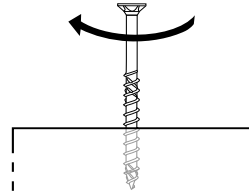
3.3 Screw Installation - Drill Pressure

Do not apply excessive pressure on the drill while driving the fastener to prevent fastener buckling or deviation during installation. Only apply the required force or use the recommended holder case to eliminate cam-out effects.



3.4 Screw Installation - One-Step Process

To avoid increased torque peaks caused by stopping and restarting the drive-in process, install the screw in one run until the head is lightly seated against the side member.

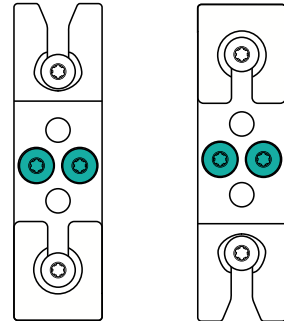


3.5 Screw Installation - Structural Screws

Install properly sized GIGANT screws in all holes.

For the primary member, use 10 x 80 mm [3/8" x 3-1/8"] GIGANT SK screws.

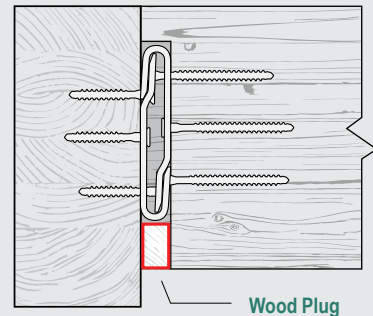
For the secondary member (in end-grain), use 10 x 120 mm [3/8" x 4-3/4"] GIGANT SK screws.



Horizontal Screw
Primary Member Secondary Member

4.1 Optional Measures - Wood Plug

Where connectors are housed in the secondary beam, it is recommended to seal the void in the routing below the connector for aesthetics and fire protection. A wood plug may be used, and installation instructions shall be provided by the EOR.





Chemeketa Agricultural Complex

Salem, Oregon

RICON S VS

Pre-Engineered Connection System

The RICON S VS connector is an ICC-certified, pre-engineered, beam-to-column and beam-to-beam connector manufactured from mild steel with a welded collar bolt. It consists of two identical parts and is suitable for use in all timber and hybrid-timber construction applications. The RICON S VS has been extensively tested for the North American market.



Pre-Installable

Pre-installable in a controlled shop environment for a faster on-site installation



Fire-Resistance-Rated

Fire-resistance rating up to 2 hours per CSA O86:24



Interstory Drift Performance-Tested

Drift ratio exceeding 4% in quasi-static rotational testing under full LSD loading



Hybrid Construction Compatible

Can be installed in wood-to-wood or wood-to-steel beam or embed plate



Fully Concealable

Easy to conceal connections, enhancing architectural wood features



Drop-in Installation

A fast, streamlined & repeatable installation process that significantly enhances efficiency

Design

- Wood-to-Wood Design Values
- Wood-to-Steel Design Values
- Seismic Performance
- Positioning Considerations for Reinforcement
- Clip Lock System
- Sloped and Skewed Configurations

Detailing

- RICON S VS 60 Series Geometry Requirements
- RICON S VS 80 Series Geometry Requirements
- RICON S VS XL Series Geometry Requirements
- Additional Detailing Considerations
- Housing Detailing and Dimensions

Installation

- Installation Configurations
- Tool Requirements
- Fastener Layout
- Installation Guidelines

STANDARD AND CERTIFICATIONS

CSA O86:24

ASTM D7147



ICC-ESR-4300

ISO 50001

Energy Management System



ETA-10/0189 2019

RICON S VS Overview

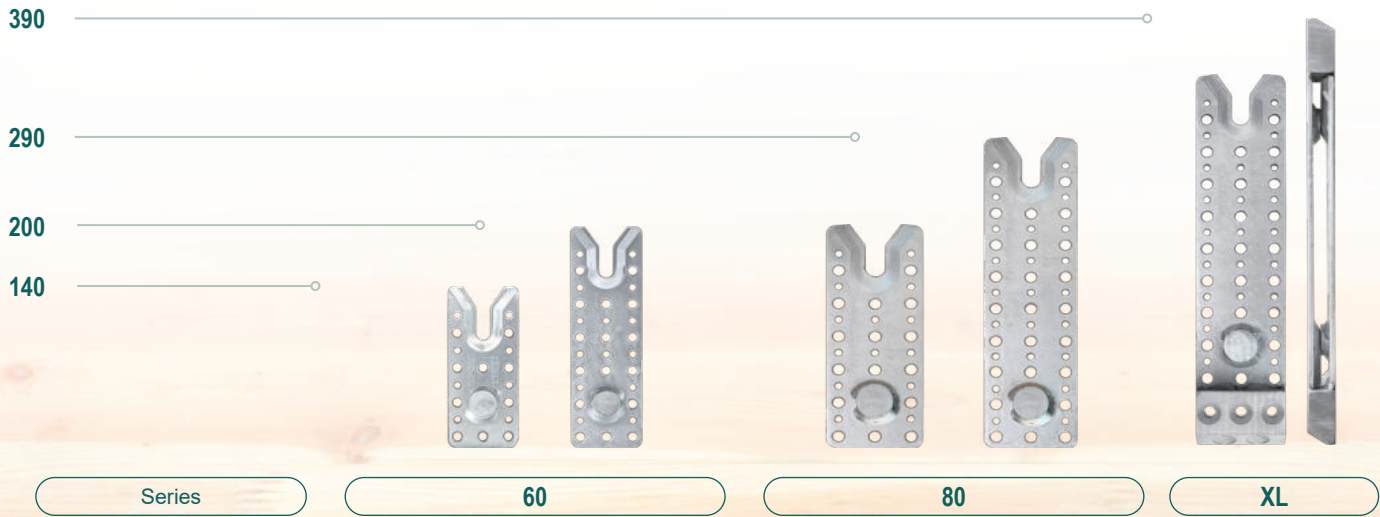


Table 5.1 - RICON S VS Hardware Package Installation Overview

RICON S VS		Plate Qty.	Fasteners				Installation Time
			Primary Member		Secondary Member		
Series	Model		Type	Qty.	Type	Qty.	min.
60	RICON S VS 140 x 60	2	MTC-FTC 8 x 80 mm	10	MTC-FTC 8 x 160 mm	10	9
	RICON S VS 200 x 60	2	MTC-FTC 8 x 80 mm	16	MTC-FTC 8 x 160 mm	16	13
80	RICON S VS 200 x 80	2	MTC-FTC 10 x 100 mm	16	MTC-FTC 10 x 200 mm	16	13
	RICON S VS 290 x 80	2	MTC-FTC 10 x 100 mm	20	MTC-FTC 10 x 200 mm	20	14
XL	RICON S VS XL 390 x 80	2	MTC-FTC 10 x 100 mm	28	MTC-FTC 10 x 200 mm	30	20
			MTC-FTC 10 x 200 mm	2			

Notes:

- Subsequent tabulated capacities in this chapter assume connectors are installed with MTC-FTC (see Table 1.1 on Page 13) fasteners specified in this table and in accordance with CCMC 13677-R.
- The estimated installation time is based on a time study and includes steps for layout and positioning, drilling a 25 mm [1 in.] deep pilot hole for each fastener, and structural screw installation for both plates. Refer to the General Installation Steps (Page 86) for more information.

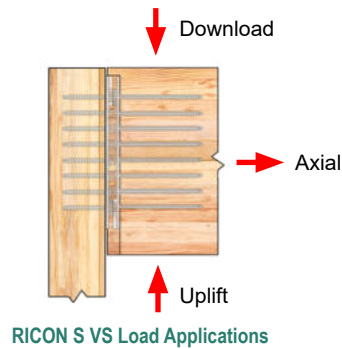
One Installer
 With Pilot Holes

Product Kit Details



MTC-FTC RICON S VS Plates

Design - RICON S VS Technical Information



Wood-to-Wood Design Values

Table 5.2 - Factored Resistances for RICON S VS 60 Series in Wood-to-Wood Connections

RICON S VS		Minimum Secondary Beam Section Dimensions [mm]				Relative Density [G]	Factored Resistance [kN]			
Model	Configuration	No FRR	45-min FRR	1-hr FRR	2-hr FRR		Download	Axial	Download w/ Clip Lock	Uplift w/ Clip Lock
RICON S VS 140 x 60	Single	92 x 186	133 x 226	152 x 242	230 x 310	≥ 0.42	22	14	16	7
						≥ 0.44	23	15	16	
						≥ 0.47	24	17	16	
						≥ 0.49	24	19	17	
	Double	160 x 186	201 x 226	220 x 242	298 x 310	≥ 0.42	38	24	26	7
						≥ 0.44	39	25	27	
						≥ 0.46	40	29	28	
						≥ 0.49	41	32	29	
RICON S VS 200 x 60	Single	92 x 246	133 x 286	152 x 302	230 x 370	≥ 0.42	36	14	29	7
						≥ 0.44	36	15	30	
						≥ 0.47	38	17	31	
						≥ 0.49	38	19	31	
	Double	160 x 246	201 x 286	220 x 302	298 x 370	≥ 0.42	60	24	49	7
						≥ 0.44	62	25	50	
						≥ 0.47	64	29	52	
						≥ 0.49	65	32	53	

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated factored resistances are applicable for wood-to-wood connections only. Screw installation must follow the patterns presented in the Installation section.
3. The listed connector resistances may be limited by the splitting resistance perpendicular to grain and the effective shear resistance of the timber members. Refer to Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain (Page 129) for more information and available reinforcement strategies. It is the responsibility of the EOR to ensure the primary and secondary members have adequate capacity to resist connection forces.
4. The Clip Lock system requires the removal of structural fasteners for proper installation. Therefore, the reduced download values shown must be used in conjunction with the Clip Lock system. For more information on the Clip Lock system, refer to Page 70.
5. Uplift values contain all applicable adjustment factors for load duration and shall not be increased for short term loads such as wind or seismic.
6. Factored resistances provided do not account for combined loading in multiple directions. Combined shear and axial loading must be verified per eq. 1 (Page 13).
7. Tabulated factored resistances assume adequate load transfer at the beam end. Where gaps or voids are present, engineering verification may be required.

Table 5.3 - Factored Resistances for RICON S VS 80 Series in Wood-to-Wood Connections

RICON S VS		Minimum Secondary Beam Section Dimensions [mm]				Relative Density [G]	Factored Resistance [kN]			
Model	Configuration	No FRR	45-min FRR	1-hr FRR	2-hr FRR		Download	Axial	Download w/ Clip Lock	Uplift w/ Clip Lock
RICON S VS 200 x 80	Single	120 x 260	153 x 300	172 x 316	250 x 384	≥ 0.42	55	22	44	13
						≥ 0.44	56	23	45	
						≥ 0.47	58	27	47	
						≥ 0.49	59	29	48	
	Double	210 x 260	243 x 300	262 x 316	340 x 384	≥ 0.42	93	37	75	13
						≥ 0.44	95	39	77	
						≥ 0.47	98	45	80	
						≥ 0.49	100	49	81	
RICON S VS 290 x 80	Single	120 x 320	153 x 360	172 x 376	250 x 444	≥ 0.42	67	22	58	13
						≥ 0.44	67	23	59	
						≥ 0.47	67	27	61	
						≥ 0.49	67	29	63	
	Double	210 x 320	243 x 360	262 x 376	340 x 444	≥ 0.42	114	37	99	13
						≥ 0.44	114	39	101	
						≥ 0.47	114	45	104	
						≥ 0.49	114	49	107	
RICON S VS XL 390 x 80	Single	120 x 430	153 x 474	172 x 491	250 x 559	≥ 0.42	115	22	105	13
						≥ 0.44	118	23	108	
						≥ 0.47	124	27	114	
						≥ 0.49	129	29	118	
	Double	210 x 430	243 x 474	262 x 491	340 x 559	≥ 0.42	195	37	178	13
						≥ 0.44	201	39	183	
						≥ 0.47	212	45	193	
						≥ 0.49	219	49	200	

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated factored resistances are applicable for wood-to-wood connections only. Screw installation must follow the patterns presented in the Installation section.
3. The listed connector resistances may be limited by the splitting resistance perpendicular to grain and the effective shear resistance of the timber members. Refer to Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain (Page 129) for more information and available reinforcement strategies. It is the responsibility of the EOR to ensure the primary and secondary members have adequate capacity to resist connection forces.
4. The Clip Lock system requires the removal of structural fasteners for proper installation. Therefore, the reduced download values shown must be used in conjunction with the Clip Lock system. For more information on the Clip Lock system, refer to Page 70.
5. Uplift values contain all applicable adjustment factors for load duration and shall not be increased for short term loads such as wind or seismic.
6. Factored resistances provided do not account for combined loading in multiple directions. Combined shear and axial loading must be verified per eq. 1 (Page 13).
7. Tabulated factored resistances assume adequate load transfer at the beam end. Where gaps or voids are present, engineering verification may be required.

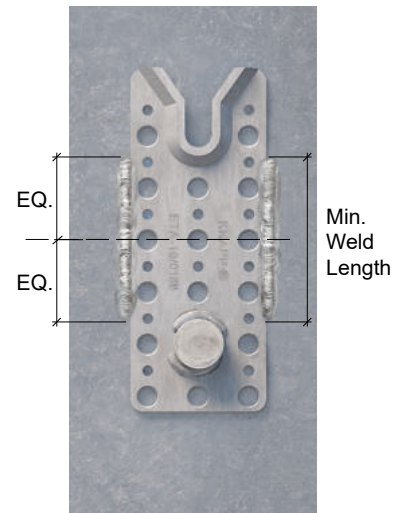
Wood-to-Steel Design Values

Table 5.4 - Factored Resistances for RICON S VS in Wood-to-Steel Connections

RICON S VS		Primary Member		Secondary Member	
		Weld Requirements		Relative Density [G]	Factored Resistance [kN]
Model	Configuration	Min. Weld Size [mm]	Min. Weld Length [mm] e/s		
RICON S VS 140 x 60	Single	5	70	≥ 0.42	22
				≥ 0.44	23
				≥ 0.47	24
				≥ 0.49	24
RICON S VS 200 x 60	Single		100	≥ 0.42	36
				≥ 0.44	36
				≥ 0.47	38
				≥ 0.49	38
RICON S VS 200 x 80	Single		100	≥ 0.42	55
				≥ 0.44	56
				≥ 0.47	58
				≥ 0.49	59
RICON S VS 290 x 80	Single		140	≥ 0.42	67
				≥ 0.44	67
				≥ 0.47	67
				≥ 0.49	67
RICON S VS XL 390 x 80	Single		190	≥ 0.42	115
				≥ 0.44	118
				≥ 0.47	124
				≥ 0.49	129



Steel-to-Wood Connection



Welded RICON S VS Connection

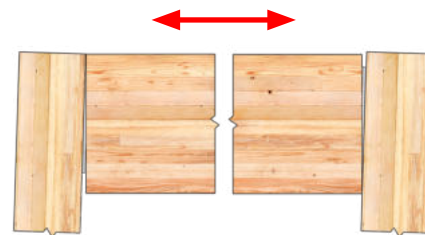
Notes:

1. Tabulated weld values are minimum requirements based on $X_u = 430$ MPa. The minimum weld length shown is the minimum required on each side of the hanger. Additional weld size or length may be required dependent on loading conditions. Welded connections must be designed by a licensed professional engineer.
2. Primary member steel must have a thickness of at least 6 mm [1/4 in.].
3. Structural steel and weld design and detailing shall be in accordance with CSA S16. The fabricator must be certified to a minimum of Division 2 of CSA W47.1.
4. Welds must be symmetrical on each side of the hanger and be centered within the height of the hanger.
5. Welded connections are not compatible with the Clip Lock system and are therefore not recommended for uplift conditions.
6. The RICON S VS can be welded directly to structural steel elements such as steel columns and steel embed plates in concrete walls.
7. The galvanized coating must be ground off the areas to be welded.
8. Refer to Tables 5.2 and 5.3 for minimum secondary beam requirements.
9. Tabulated factored resistances assume adequate load transfer at the beam end. Where gaps or voids are present, engineering verification may be required.

RICON S VS Seismic Performance

MTC has conducted extensive quasi-static and component testing on the RICON S VS connector. The results have demonstrated its robust performance under drift and axial demands.

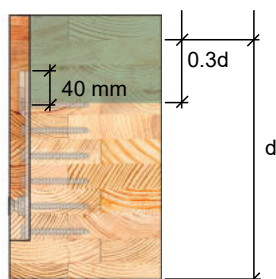
- The RICON S VS can accommodate drifts of over 4% while fully loaded, satisfying the drift limits specified in NBCC 2024 Clause 4.1.8.13.
- The RICON S VS maintains axial load-transfer capacity while carrying full download to ensure the structural integrity of the connection is maintained during a wind or seismic event.



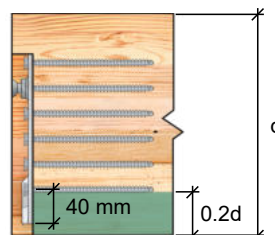
These results demonstrate the RICON S VS connector's ability to accommodate seismic demands while maintaining connection integrity. However, the RICON S VS is not intended to be used as part of the Lateral Force Resisting System (LFRS). Contact MTC Technical Support for additional details for accommodating seismic loads in your design.

Positioning Considerations for Reinforcement

The hanger placement relative to the height of the beam can impact the need for reinforcement. Connectors in the primary beam should have the insertion point of the uppermost fastener in the top 30% of the member depth ($0.3d$), as shown in the left figures. Connectors in the secondary beam should have the insertion point of the lowermost fastener in the bottom 20% ($0.2d$), as shown in the right figures. Outside of these zones, the primary and secondary beams should be checked for splitting to determine if reinforcement is required. Note that these requirements do not apply to columns. For further information, refer to Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain (Page 129).

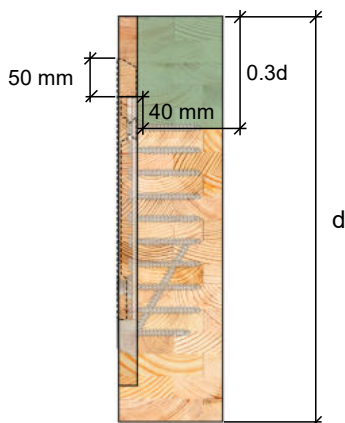


Primary Beam

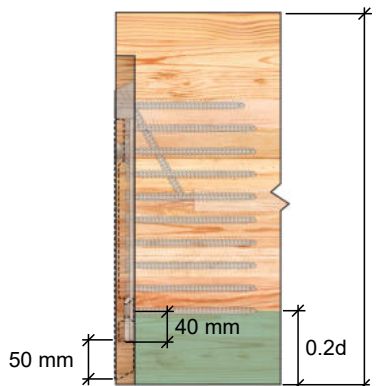


Secondary Beam

RICON S VS 60 & 80 Series



Primary Beam



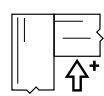
Secondary Beam

RICON S VS XL

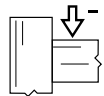
Design - RICON S VS Clip Lock System

Clip Lock Brace System for Uplift

Clip Lock brace systems are additional components available for the RICON S VS beam hanger system. The Clip Lock is a special thin steel plate designed to fit into and lock the RICON S VS beam hanger plates together, providing a resistance to uplift forces. The Clip Lock is installed with the hanger on the primary beam or column, and as the secondary beam is lowered into place, the Clip Lock will automatically engage the screw heads on the opposite plate, providing resistance to uplift loads. These components are installed using the same screws used to fasten the beam hanger plates into the wood member. A new screw pattern applies to the primary member to allow the Clip Lock to be installed properly, which results in a reduced download capacity. Screws cannot be installed at the prohibited screw locations as they will deform the Clip Lock and prevent it from working properly.



Uplift Force
Resistance



Reduced
Downward Force



Table 5.5 - Screw Patterns with Clip Lock Brace System (in Primary Member)

- Clip Lock Mounting Screw Locations
- Prohibited Screw Locations



	RICON S VS 140 x 60	RICON S VS 200 x 60	RICON S VS 200 x 80	RICON S VS 290 x 80	RICON S VS XL 390 x 80
MTC-FTC Screw Qty.	7	13	13	17	27

Note:

1. Secondary member is assumed to have fasteners installed as noted in Table 2.1.

Design - RICON S VS Sloped and Skewed Configurations

RICON S VS connectors can be installed in sloped or skewed configurations. These configurations may require different fastener lengths for the connector plate installed into the secondary member to prevent the fasteners from protruding. The connector plate installed into the primary member (e.g., girder beam or a column) has fasteners driven in the side grain. Because this fiber orientation promotes higher withdrawal capacity, the fasteners may be shorter and still sustain the same load. In a typical installation configuration, the connector plate installed into the secondary member has fasteners driven into the end grain. Longer fully threaded screws are used in the secondary member in order to compensate for the reduced resistance that is characteristic of this orientation of the wood fiber.



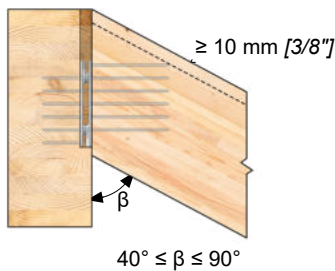
Sloped Configuration: Rafter-to-Ridge Beam Connection



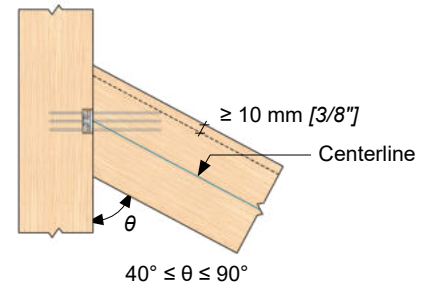
Skewed Configuration: Joist-to-Beam Connection

In sloped and skewed connections, the connector plate installed into the secondary member has fasteners driven into the grain at an angle relative to the connection angle. The factored resistance of the connection increases due to the improved angle-to-grain relationship, and thus respective design values may be achieved with shorter screw lengths in the secondary member.

Sloped and Skewed Connection Requirements



Sloped Configuration: Rafter-to-Ridge Beam Connection (Side View)



Skewed Configuration: Joist-to-Beam or Column Connection (Top View)

In sloped and skewed connections, the connector placement must adhere to the connection geometry requirements in order to avoid reinforcement. Where connection geometry imposes restrictions, fastener length may be reduced, and factored download resistances shall be adjusted with the appropriate reduction factor, R_s . For skewed connections ($40^\circ \leq \theta \leq 90^\circ$), the connector must be aligned with the centerline of the joist; otherwise, eccentricities and resulting moments must be accounted for by the Engineer of Record.

Table 5.6 - Reduction Factor, R_s , for RICON S VS 60 Series

Fastener Length [mm]	β or $\theta = 90^\circ$	β or $\theta = 80^\circ$	β or $\theta = 70^\circ$	β or $\theta = 60^\circ$	β or $\theta = 50^\circ$	β or $\theta = 40^\circ$
160	1.0	1.0	1.0	1.0	1.0	1.0
140	0.9	1.0	1.0	1.0	1.0	1.0
120	0.8	0.9	0.9	1.0	1.0	1.0

Note: Refer to the notes below Table 2.20.

Table 5.7 - Reduction Factor, R_s , for RICON S VS 80 Series and RICON S VS XL

Fastener Length [mm]	β or $\theta = 90^\circ$	β or $\theta = 80^\circ$	β or $\theta = 70^\circ$	β or $\theta = 60^\circ$	β or $\theta = 50^\circ$	β or $\theta = 40^\circ$
200	1.0	1.0	1.0	1.0	1.0	1.0
180	0.9	1.0	1.0	1.0	1.0	1.0
160	0.8	0.9	0.9	1.0	1.0	1.0
140	0.7	0.8	0.8	0.9	0.9	1.0

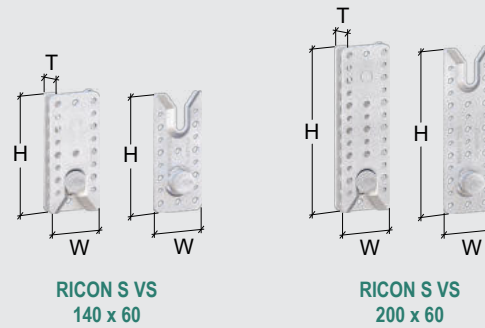
1. Reduced fastener lengths only apply for installation in the secondary member.
2. Factored download resistance of the connector must be adjusted with the reduction factor provided in the table.
3. Reduction factor values are derived from ETA-10/0189.

Detailing - RICON S VS 60 Series Geometry Requirements

RICON S VS 60 Series - Connector Geometry

Table 5.8 - RICON S VS 60 Geometry

Connector Geometry	Model	
	RICON S VS 140 x 60	RICON S VS 200 x 60
	[mm]	
H	140	200
W	60	60
T	25	25



Note:

1. Refer to Appendix D: Product Specifications (Page 138) for additional product specifications.



Secondary Member Geometry Requirements

Unhoused

Housed

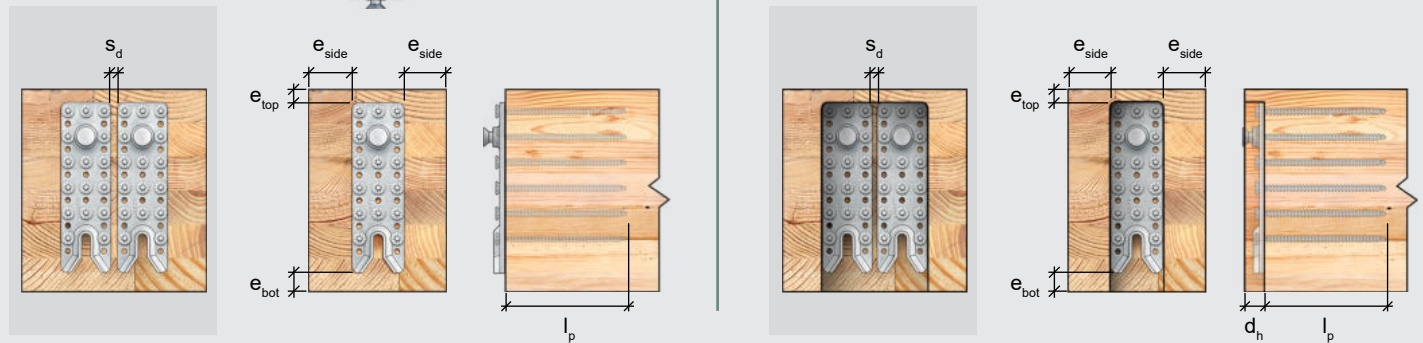


Table 5.9 - RICON S VS 60 Geometry Requirements for Secondary Member

RICON S VS 60		Geometry Requirements [mm]											
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
Model	Configuration			e _{side}	e _{bot}	e _{side}	e _{bot}	e _{side}	e _{bot}	e _{side}	e _{bot}		
RICON S VS 140 x 60	Single	152	46	16	0	36	40	46	56	85	124	23	N/A
	Double	152	46	16	0	36	40	46	56	85	124	23	8
RICON S VS 200 x 60	Single	152	46	16	0	36	40	46	56	85	124	23	N/A
	Double	152	46	16	0	36	40	46	56	85	124	23	8

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values presented are the minimum required unless noted otherwise. Tabulated values for l_p are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance as well as the effective shear resistance of the member.



Primary Member Geometry Requirements - Beam/Girder

Unhoused

Housed

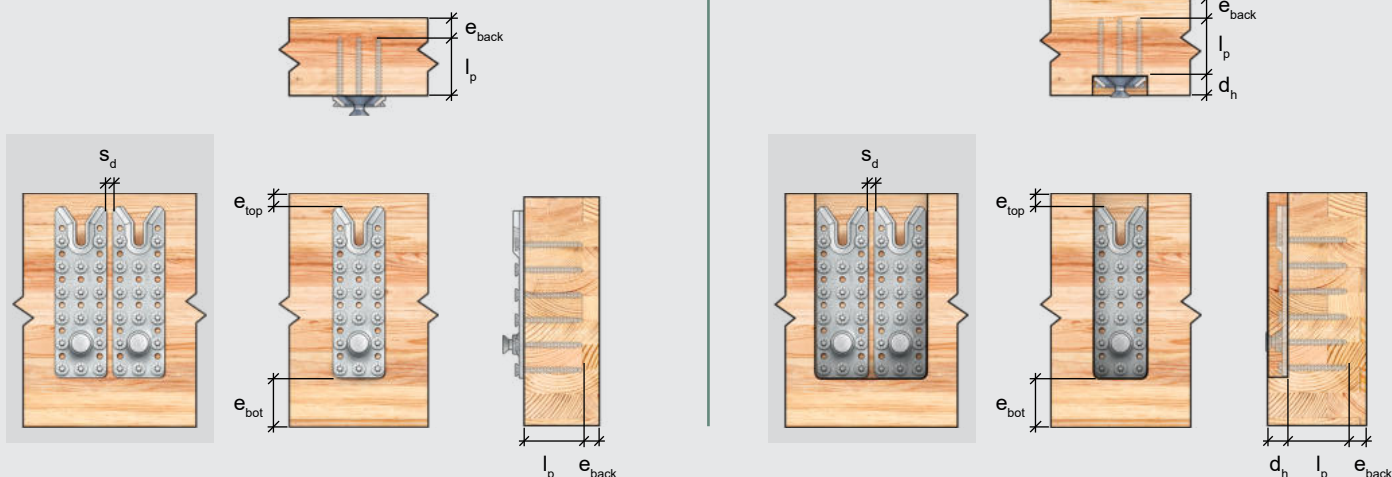


Table 5.10 - RICON S VS 60 Geometry Requirements for Primary Member (Beam/Girder)

RICON S VS 60		Geometry Requirements [mm]											
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
Model	Configuration			e _{bot}	e _{back}	e _{bot}	e _{back}	e _{bot}	e _{back}	e _{bot}	e _{back}		
RICON S VS 140 x 60	Single	72	46	46	10	46	36	56	46	124	85	23	N/A
	Double	72	46	46	10	46	36	56	46	124	85	23	8
RICON S VS 200 x 60	Single	72	46	46	10	46	36	56	46	124	85	23	N/A
	Double	72	46	46	10	46	36	56	46	124	85	23	8

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values presented are the minimum required unless noted otherwise. Tabulated values for l_p are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Values for e_{top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam.
4. Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance as well as the effective shear resistance of the member.

RIDGE

APEX

GIGANT

RICON S VS

Design

Detailing

Installation

MEGANT



Primary Member Geometry Requirements - Column

Unhoused

Housed

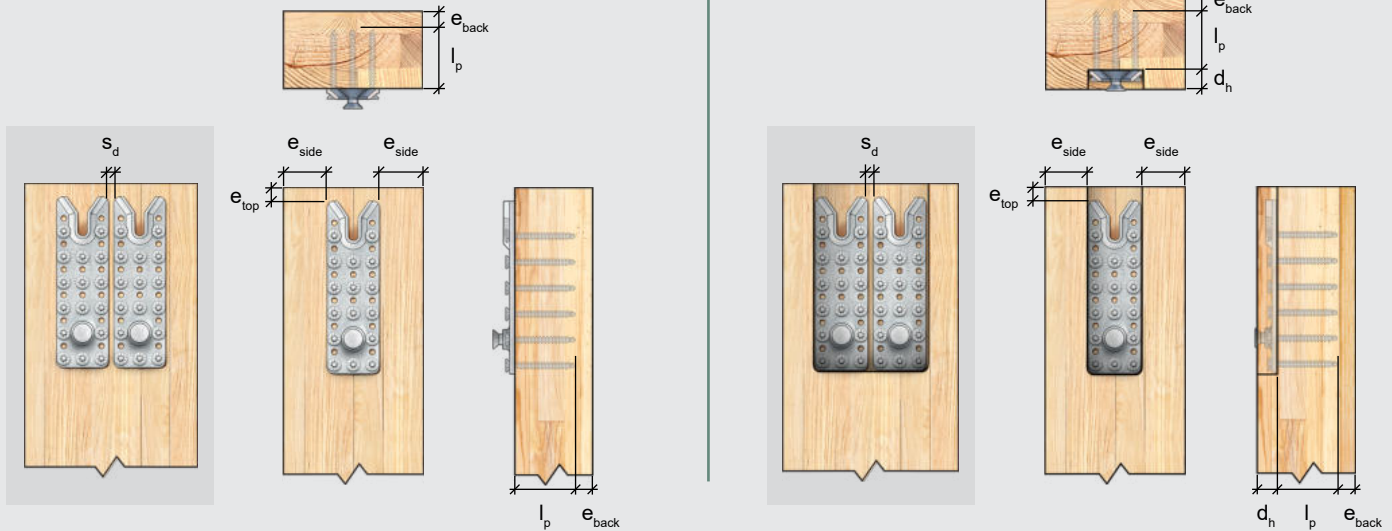


Table 5.11 - RICON S VS 60 Geometry Requirements for Primary Member (Column)

RICON S VS 60		Geometry Requirements [in.]											
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
Model	Configuration			e _{side}	e _{back}	e _{side}	e _{back}	e _{side}	e _{back}	e _{side}	e _{back}		
RICON S VS 140 x 60	Single	72	46	16	10	36	36	46	46	85	85	23	N/A
	Double	72	46	16	10	36	36	46	46	85	85	23	8
RICON S VS 200 x 60	Single	72	46	16	10	36	36	46	46	85	85	23	N/A
	Double	72	46	16	10	36	36	46	46	85	85	23	8

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values presented are the minimum required unless noted otherwise. Tabulated values for l_p are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Values for e_{top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam.

Detailing - RICON S VS 80 Series Geometry Requirements

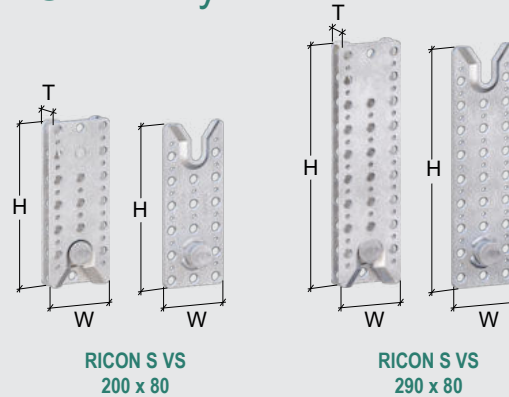
RICON S VS 80 Series - Connector Geometry

Table 5.12 - RICON S VS 80 Geometry

Connector Geometry	Model	
	RICON S VS 200 x 80	RICON S VS 290 x 80
	[mm]	
H	200	290
W	80	80
T	25	25

Note:

1. Refer to Appendix D: Product Specifications (Page 138) for additional product specifications.



Secondary Member Geometry Requirements

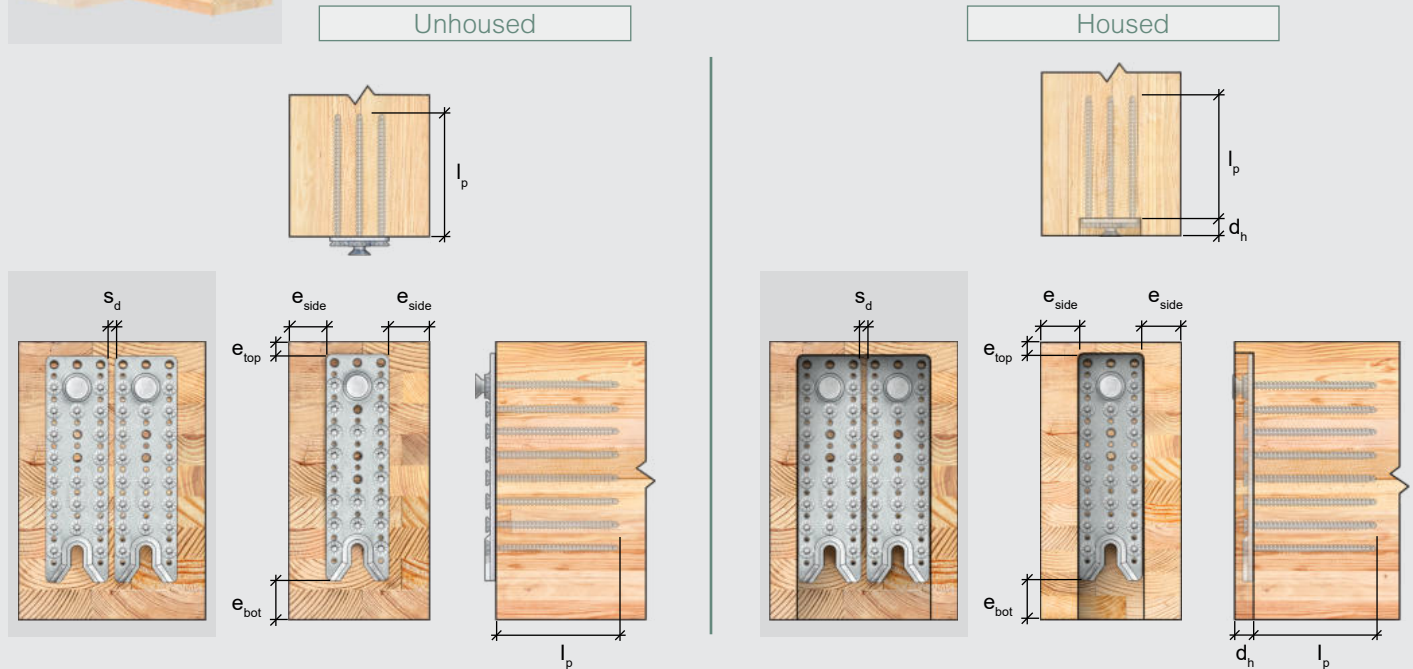


Table 5.13 - RICON S VS 80 Geometry Requirements for Secondary Member

RICON S VS 80		Geometry Requirements [mm]											
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
e _{side}	e _{bot}			e _{side}	e _{bot}	e _{side}	e _{bot}	e _{side}	e _{bot}				
Model	Configuration												
RICON S VS 200 x 80	Single	192	60	20	0	36	40	46	56	85	124	23	N/A
	Double	192	60	20	0	36	40	46	56	85	124	23	10
RICON S VS 290 x 80	Single	192	30	20	0	36	40	46	56	85	124	23	N/A
	Double	192	30	20	0	36	40	46	56	85	124	23	10

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values presented are the minimum required unless noted otherwise. Tabulated values for l_p are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance as well as the effective shear resistance of the member.

RIDGE

APEX

GIGANT

RICON SVS

Design

Detailing

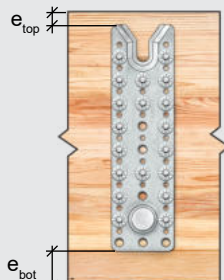
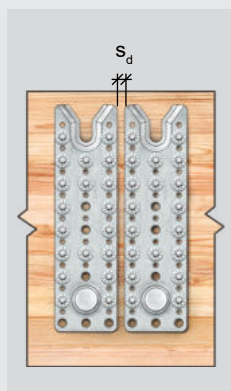
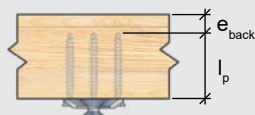
Installation

MEGANT

Primary Member Geometry Requirements - Beam/Girder



Unhoused



Housed

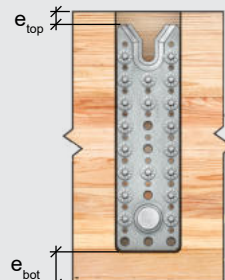
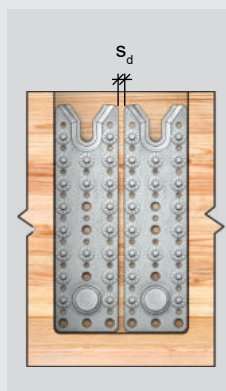
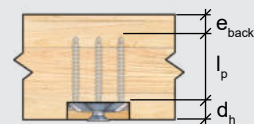


Table 5.14 - RICON S VS 80 Geometry Requirements for Primary Member (Beam/Girder)

RICON S VS 80		Geometry Requirements [mm]											
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
Model	Configuration			e _{bot}	e _{back}	e _{bot}	e _{back}	e _{bot}	e _{back}	e _{bot}	e _{back}		
RICON S VS 200 x 80	Single	92	60	60	10	60	36	60	46	124	85	23	N/A
	Double	92	60	60	10	60	36	60	46	124	85	23	10
RICON S VS 290 x 80	Single	92	30	30	10	40	36	56	46	124	85	23	N/A
	Double	92	30	30	10	40	36	56	46	124	85	23	10

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values presented are the minimum required unless noted otherwise. Tabulated values for l_p are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Values for e_{top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam
4. Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance as well as the effective shear resistance of the member.



Primary Member Geometry Requirements - Column

Unhoused

Housed

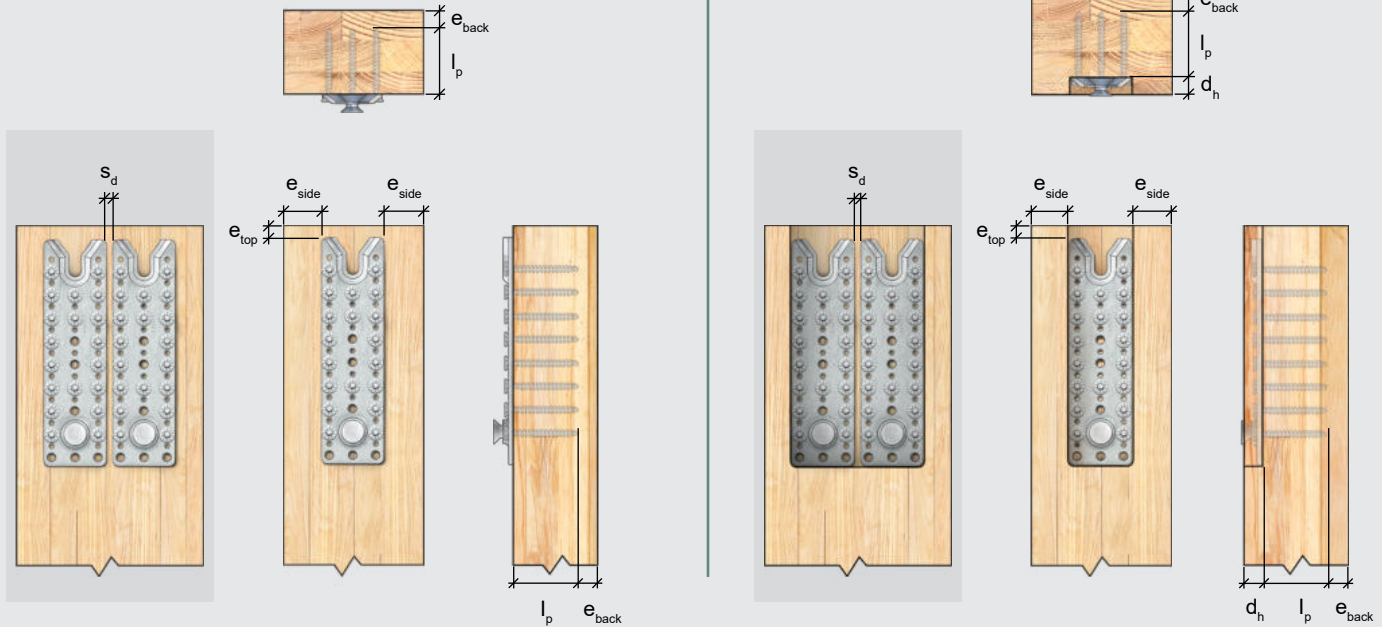


Table 5.15 - RICON S VS 80 Geometry Requirements for Primary Member (Column)

RICON S VS 60		Geometry Requirements [in.]											
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
Model	Configuration			e _{side}	e _{back}	e _{side}	e _{back}	e _{side}	e _{back}	e _{side}	e _{back}		
RICON S VS 140 x 60	Single	72	46	16	10	36	36	46	46	85	85	23	N/A
	Double	72	46	16	10	36	36	46	46	85	85	23	8
RICON S VS 200 x 60	Single	72	46	16	10	36	36	46	46	85	85	23	N/A
	Double	72	46	16	10	36	36	46	46	85	85	23	8

Notes:

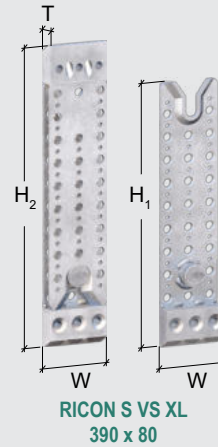
1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values presented are the minimum required unless noted otherwise. Tabulated values for l_p are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Values for e_{top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam.

Detailing - RICON S VS XL Geometry Requirements

RICON S VS XL - Connector Geometry

Table 5.16 - RICON S VS XL Geometry

Connector Geometry	Model
	RICON S VS XL 390 x 80
	[mm]
H_1	340
H_2	390
T	25
W	80



Note:

- Refer to Appendix D: Product Specifications (Page 138) for additional product specifications.



Secondary Member Geometry Requirements

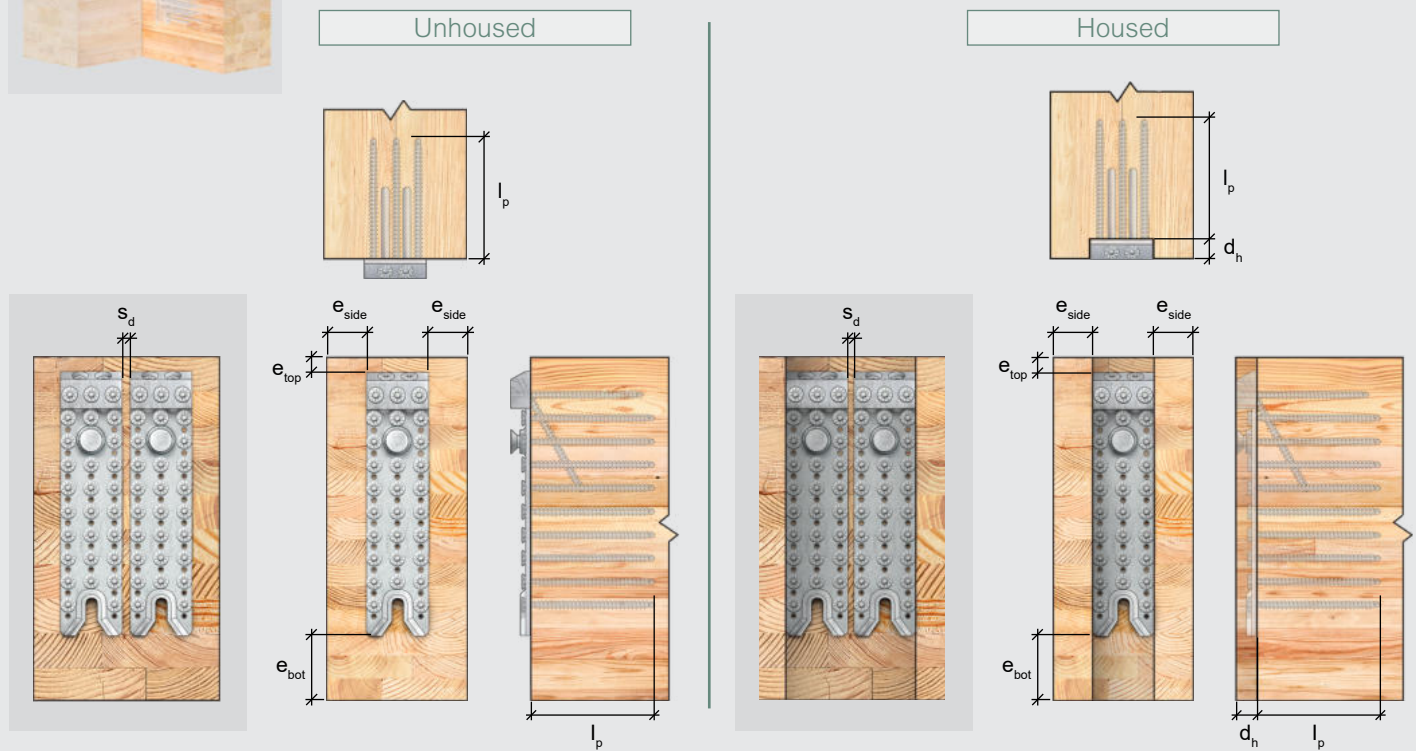


Table 5.17 - RICON S VS XL 390 x 80 Geometry Requirements for Secondary Member

RICON S VS XL		Geometry Requirements [mm]											
		I _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
				e _{side}	e _{bot}	e _{side}	e _{bot}	e _{side}	e _{bot}	e _{side}	e _{bot}		
Model	Configuration												
RICON S VS XL 390 x 80	Single	192	40	20	50	36	94	46	111	85	179	23	N/A
	Double	192	40	20	50	36	94	46	111	85	179	23	10

Notes:

- Connection design must meet all relevant requirements of the General Notes to the Designer section.
- Tabulated values presented are the minimum required unless noted otherwise. Tabulated values for I_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
- Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance as well as the effective shear resistance of the member.

Primary Member Geometry Requirements - Beam/Girder



Unhoused

Housed

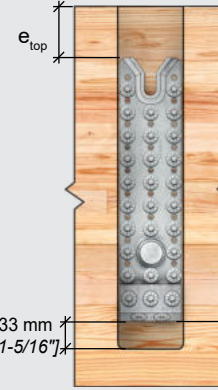
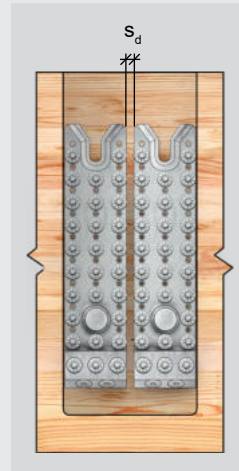
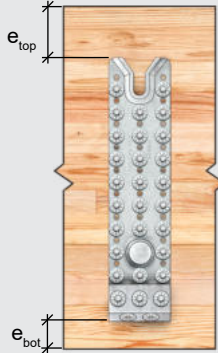
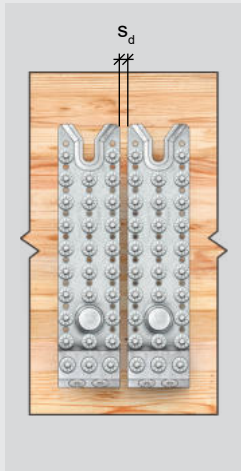
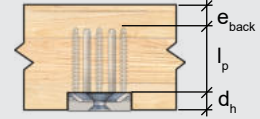
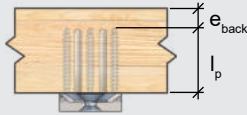


Table 5.18 - RICON S VS XL 390 x 80 Geometry Requirements for Primary Member (Beam/Girder)

RICON S VS XL		Geometry Requirements [mm]										d _h	s _d
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR			
Model	Configuration			e _{bot}	e _{back}	e _{bot}	e _{back}	e _{bot}	e _{back}	e _{bot}	e _{back}		
RICON S VS XL 390 x 80	Single	92	90	40	10	44	36	61	46	129	85	23	N/A
	Double	92	90	40	10	44	36	61	46	129	85	23	10

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values presented are the minimum required unless noted otherwise. Tabulated values for l_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Values for e_{top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam.
4. For any connection with an FRR where the RICON S VS XL is housed in the primary beam, the space below the RICON S VS XL must be filled with noncombustible material.
5. Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance as well as the effective shear resistance of the member.

RIDGE

APEX

GIGANT

RICON S VS

Design

Detailing

Installation

MEGANT



Primary Member Geometry Requirements - Column

Unhoused

Housed

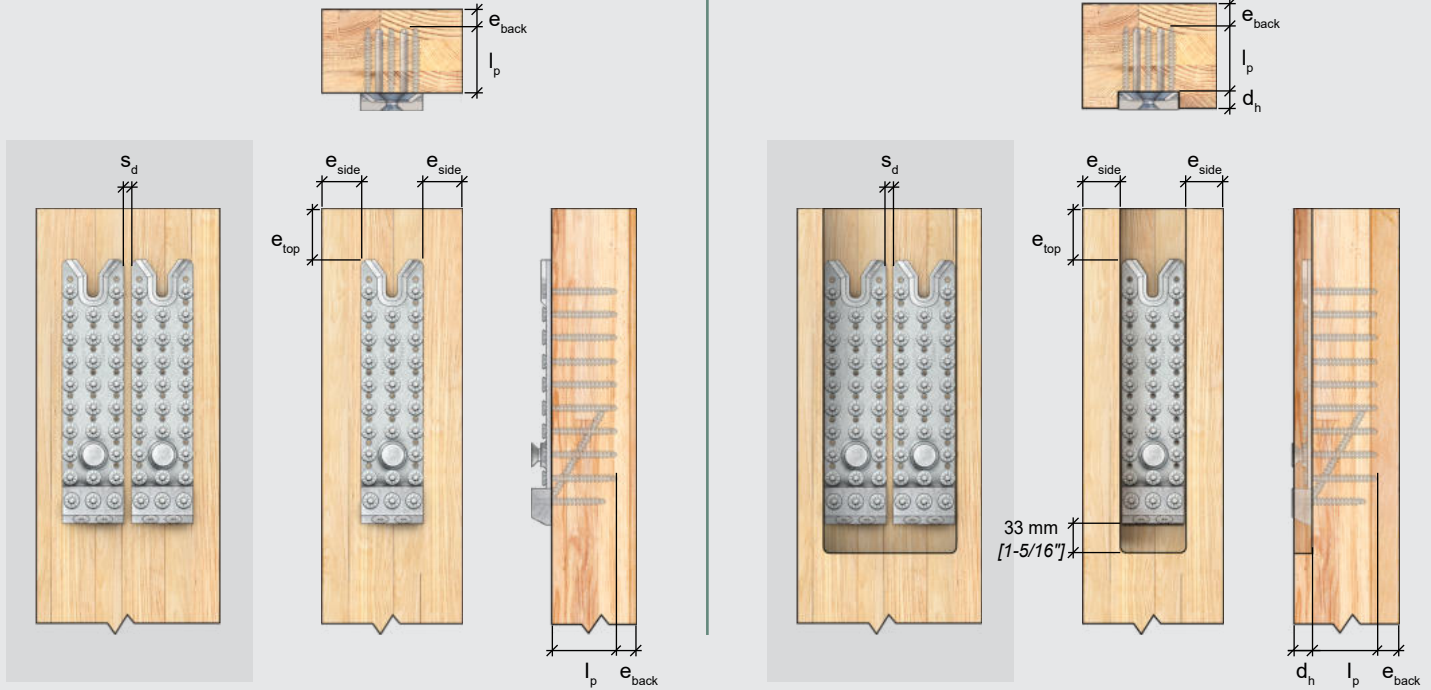


Table 5.19 - RICON S VS XL 390 x 80 Geometry Requirements for Primary Member (Column)

RICON S VS 80		Geometry Requirements [mm]											
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
Model	Configuration			e _{side}	e _{back}	e _{side}	e _{back}	e _{side}	e _{back}	e _{side}	e _{back}		
RICON S VS 200 x 80	Single	92	60	20	10	36	36	46	46	85	85	23	N/A
	Double	92	60	20	10	36	36	46	46	85	85	23	10
RICON S VS 290 x 80	Single	92	30	20	10	36	36	46	46	85	85	23	N/A
	Double	92	30	20	10	36	36	46	46	85	85	23	10

Notes:

- Connection design must meet all relevant requirements of the General Notes to the Designer section.
- Tabulated values presented are the minimum required unless noted otherwise. Tabulated values for l_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
- Values for e_{top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam.
- For any connection with an FRR where the RICON S VS XL is housed in the column, the space below the RICON S VS XL must be filled with noncombustible material.

Detailing - RICON S VS Additional Considerations

Geometry Requirements for Columns with Multiple Beam Hangers

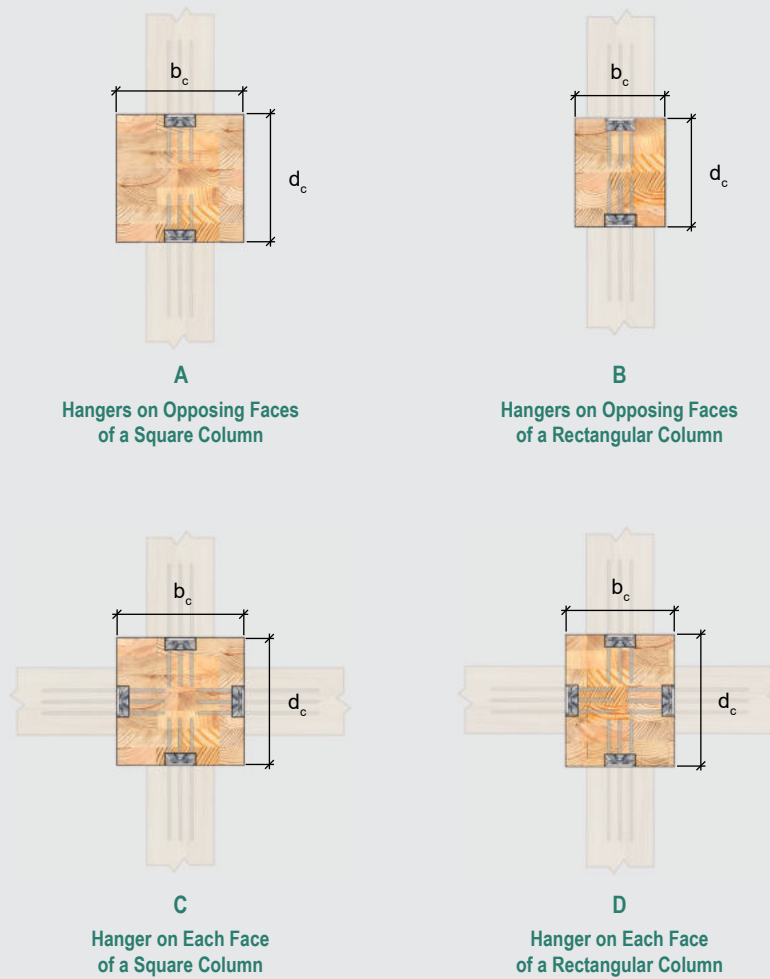


Table 5.20 - Minimum Column Sizes for Multiple RICON S VS Connectors

Model Series	Minimum Column Section Dimensions, $b_c \times d_c$ [mm x mm]							
	A Hangers on Opposing Faces of a Square Column				B Hangers on Opposing Faces of a Rectangular Column			
	No FRR	45-min FRR	1-hr FRR	2-hr FRR	No FRR	45-min FRR	1-hr FRR	2-hr FRR
RICON S VS 60	204 x 204	204 x 204	204 x 204	230 x 230	92 x 204	133 x 204	152 x 204	230 x 204
RICON S VS 80 and XL	244 x 244	244 x 244	244 x 244	250 x 250	120 x 244	153 x 244	172 x 244	250 x 244

Model Series	Minimum Column Section Dimensions, $b_c \times d_c$ [mm x mm]							
	C Hanger on Each Face of a Square Column				D Hangers on Each Face of a Rectangular Column			
	No FRR	45-min FRR	1-hr FRR	2-hr FRR	No FRR	45-min FRR	1-hr FRR	2-hr FRR
RICON S VS 60	253 x 253	253 x 253	253 x 253	253 x 253	92 x 253	133 x 253	152 x 253	230 x 253
RICON S VS 80 and XL	309 x 309	309 x 309	309 x 309	309 x 309	120 x 309	153 x 309	172 x 309	250 x 309

Notes:

1. Tabulated column section dimensions are minimum values based on a 12.7 mm [1/2 in.] clearance between screw tips, minimum edge and end distances, and minimum wood cover requirements for FRR. Refer to Geometry Requirements for further details.
2. It is the responsibility of the EOR to ensure the primary and secondary members have adequate capacity to resist connection forces.
3. Tabulated column section dimensions assume hangers are centered within each column face and are housed in the column as shown.

RIDGE

APEX

GIGANT

RICON S VS

Design

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Detailing - RICON S VS Housing Details

Housing Possibilities

Primary Beam Housing

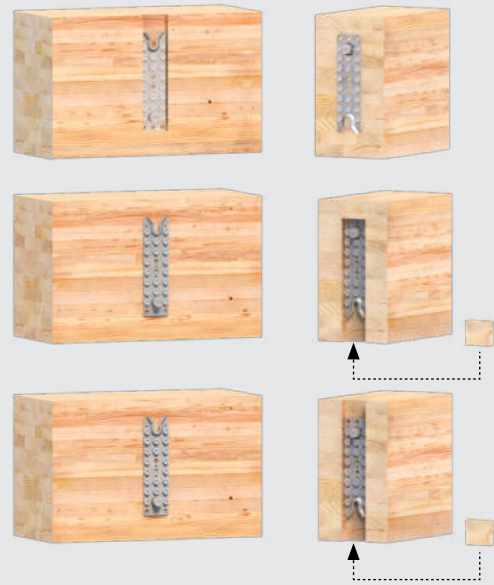
- Most common housing for concealed installation
- Concealed from below

Secondary Beam Housing

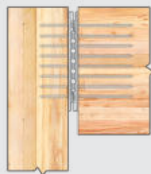
- Joist housing from bottom up
- Concealed from below with a wood plug

Secondary Beam Through Housing

- Full-depth housing in joist
- Concealed from below with a wood plug
- Simplifies fabrication



Housing and Surface Detailing



Surface-Mounted



Housed in Primary Member
(Column)



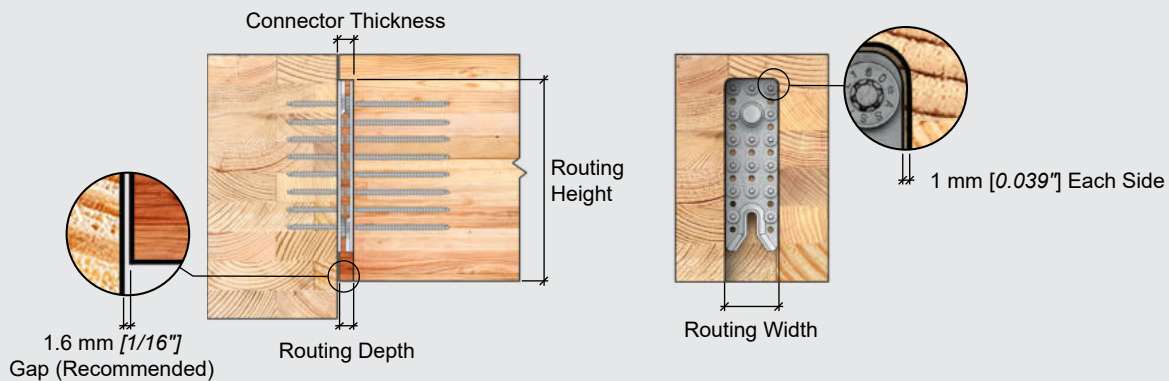
Housed in Primary Member
(Girder)



Housed in Secondary Member
(Joist or Purlin)

Parallel Surface: The members must be parallel at the location of the connection to ensure proper hanger alignment and load transfer.

Gap Size: The gap size between wood members balances installation ease and fire performance, with larger gaps simplifying installation but reducing fire protection. A gap of 1.6 mm [1/16 in.] is recommended for proper installation to allow the secondary member to slide into place. The gap should be no more than 3.2 mm [1/8 in.] to address fire protection considerations. For more information, refer to Appendix A: Fire Protection (Page 121).



Routing Depth: The routing depth is the depth of the housing, d_h , noted in the Geometry Requirements and Routing Details sections. This depth takes into account the thickness of the connector and the gap between members (recommended 1.6 mm [1/16 in.] herein—larger gaps will reduce d_h accordingly).

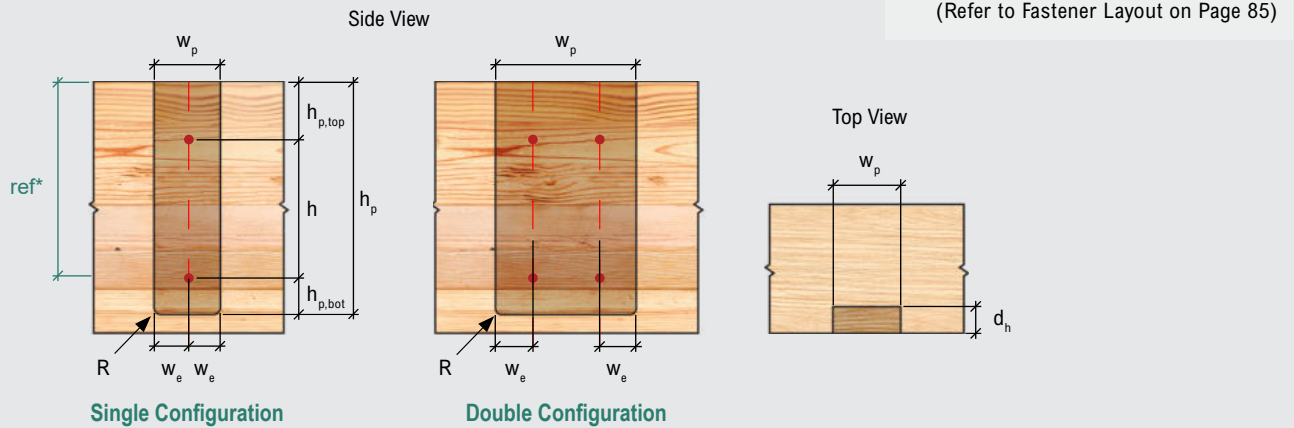
Routing Width: It is recommended to allow a clearance of 1 mm [0.039 in.] on each side of the connector:

- RICON S VS 60 Series: 62 mm [2.441 in.]
- RICON S VS 80 Series (including RICON S VS XL): 82 mm [3.228 in.]

Routing Height: The routing height must be coordinated with the Engineer of Record. The height of the connector in the beam section has an impact on connector performance. Refer to Positioning Considerations for Reinforcement (Page 69) for further information.

Detailing - RICON S VS Housing Dimensions

Routing in Primary Member



* The reference point for routing and installation is the lower nonstructural positioning screw measured from the top of the beam. Refer to the Installation Guidelines (Page 86) for more information.

Table 5.21 - Routing Dimensions for RICON S VS Housed in Primary Member

Model	Routing Dimensions, mm [in.]								
	h_p	$h_{p,top}$	h	$h_{p,bot}$	w_p		w_e	d_h	R
					Single	Double			
RICON S VS 140 x 60	187 [7.362]	116 [4.567]	60 [2.362]	11 [0.433]	62 [2.441]	130 [5.118]	31 [1.220]	23 [0.922]	7.5 [0.295]
RICON S VS 200 x 60	247 [9.724]	116 [4.567]	120 [4.724]	11 [0.433]	62 [2.441]	130 [5.118]	31 [1.220]	23 [0.922]	7.5 [0.295]
RICON S VS 200 x 80	261 [10.276]	130 [5.118]	120 [4.724]	11 [0.433]	82 [3.228]	172 [6.772]	41 [1.614]	23 [0.922]	7.5 [0.295]
RICON S VS 290 x 80	321 [12.638]	100 [3.937]	150 [5.906]	71 [2.795]	82 [3.228]	172 [6.772]	41 [1.614]	23 [0.922]	7.5 [0.295]
RICON S VS XL 390 x 80	463 [18.228]	160 [6.299]	210 [8.268]	93 [3.661]	82 [3.228]	172 [6.772]	41 [1.614]	23 [0.922]	7.5 [0.295]

Notes:

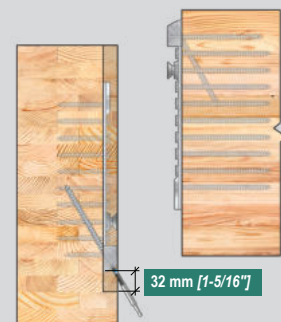
1. Tabulated values are general guidelines for routing requirements. The EOR and fabricator are responsible for ensuring final routing dimensions account for all project-specific conditions.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for h and R are fixed. Tabulated values for d_h are maximum allowable.
3. Tabulated values account for 1 mm [0.039 in.] on each side of and below the hanger. Larger installation tolerances will increase height and width values accordingly.
4. Tabulated values are based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
5. Refer to the Geometry Requirements tables for each respective beam hanger for additional information.
6. Tabulated values for h_p and $h_{p,bot}$ for the RICON S VS XL account for a 33 mm [1-5/16 in.] gap below the connector to allow the installation of the fasteners. The resulting hidden void should be protected from fire using industry-approved methods.
7. Manufacturers should adjust the tabulated values based on their specific routing bit sizes if different than R .

RICON S VS XL - Additional Routing Clearance Requirements

An additional housing clearance of 32 mm [1-5/16 in.] must be accounted for during design phase for the 45° inclined screws of the RICON S VS XL.

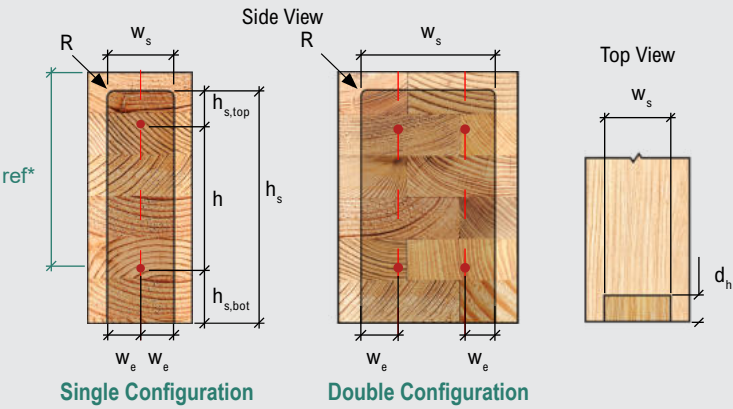
Notes:

1. A bit extender is recommended to facilitate installation.
2. Values provided in the Housing Dimensions section (Pages Page 83–Page 84) already accommodate oversized housing.
3. To satisfy fire-resistance rating requirements, the cavity must be filled under the direction of the EOR.



Routing in Secondary Member

Fastener Orientation
● Structural Positioning Screws
(Refer to Fastener Layout on Page 85)



* The reference point for routing and installation is the lower nonstructural positioning screw measured from the top of the beam. Refer to the Installation Guidelines (Page 31) for more information.

Table 5.22 - Routing Dimensions for RICON S VS Housed in Secondary Member (Beam-End)

Model	Routing Dimensions, mm [in.]								
	h_s	$h_{s,top}$	h	$h_{s,bot}$	w_s		w_e	d_h	R
					Single	Double			
RICON S VS 140 x 60	141 [5.551]	11 [0.433]	60 [2.362]	70 [2.756]	62 [2.441]	130 [5.118]	31 [1.220]	23 [0.922]	7.5 [0.295]
RICON S VS 200 x 60	201 [7.913]	11 [0.433]	120 [4.724]	70 [2.756]	62 [2.441]	130 [5.118]	31 [1.220]	23 [0.922]	7.5 [0.295]
RICON S VS 200 x 80	201 [7.913]	11 [0.433]	120 [4.724]	70 [2.756]	82 [3.228]	172 [6.772]	41 [1.614]	23 [0.922]	7.5 [0.295]
RICON S VS 290 x 80	291 [11.457]	71 [2.795]	150 [5.906]	70 [2.756]	82 [3.228]	172 [6.772]	41 [1.614]	23 [0.922]	7.5 [0.295]
RICON S VS XL 390 x 80	423 [16.654]	93 [3.661]	210 [8.268]	120 [4.724]	82 [3.228]	172 [6.772]	41 [1.614]	23 [0.922]	7.5 [0.295]

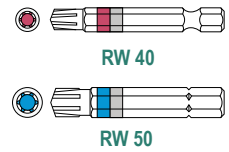
- Notes:
1. Tabulated values are general guidelines for routing requirements. The EOR and fabricator are responsible for ensuring final routing dimensions account for all project-specific conditions.
 2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for h and R are fixed. Tabulated values for d_h are maximum allowable.
 3. Tabulated values account for 1 mm [0.039 in.] on each side of and above the hanger. Larger installation tolerances will increase height and width values accordingly.
 4. Tabulated values are based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
 5. Refer to the Geometry Requirements tables for each respective beam hanger for additional information.
 6. Tabulated values for h_e and $h_{s,top}$ for the RICON S VS XL account for a 33 mm [1-5/16 in.] gap above the connector to allow the installation of the fasteners. The resulting hidden void should be protected from fire using industry-approved methods.
 7. Manufacturers should adjust the tabulated values based on their specific routing bit sizes if different than R .

Installation - RICON S VS General Requirements

Tool Requirements

Tools - Use the Correct Bit

MTC Solutions fasteners should only be driven using RW bits, or appropriately sized star bits. This ensures good centering and positioning with optimal torque transmission. For the RICON S VS, use an RW 40 bit for 8 mm [5/16 in.] screws and an RW 50 bit for 10 mm [3/8 in.] screws.

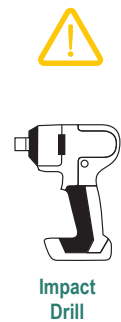
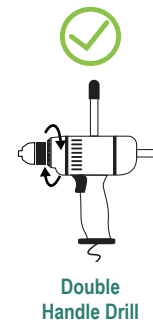
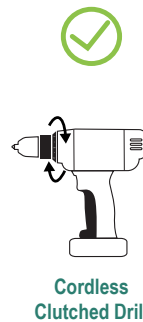


Tools - Use the Correct Drill

Use low-RPM, high-torque drills equipped with a feather (variable speed) trigger to install fasteners. Avoid excessive acceleration and deceleration during the drive-in process. Do not overtorque fasteners. Although impact drills are not expressly prohibited, their use is discouraged - particularly for beam hanger systems - due to an increased risk of overtorquing. Use the appropriate drill chuck size according to the fastener.

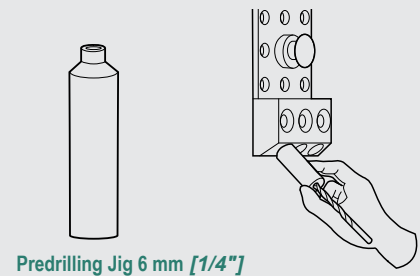
Table 5.23 - Recommended Torque, Drill Bits, and Power Drill

Nominal Fastener Diameter [D]	HSS Drill Bit Size	Power Voltage Drill	Allowable Insertion Torque
mm [in.]	mm [in.]	V	N · m [lb. ft.]
8 [5/16]	5 [3/16]	20	16.67 [12.30]
10 [3/8]	6 [1/4]	60	30.00 [22.13]



Tools - Predrilling Jig 6 mm [1/4 in.]

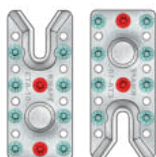
The Predrilling Jig ensures precise alignment of the RICON S VS XL 30° inclined fasteners. It guides the drill bit to create an accurate pilot hole, and ensures proper fastener seating. The hole in the jig accommodates standard imperial and metric drill bit diameters. For the 10 mm [3/8 in.] inclined fasteners, pilot holes 6 mm [1/4 in.] in diameter and 25 mm [1 in.] long are recommended.



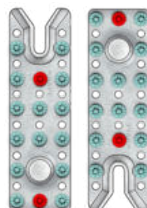
Fastener Layout

Fastener Orientation

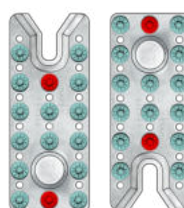
- Structural Positioning Screws (without Clip Lock)
- Horizontal Screws (without Clip Lock)
- Inclined Screws



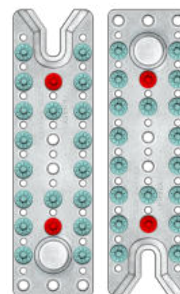
RICON S VS
140 x 60



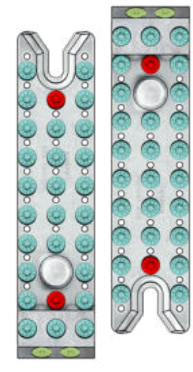
RICON S VS
200 x 60



RICON S VS
200 x 80



RICON S VS
290 x 80



RICON S VS XL
390 x 80

Note:

- Alternative locations for positioning screws are required when using a Clip Lock System. For more information, see Page 70.

Installation - RICON S VS Guidelines

General Installation Steps

Estimated Installation Time

The estimated time for a single person to install a complete RICON S VS product is shown in Table 5.24.

This process includes the following steps:

1. Layout (~10%–15%)
2. Positioning (~15%–20%)
3. Pilot Holes (~20%–30%)
4. Screw Installation (~45%–55%)
5. Optional Measures (not included in the time installation % breakdown)

The estimated installation time can be improved upon with efficient fabrication and site practices such as:

1. Drilling pilot holes for the structural positioning screws at the time of fabrication
2. Utilizing templates to drill pilot holes for structural screws
3. Optimizing beam positioning to reduce worker fatigue

Table 5.24 - RICON S VS Estimated Installation Time

RICON S VS Model	Average Installation Time [min.]
140 x 60	9
200 x 60	13
200 x 80	13
290 x 80	14
XL 390 x 80	20

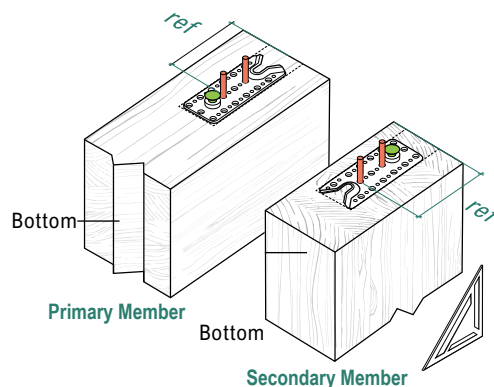
Step-by-Step Installation Guidelines

1.1 Layout - Reference Points

Begin by laying out the installation locations in the primary and secondary members using a pencil and square.

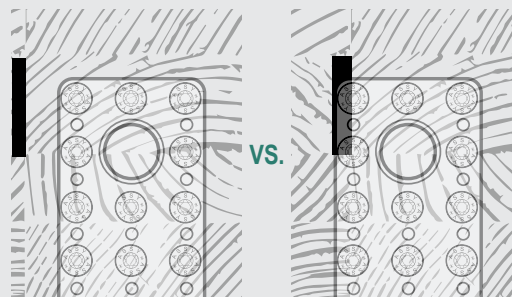
The connector's point of reference is the top of the member. The **lower structural positioning screw** should be measured from that point of reference (ref).

The **collar bolt** should be at the **bottom** on the primary member and on the **top** on the secondary member.



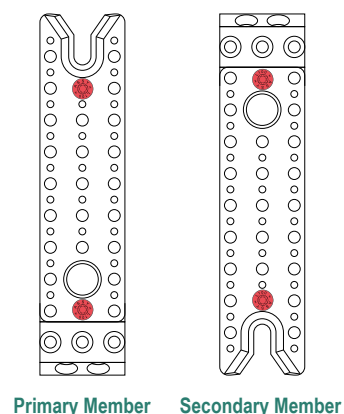
1.2 Layout - Split Lamination Considerations

Where lamination gaps are present, positioning fasteners away from the gap is recommended to promote uniform load transfer. The influence of lamination gaps on fasteners performance depends on their size relative to fastener geometry and their proximity to fasteners.



2.1 Positioning - Structural Positioning Screw Installation

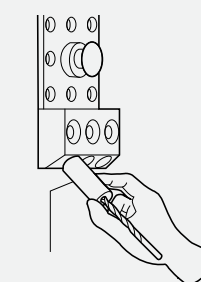
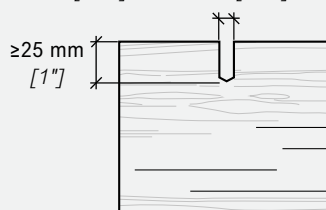
Positioning screws ensure accurate placement of the RICON S VS connector. To improve accuracy and reduce installation time, it is recommended to predrill the structural positioning screw locations during member fabrication. Note that structural screws cannot be reused if the connector requires adjustment. Install one structural positioning screw into the hole highlighted at the top of the plate. Check to ensure alignment is maintained and then install the second structural positioning screw into the hole highlighted at the bottom of the plate. If using a Clip Lock system Clip Lock Brace System for Uplift section (Page 70), an alternate positioning screw location will be required.



3.1 Pilot Holes - Recommendations

Pilot holes are optional; however, they facilitate screw thread engagement, help reduce splitting risks, ensure a proper penetration path, reduce screw wandering, and reduce insertion torque. 5 mm [3/16 in.] diameter pilot holes are recommended for the 8 mm [5/16 in.] horizontal screws, while 6 mm [1/4 in.] diameter pilot holes are recommended for the 10 mm [3/8 in.] inclined screws. Pilot holes should be 25 mm [1 in.] long. The use of MTC Predrilling Jig for the inclined screws of the RICON S VS XL is recommended to ensure proper hole placement.

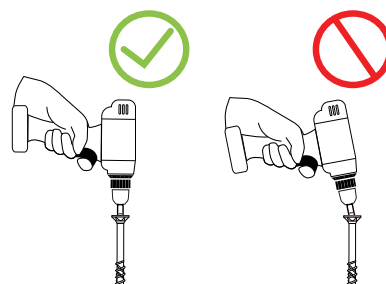
5 mm [3/16"] for 8 mm [5/16"] screws
6 mm [1/4"] for 10 mm [3/8"] screws



MTC Predrilling Jig

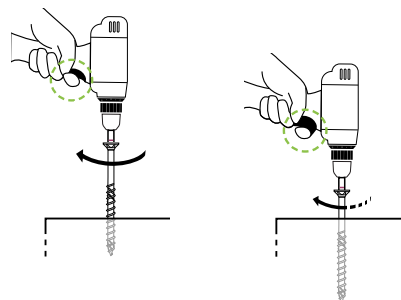
4.1 Screw Installation - Align Drill Bit Axis

Align the driver bit axis parallel to the fastener axis during installation to allow proper torque transmission and to avoid stripping.



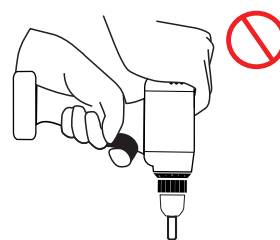
4.2 Screw Installation - Decrease RPM

To avoid overtightening the screw, decrease the rotation speed about 13 mm [1/2 in.] away from the final installed position. This is crucial to prevent wood crushing due to overtightening, which can impact beam hanger tolerances, potentially impeding overall connection assembly. This is especially important when using an impact drill.



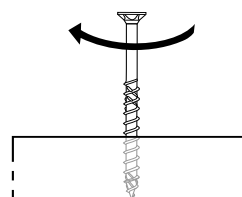
4.3 Screw Installation - Drill Pressure

Do not apply excessive pressure on the drill while driving the fastener to prevent fastener buckling or deviation during installation. Only apply the required force or use the recommended holder case to eliminate cam-out effects.



4.4 Screw Installation - One-Step Process

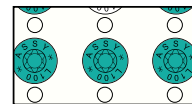
To avoid increased torque peaks caused by stopping and restarting the drive-in process, install the screw in one run until the head is lightly seated against the side member. If necessary, a torque wrench may be used to complete installation immediately after the screw has been driven.



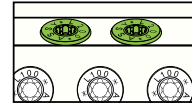
4.5 Screw Installation - Structural Screws

Install 8 mm [5/16 in.] MTC-FTC screws in all horizontal holes. If using a Clip Lock system, refer to Step 5.1 and Page 70 for further information.

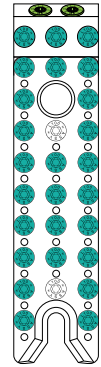
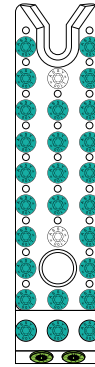
For the RICON S VS XL only: install 10 x 200 mm [3/8" x 7-7/8"] MTC-FTC screws into all inclined holes after all horizontal screws have been installed.



Horizontal Screws



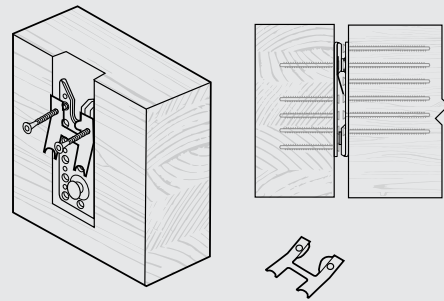
30° Inclined Screws



Primary Member Secondary Member

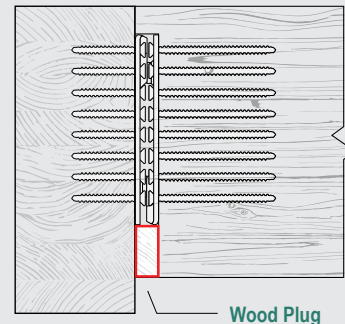
5.1 Optional Measures - Clip Lock Installation

The Clip Lock system must be installed with a modified screw pattern in the primary member. Refer to Page 70 for further details on the screw pattern for the Clip Lock.



5.2 Optional Measures - Wood Plug

Where connectors are housed in the secondary beam, it is recommended to seal the void in the routing below the connector for aesthetics and fire protection. A wood plug may be used, and installation instructions shall be provided by the EOR.



MEGANT

Pre-Engineered Connection System

The MEGANT is a pre-engineered beam-to-beam and beam-to-column connector manufactured from aluminum and consisting of plates and threaded rods for securing the connection. The MEGANT has been tested for the North American market.



Pre-Installable

Pre-installable in a controlled shop environment for a faster on-site installation



Multi-Direction Installation

Facilitates beam installation from any direction (top, bottom, and sides)



Fire-Resistance-Rated

Fire-resistance rating up to 2 hours per CSA O86:24



Interstory Drift Tested

Drift ratio exceeding 4% in quasi-static rotational testing



Test-Derived Factored Resistances

Factored resistances derived from connector and fastener testing and in accordance with CSA O86:24



Drop-in Installation

A fast, streamlined repeatable installation process that significantly enhances efficiency

Design

- Force Transfer Principle
- Wood-to-Wood Design Values
- Seismic Performance
- Positioning Considerations for Reinforcement

Detailing

- MEGANT 60 Series Geometry Requirements
- MEGANT 100 Series Geometry Requirements
- MEGANT 150 Series Geometry Requirements
- Additional Detailing Considerations
- Housing Detailing and Dimensions

Installation

- Tool Requirements
- Fastener Layout
- Installation Guidelines

STANDARDS AND CERTIFICATIONS

CSA O86:24

ISO 50001

Energy
Management
System



ETA-15/0667 2019

MEGANT Overview

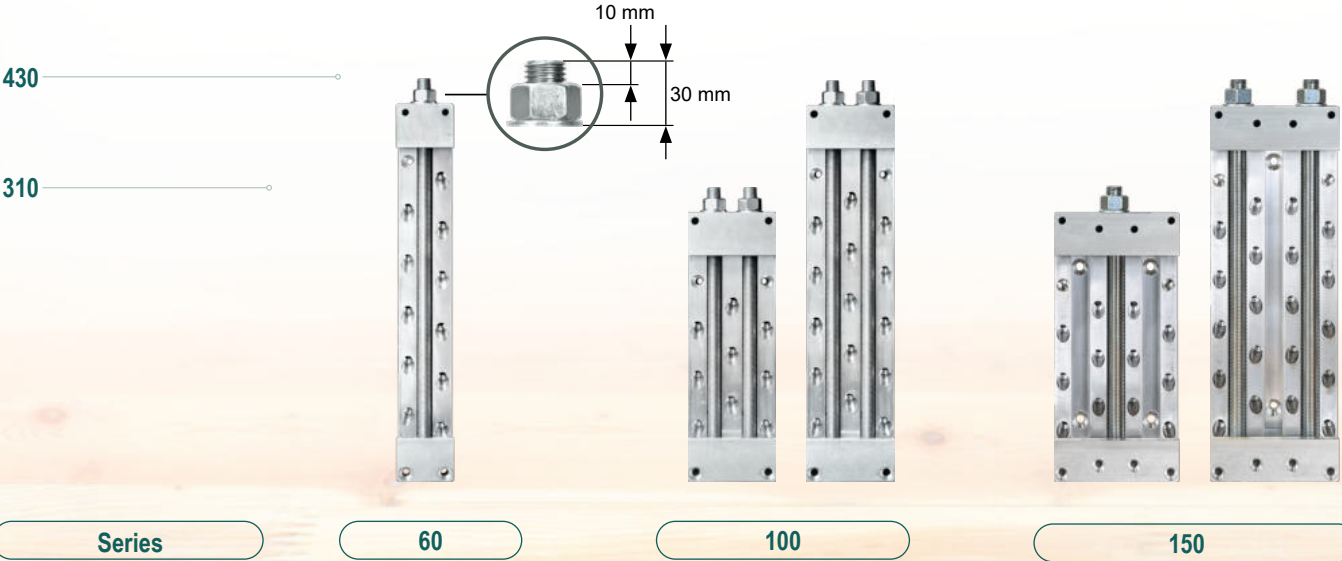


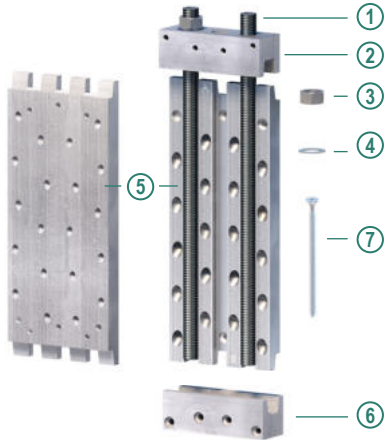
Table 6.1 - MEGANT Hardware Package Installation Overview

MEGANT		Plate Qty.	Fasteners		Threaded Rods		Installation Time
Series	Model		Type	Qty.	Type	Qty.	
60	MEGANT 430 x 60	2	MTC-FTC 8 x 160 mm	32	M20 x 460 mm Grade 8.8	1	21
100	MEGANT 310 x 100	2	MTC-FTC 8 x 160 mm	34	M16 x 340 mm Grade 8.8	2	23
	MEGANT 430 x 100		MTC-FTC 8 x 160 mm	46	M16 x 460 mm Grade 8.8	2	27
150	MEGANT 310 x 150	2	MTC-FTC 8 x 160 mm	48	M20 x 340 mm Grade 8.8	1	31
	MEGANT 430 x 150		MTC-FTC 8 x 160 mm	64	M20 x 460 mm Grade 8.8	2	37

- Notes:
- Subsequent tabulated capacities in this chapter assume connectors are installed with specified MTC-FTC (see Table 1.1 on Page 13) fasteners specified in this table and in accordance with CCMC 13677-R.
 - The estimated installation time is based on a time study and includes steps for layout and positioning, drilling a 25 mm [1 in.] deep pilot hole for each fastener, structural screw installation for both plates, clamping jaw installation, and threaded rod installation. Refer to the General Installation Steps (Page 110) for more information.



Product Kit Details

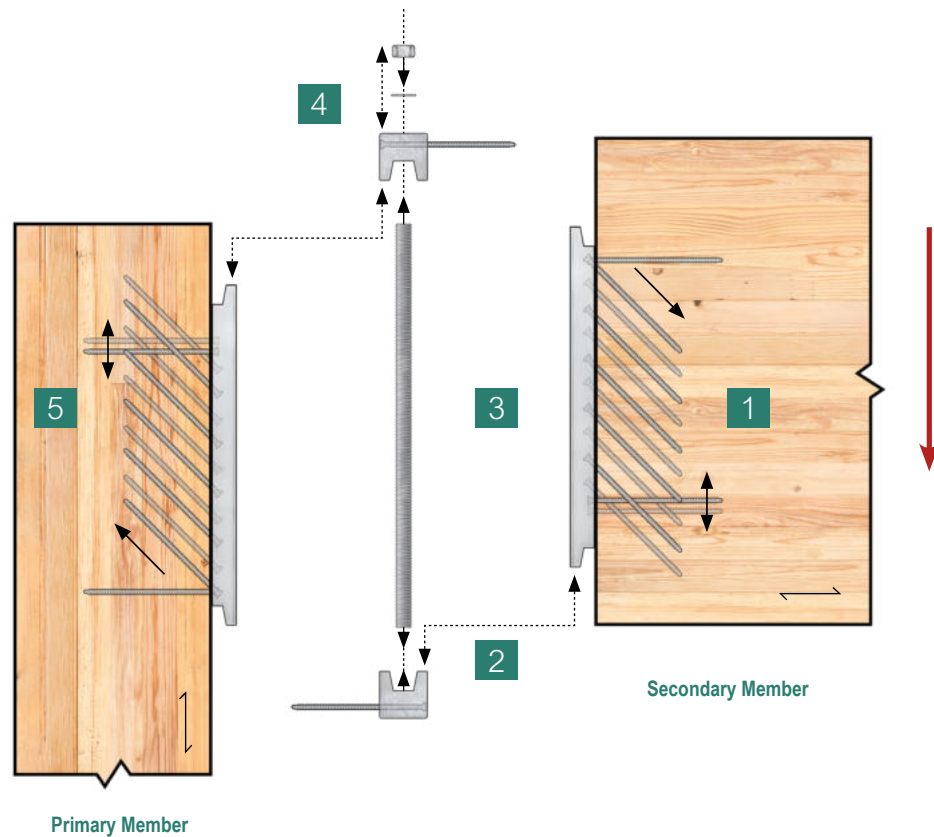


- Threaded Rod
- Clamping Jaw
- Hex Nut
- Washer
- Connector Plates
- Threaded Clamping Jaw
- MTC-FTC

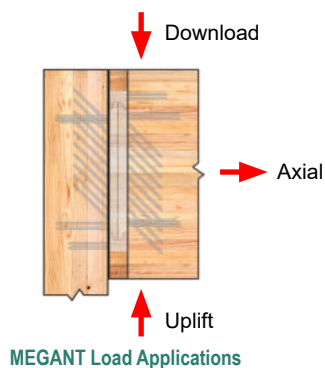
Design - MEGANT General Information

MEGANT Force Transfer Principle

The following figure highlights the flow of forces through various components of the MEGANT connector, showing why the fasteners and connector must be installed as specified.



- 1 The shear load in the secondary member transfers to the MEGANT plate through tension in the 45° screws and shear in the 90° screws.
- 2 The load in the MEGANT plate transfers to the lower jaw through bearing of the parts.
- 3 The load in the lower jaw transfers to the threaded rod through thread engagement, putting the threaded rod in tension, which is supported by the nut at the upper jaw.
- 4 The nut transfers the load to the upper jaw, which bears on the MEGANT plate in the primary member.
- 5 The MEGANT plate transfers the load to the primary member plate through tension in the 45° screws and shear in the 90° screws.



Wood-to-Wood Design Values

Table 6.2 - Factored Resistances for MEGANT 60 in Wood-to-Wood Connections

MEGANT		Minimum Secondary Beam Section Dimensions [mm]				Relative Density [G]	Factored Resistances [kN]		
Model	Configuration	No FRR	45-min FRR	1-hr FRR	2-hr FRR		Download	Axial	Uplift
MEGANT 430 x 60	Single	89 x 530	133 x 530	152 x 541	230 x 609	≥ 0.42	64	17	11
						≥ 0.44	68	18	11
						≥ 0.47	77	21	12
						≥ 0.49	83	23	12
	Double	153 x 530	197 x 530	217 x 541	295 x 609	≥ 0.42	109	29	18
						≥ 0.44	115	31	19
						≥ 0.47	125	34	20
						≥ 0.49	141	38	20

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated factored resistances are applicable for wood-to-wood connections only. Screw installation must follow the patterns presented in the Installation section.
3. The listed connector resistances may be limited by the splitting resistance perpendicular to grain and the effective shear resistance of the timber members. Refer to Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain (Page 129) for more information and available reinforcement strategies. It is the responsibility of the EOR to ensure the primary and secondary members have adequate capacity to resist connection forces.
4. Factored resistances provided do not account for combined loading in multiple directions. Combined shear and axial loading must be verified per eq. 1 (Page 13).
5. Tabulated factored resistances assume adequate load transfer at the beam end. Where gaps or voids are present, engineering verification may be required.
6. Tabulated factored resistances for double hanger configurations assume equal load distribution between hangers.

Table 6.3 - Factored Resistances for MEGANT 100 and 150 in Wood-to-Wood Connections

MEGANT		Minimum Secondary Beam Section Dimensions [mm]				Relative Density [G]	Factored Resistances [kN]		
Model	Configuration	No FRR	45-min FRR	1-hr FRR	2-hr FRR		Download	Axial	Uplift
MEGANT 310 x 100	Single	128 x 376	173 x 400	192 x 417	270 x 485	≥ 0.42	57	32	17
						≥ 0.44	60	33	18
						≥ 0.47	67	38	19
						≥ 0.49	73	41	19
	Double	232 x 376	277 x 400	296 x 417	374 x 485	≥ 0.42	97	54	29
						≥ 0.44	102	57	30
						≥ 0.47	114	65	32
						≥ 0.49	123	70	33
MEGANT 430 x 100	Single	128 x 496	173 x 520	192 x 537	270 x 605	≥ 0.42	89	34	17
						≥ 0.44	94	36	18
						≥ 0.47	106	41	19
						≥ 0.49	115	43	19
	Double	232 x 496	277 x 520	296 x 537	374 x 605	≥ 0.42	151	57	29
						≥ 0.44	159	60	30
						≥ 0.47	180	69	32
						≥ 0.49	195	73	33
MEGANT 310 x 150	Single	178 x 376	223 x 400	242 x 417	320 x 485	≥ 0.42	74	38	24
						≥ 0.44	78	40	25
						≥ 0.47	87	46	27
						≥ 0.49	94	50	29
	Double	332 x 376	377 x 400	396 x 417	474 x 485	≥ 0.42	126	64	41
						≥ 0.44	132	68	43
						≥ 0.47	148	78	45
						≥ 0.49	160	84	49
MEGANT 430 x 150	Single	178 x 496	223 x 520	242 x 537	320 x 605	≥ 0.42	114	40	24
						≥ 0.44	120	43	25
						≥ 0.47	136	49	27
						≥ 0.49	147	53	29
	Double	332 x 496	377 x 520	396 x 537	474 x 605	≥ 0.42	194	69	41
						≥ 0.44	205	73	43
						≥ 0.47	231	83	45
						≥ 0.49	250	90	49

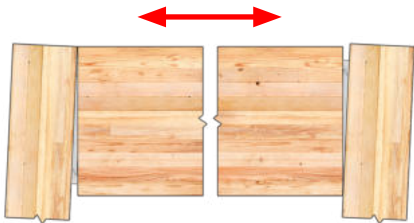
Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated factored resistances are applicable for wood-to-wood connections only. Screw installation must follow the patterns presented in the Installation section..
3. The listed connector resistances may be limited by the splitting resistance perpendicular to grain and the effective shear resistance of the timber members. Refer to Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain (Page 129) for more information and available reinforcement strategies. It is the responsibility of the EOR to ensure the primary and secondary members have adequate capacity to resist connection forces.
4. Factored resistances provided do not account for combined loading in multiple directions. Combined shear and axial loading must be verified per eq. 1 (Page 13).
5. Tabulated factored resistances assume adequate load transfer at the beam end. Where gaps or voids are present, engineering verification may be required.
6. Tabulated factored resistances for double hanger configurations assume equal load distribution between hangers.

MEGANT Seismic Performance

MTC has conducted extensive quasi-static and component testing on the MEGANT connector. The results have demonstrated its robust performance under drift and axial demands.

- The MEGANT connector can accommodate drifts over 4% while fully loaded, satisfying the drift limits specified in NBCC 2024 Clause 4.1.8.13.
- The MEGANT maintains axial load-transfer capacity while carrying full download to ensure the structural integrity of the connection is maintained during a wind or seismic event.



These results demonstrate the MEGANT connector’s ability to accommodate seismic demands while maintaining connection integrity. However, the MEGANT is not intended to be used as part of the Lateral Force Resisting System (LFRS). Contact MTC Technical Support for additional details for accommodating seismic loads in your design.

Positioning Considerations for Reinforcement

The hanger placement relative to the height of the beam can impact the need for reinforcement. Connectors in the primary beam should have the insertion point of the uppermost fastener in the top 30% of the member depth (0.3d), as shown in the left figure. Connectors in the secondary beam should have the insertion point of the lowermost fastener in the bottom 30% (0.3d), as shown in the right figure. Outside of these zones, the primary and secondary beams should be checked for splitting to determine if reinforcement is required. Note that these requirements do not apply to columns. For further information, refer to Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain (Page 129).

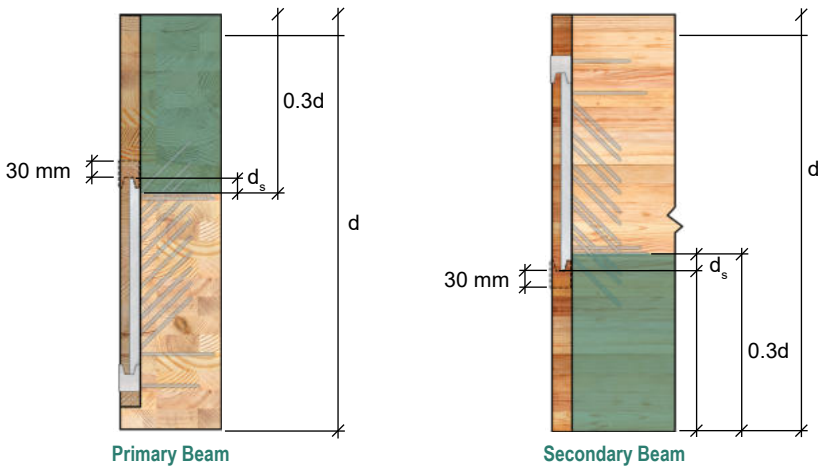


Table 6.4 - MEGANT Screw Tip Distances

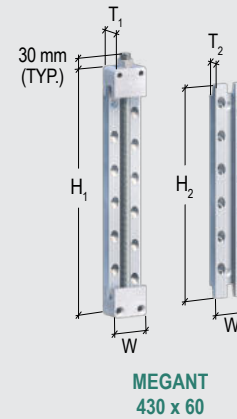
Model	d _s	
	mm	[in.]
MEGANT 430 x 60	30	[1-3/16]
MEGANT 310 x 100	35	[1-3/8]
MEGANT 430 x 100	35	[1-3/8]
MEGANT 310 x 150	35	[1-3/8]
MEGANT 430 x 150	35	[1-3/8]

Detailing - MEGANT 60 Series Geometry Requirements

MEGANT 60 Series - Connector Geometry

Table 6.5 - MEGANT 60 Geometry

Connector Geometry	Model
	MEGANT 430 x 60
	[mm]
H_1	430
H_2	370
T_1	40
T_2	20
W	60



Note:

1. Refer to Appendix D: Product Specifications (Page 138) for additional product specifications.

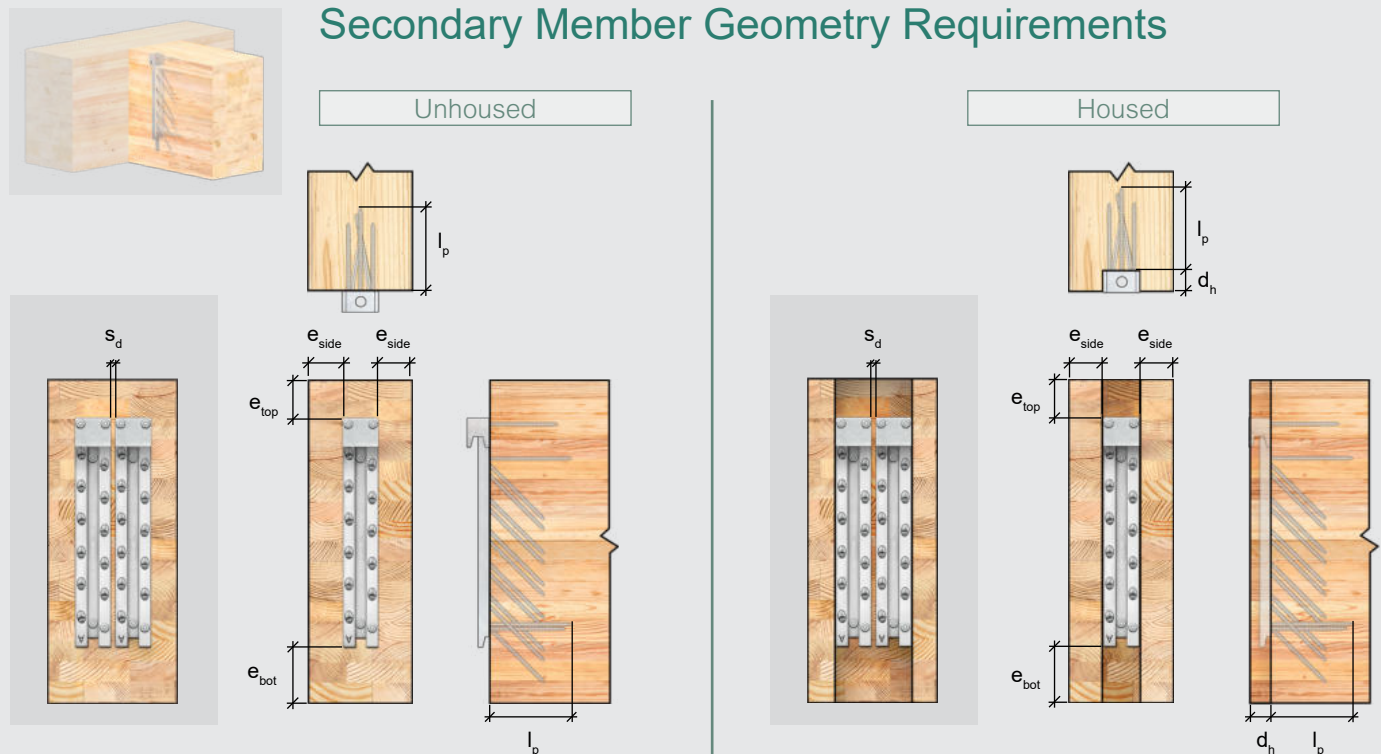


Table 6.6 - MEGANT 60 Geometry Requirements for Secondary Member

MEGANT 60		Geometry Requirements [mm]											
		I _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
Model	Configuration			e _{side}	e _{bot}	e _{side}	e _{bot}	e _{side}	e _{bot}	e _{side}	e _{bot}		
MEGANT 430 x 60	Single	152	50	14	80	36	80	46	91	85	159	38	N/A
	Double	152	50	14	80	36	80	46	91	85	159	38	5

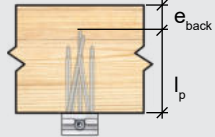
Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for l_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Dimensions for FRRs are based on the unthreaded jaw being installed on top, with the threaded rod and nut being installed from above as shown in the examples above.
4. Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance as well as the effective shear resistance of the members.

Primary Member Geometry Requirements - Beam/Girder



Unhoused



Housed

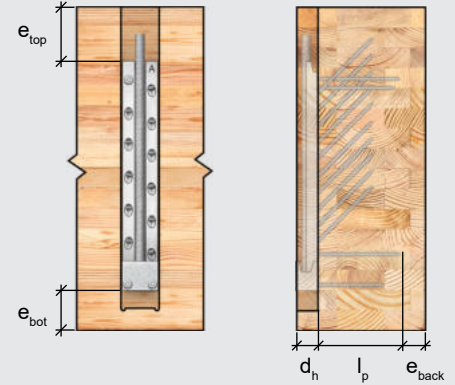
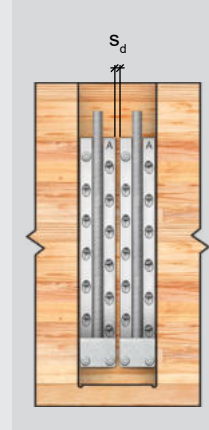
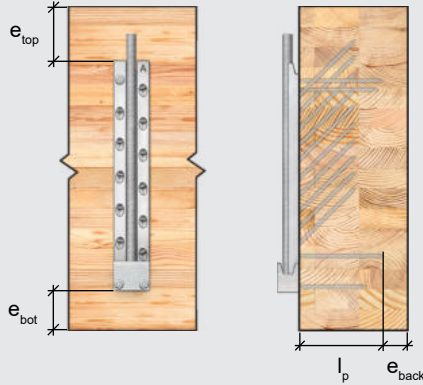
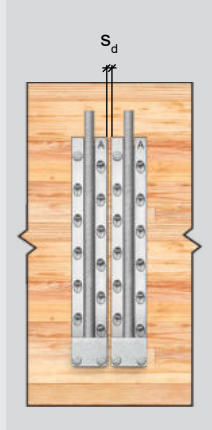
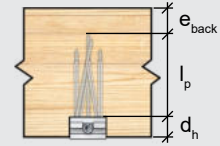


Table 6.7 - MEGANT 60 Geometry Requirements for Primary Member (Beam/Girder)

MEGANT 60		Geometry Requirements [mm]											
		I _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
e _{bot}	e _{back}			e _{bot}	e _{back}	e _{bot}	e _{back}	e _{bot}	e _{back}				
MEGANT 430 x 60	Single	152	80	50	10	50	36	61	46	129	85	38	N/A
	Double	152	80	50	10	50	36	61	46	129	85	38	5

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for l_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Values for e_{top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam.
4. Dimensions for FRRs are based on the threaded jaw being installed on the bottom, with the threaded rod and nut being installed from above as shown in the examples above.
5. Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance as well as the effective shear resistance of the members.



Primary Member Geometry Requirements - Column

Unhoused

Housed

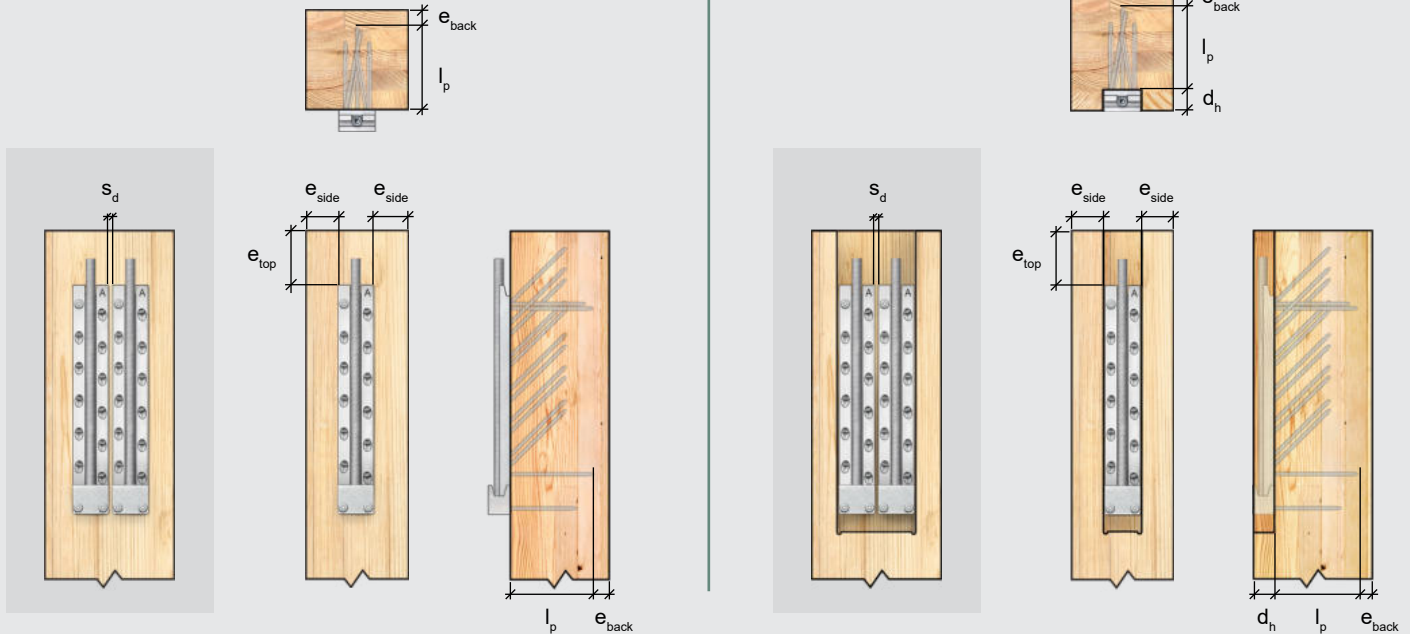


Table 6.8 - MEGANT 60 Geometry Requirements for Primary Member (Column)

MEGANT 60		Geometry Requirements [mm]											
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
Model	Configuration			e _{side}	e _{back}	e _{side}	e _{back}	e _{side}	e _{back}	e _{side}	e _{back}		
MEGANT 430 x 60	Single	152	80	14	10	36	36	46	46	85	85	38	N/A
	Double	152	80	14	10	36	36	46	46	85	85	38	5

Notes:

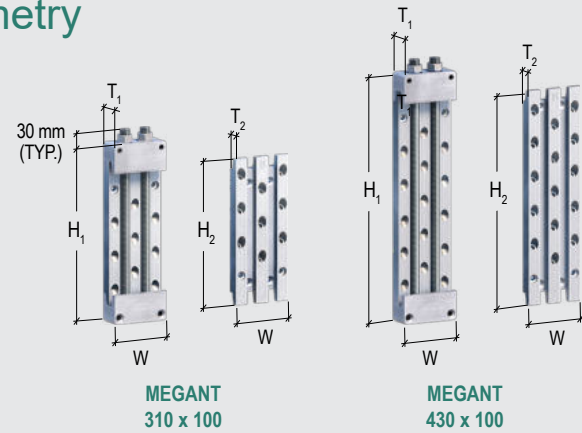
1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for l_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Values for e_{top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam.
4. Dimensions for FRRs are based on the threaded jaw being installed on the bottom, with the threaded rod and nut being installed from above as shown in the examples above.

Detailing - MEGANT 100 Series Geometry Requirements

MEGANT 100 Series - Connector Geometry

Table 6.9 - MEGANT 100 Geometry

Connector Geometry	Model	
	MEGANT 310 x 100	MEGANT 430 x 100
	[mm]	
H ₁	310	430
H ₂	250	370
T ₁	40	40
T ₂	20	20
W	100	100



Note:

1. Refer to Appendix D: Product Specifications (Page 138) for additional product specifications.



Secondary Member Geometry Requirements

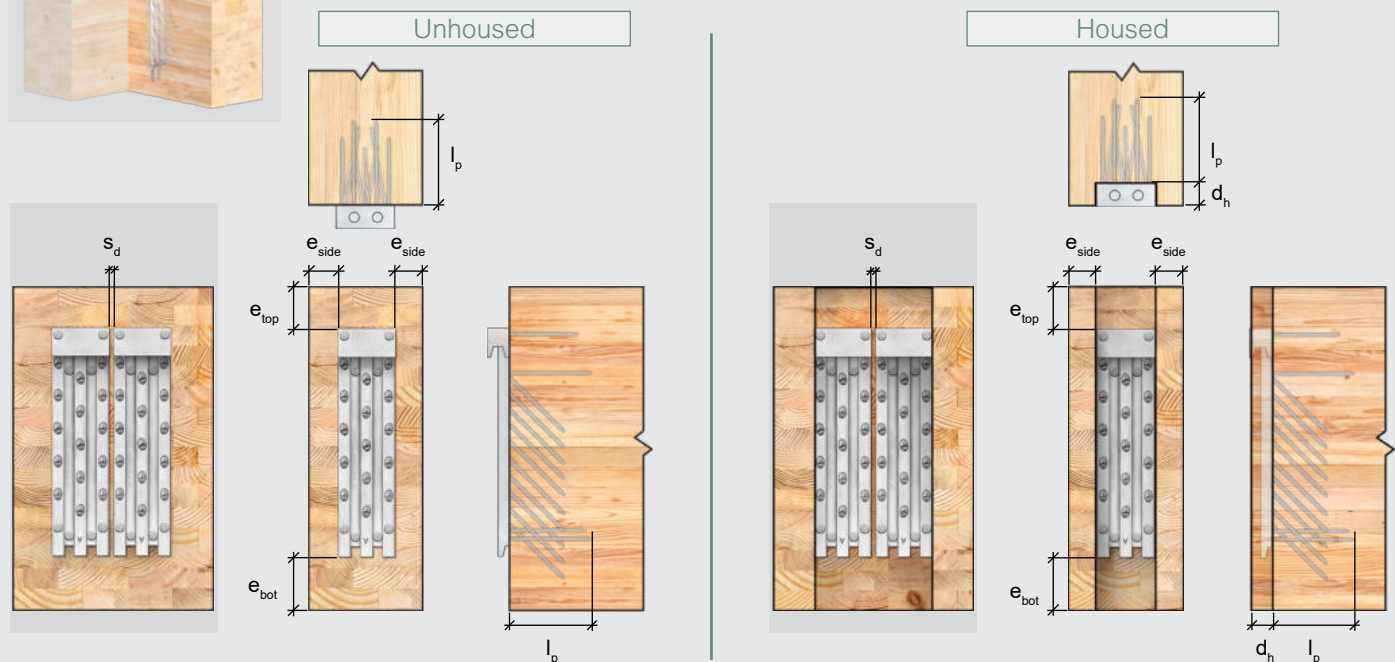


Table 6.10 - MEGANT 100 Geometry Requirements for Secondary Member

MEGANT 100		Geometry Requirements [mm]											
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
				e _{side}	e _{bot}	e _{side}	e _{bot}	e _{side}	e _{bot}	e _{side}	e _{bot}		
Model	Configuration												
MEGANT 310 x 100	Single	152	46	14	50	36	74	46	91	85	159	38	N/A
	Double	152	46	14	50	36	74	46	91	85	159	38	4
MEGANT 430 x 100	Single	152	46	14	50	36	74	46	91	85	159	38	N/A
	Double	152	46	14	50	36	74	46	91	85	159	38	4

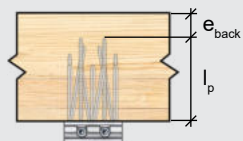
Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for l_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Dimensions for FRRs are based on the unthreaded jaw being installed on top, with the threaded rod and nut being installed from above as shown in the examples above.
4. Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance as well as the effective shear resistance of the members.

Primary Member Geometry Requirements - Beam/Girder



Unhoused



Housed

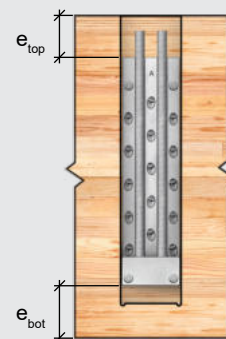
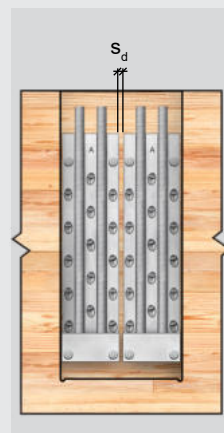
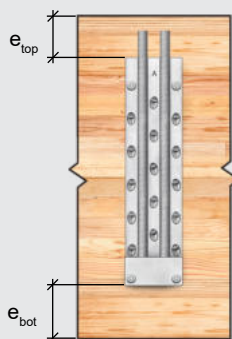
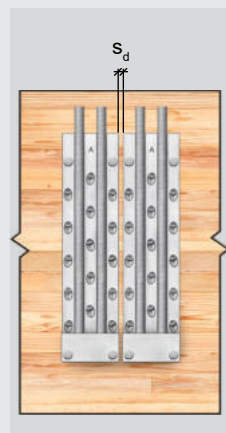
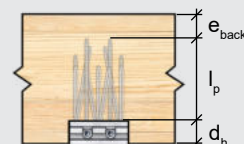


Table 6.11 - MEGANT 100 Geometry Requirements for Primary Member (Beam/Girder)

MEGANT 100		Geometry Requirements [mm]											
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
				e _{bot}	e _{back}	e _{bot}	e _{back}	e _{bot}	e _{back}	e _{bot}	e _{back}		
Model	Configuration												
MEGANT 310 x 100	Single	152	76	46	10	46	36	61	46	129	85	38	N/A
	Double	152	76	46	10	46	36	61	46	129	85	38	4
MEGANT 430 x 100	Single	152	76	46	10	46	36	61	46	129	85	38	N/A
	Double	152	76	46	10	46	36	61	46	129	85	38	4

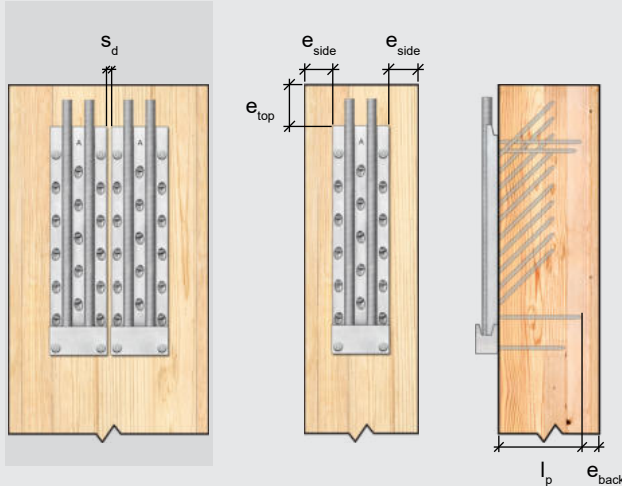
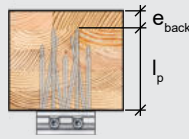
Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for l_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Values for e_{top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam.
4. Dimensions for FRRs are based on the threaded jaw being installed on the bottom, with the threaded rod and nut being installed from above as shown in the examples above.
5. Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance as well as the effective shear resistance of the members.

Primary Member Geometry Requirements - Column



Unhoused



Housed

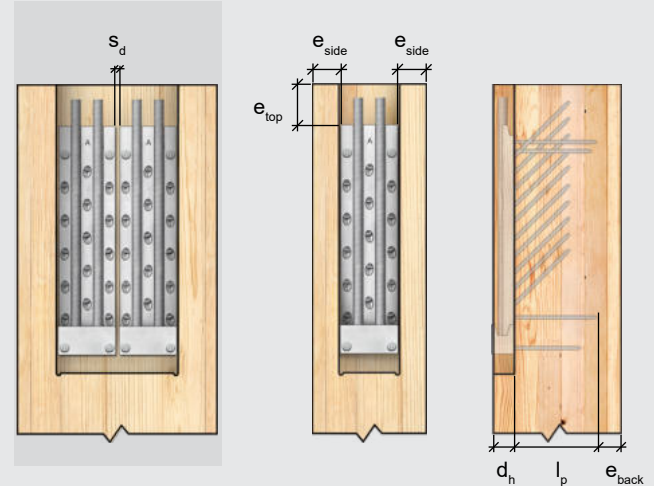
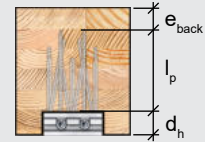


Table 6.12 - MEGANT 100 Geometry Requirements for Primary Member (Column)

MEGANT 100		Geometry Requirements [mm]											
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
				e _{side}	e _{back}	e _{side}	e _{back}	e _{side}	e _{back}	e _{side}	e _{back}		
Model	Configuration												
MEGANT 310 x 100	Single	152	76	14	10	36	36	46	46	85	85	38	N/A
	Double	152	76	14	10	36	36	46	46	85	85	38	4
MEGANT 430 x 100	Single	152	76	14	10	36	36	46	46	85	85	38	N/A
	Double	152	76	14	10	36	36	46	46	85	85	38	4

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for l_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Values for e_{top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam.
4. Dimensions for FRRs are based on the threaded jaw being installed on the bottom, with the threaded rod and nut being installed from above as shown in the examples above.

Detailing - MEGANT 150 Series Geometry Requirements

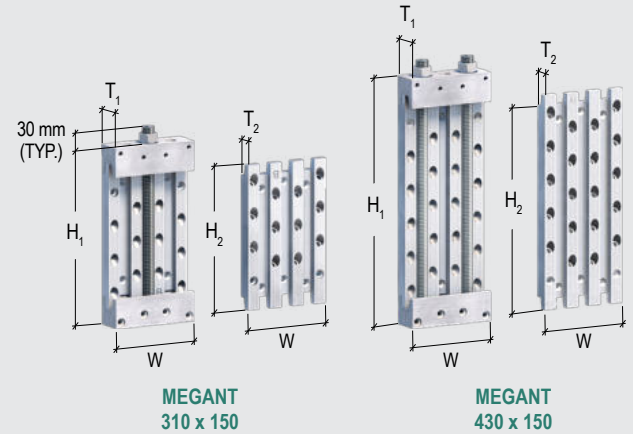
MEGANT 150 Series - Connector Geometry

Table 6.13 - MEGANT 150 Geometry

Connector Geometry	Model	
	MEGANT 310 x 150	MEGANT 430 x 150
	[mm]	
H ₁	310	430
H ₂	250	370
T ₁	50	50
T ₂	25	25
W	150	150

Note:

1. Refer to Appendix D: Product Specifications (Page 138) for additional product specifications.



Secondary Member Geometry Requirements

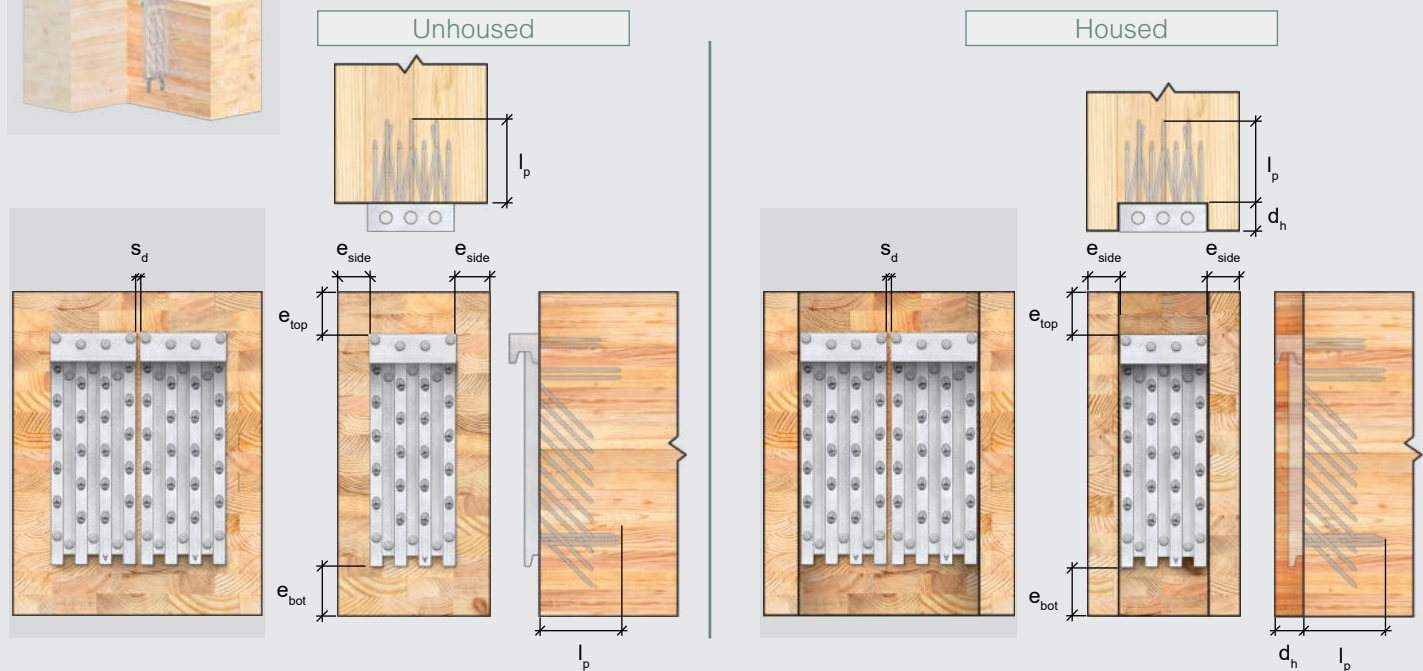


Table 6.14 - MEGANT 150 Geometry Requirements for Secondary Member

MEGANT 150		Geometry Requirements [mm]											
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
				e _{side}	e _{bot}	e _{side}	e _{bot}	e _{side}	e _{bot}	e _{side}	e _{bot}		
Model	Configuration												
MEGANT 310 x 150	Single	147	46	14	50	36	74	46	91	85	159	48	N/A
	Double	147	46	14	50	36	74	46	91	85	159	48	4
MEGANT 430 x 150	Single	147	46	14	50	36	74	46	91	85	159	48	N/A
	Double	147	46	14	50	36	74	46	91	85	159	48	4

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for L_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Dimensions for FRRs are based on the unthreaded jaw being installed on top, with the threaded rod and nut being installed from above as shown in the examples above.
4. Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance as well as the effective shear resistance of the members.



Primary Member Geometry Requirements - Beam/Girder

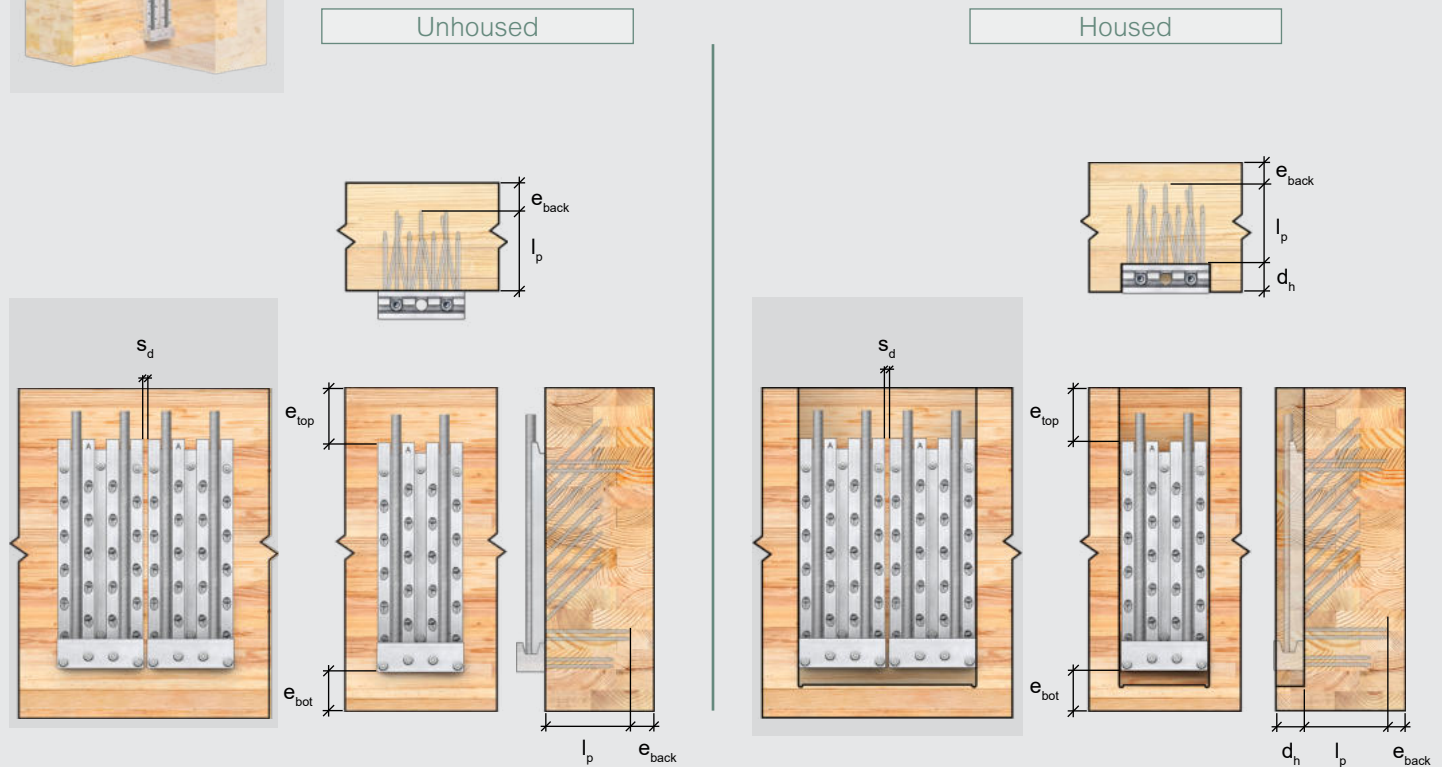


Table 6.15 - MEGANT 150 Geometry Requirements for Primary Member (Beam/Girder)

MEGANT 150		Geometry Requirements [mm]											
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
				e _{bot}	e _{back}	e _{bot}	e _{back}	e _{bot}	e _{back}	e _{bot}	e _{back}		
Model	Configuration												
MEGANT 310 x 150	Single	147	76	46	10	46	36	61	46	129	85	48	N/A
	Double	147	76	46	10	46	36	61	46	129	85	48	4
MEGANT 430 x 150	Single	147	76	46	10	46	36	61	46	129	85	48	N/A
	Double	147	76	46	10	46	36	61	46	129	85	48	4

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for l_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Values for e_{top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam
4. Dimensions for FRRs are based on the threaded jaw being installed on the bottom, with the threaded rod and nut being installed from above as shown in the examples above.
5. Placement of a connector within the depth of the beam must be verified by the EOR for splitting perpendicular to grain resistance as well as the effective shear resistance of the members.



Primary Member Geometry Requirements - Column

Unhoused

Housed

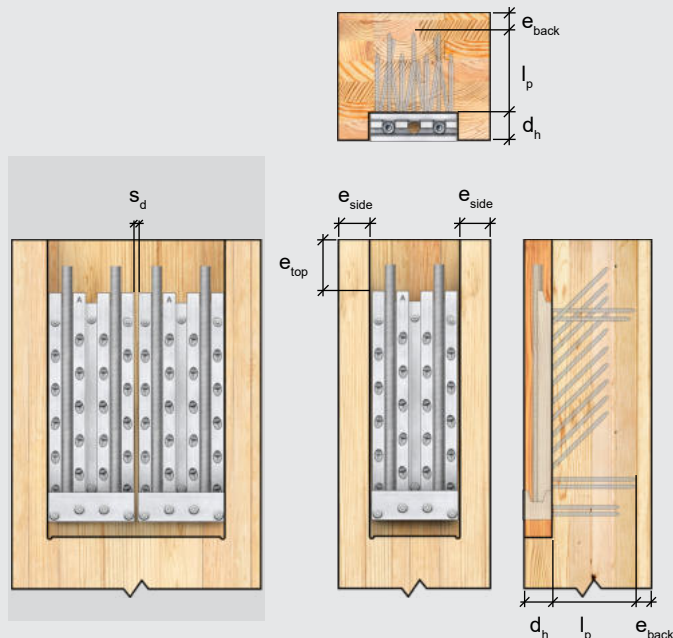
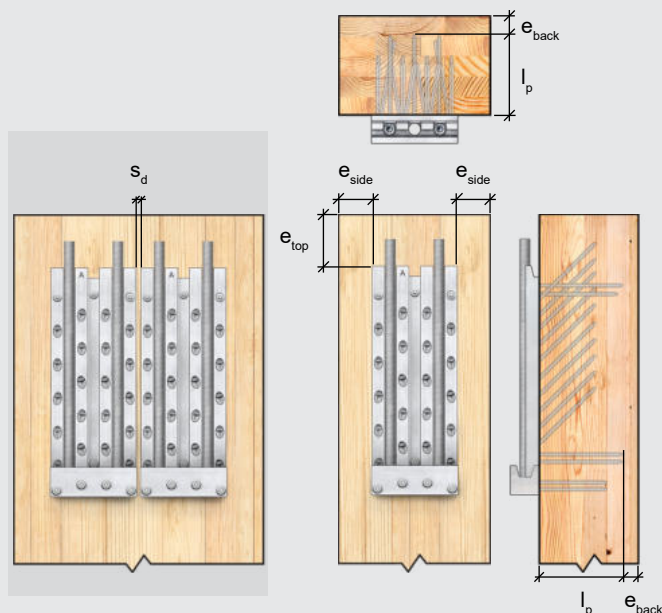


Table 6.16 - MEGANT 150 Geometry Requirements for Primary Member (Column)

MEGANT 150		Geometry Requirements [mm]											
		l _p	e _{top}	No FRR		45-min FRR		1-hr FRR		2-hr FRR		d _h	s _d
Model	Configuration			e _{side}	e _{back}	e _{side}	e _{back}	e _{side}	e _{back}	e _{side}	e _{back}		
MEGANT 310 x 150	Single	147	76	14	10	36	36	46	46	85	85	48	N/A
	Double	147	76	14	10	36	36	46	46	85	85	48	4
MEGANT 430 x 150	Single	147	76	14	10	36	36	46	46	85	85	48	N/A
	Double	147	76	14	10	36	36	46	46	85	85	48	4

Notes:

1. Connection design must meet all relevant requirements of the General Notes to the Designer section.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for l_p are to the deepest screw penetration and are fixed. Tabulated values for d_h are maximum values based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
3. Values for e_{top} are minimum requirements based on minimum end and edge distance, and may need to be adjusted to align with the hanger placement in the secondary beam.
4. Dimensions for FRRs are based on the threaded jaw being installed on the bottom, with the threaded rod and nut being installed from above as shown in the examples above.

Detailing - MEGANT Additional Considerations

Geometry Requirements for Columns with Multiple Beam Hangers

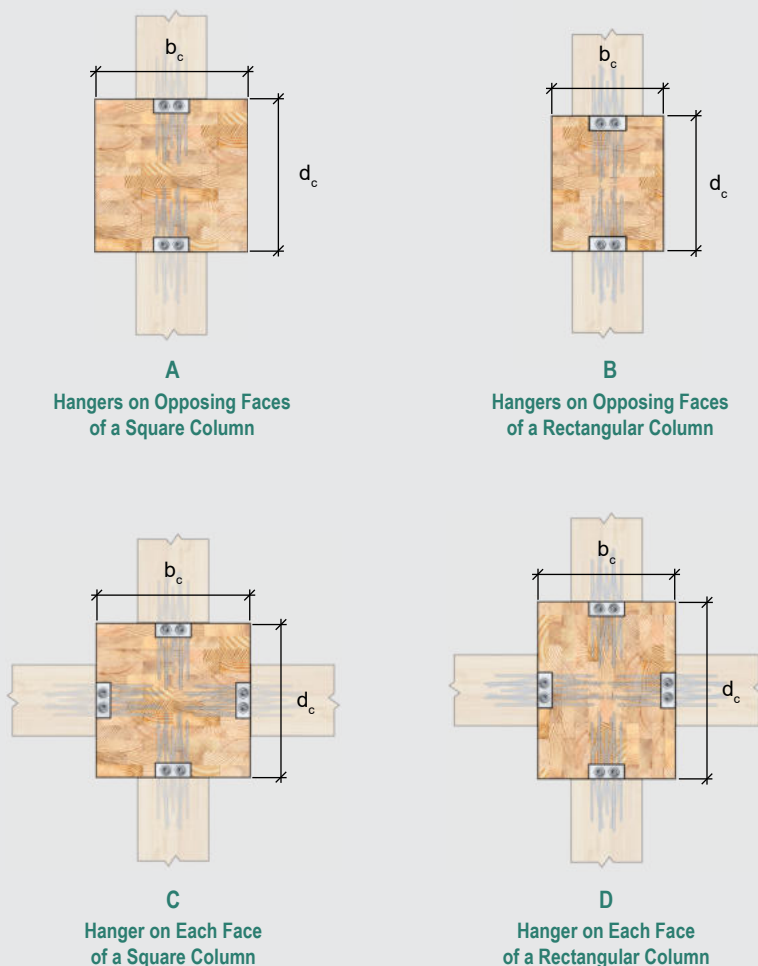


Table 6.17 - Minimum Column Sizes for Multiple MEGANT Connectors

Model	Minimum Column Section Dimensions, $b_c \times d_c$ [mm x mm]							
	A Hangers on Opposing Faces of a Square Column				B Hangers on Opposing Faces of a Rectangular Column			
	No FRR	45-min FRR	1-hr FRR	2-hr FRR	No FRR	45-min FRR	1-hr FRR	2-hr FRR
MEGANT 60 Series	394 x 394	394 x 394	394 x 394	394 x 394	89 x 394	133 x 394	152 x 394	230 x 394
MEGANT 100 Series	394 x 394	394 x 394	394 x 394	394 x 394	128 x 394	173 x 394	192 x 394	270 x 394
MEGANT 150 Series	404 x 404	404 x 404	404 x 404	404 x 404	178 x 404	223 x 404	242 x 404	320 x 404

Model	Minimum Column Section Dimensions, $b_c \times d_c$ [mm x mm]							
	C Hanger on Each Face of a Square Column				D Hangers on Each Face of a Rectangular Column			
	No FRR	45-min FRR	1-hr FRR	2-hr FRR	No FRR	45-min FRR	1-hr FRR	2-hr FRR
MEGANT 60 Series	399 x 399	399 x 399	399 x 399	399 x 399	394 x 403	394 x 403	394 x 403	394 x 403
MEGANT 100 Series	439 x 439	439 x 439	439 x 439	439 x 439	394 x 446	394 x 446	394 x 446	394 x 446
MEGANT 150 Series	495 x 495	495 x 495	495 x 495	495 x 495	404 x 553	404 x 553	404 x 553	404 x 553

Notes:

1. Tabulated column section dimensions are minimum values based on a 12.7 mm [1/2 in.] clearance between screw tips, minimum edge and end distances, and minimum wood cover requirements for FRR. Refer to Geometry Requirements for further details.
2. It is the responsibility of the EOR to ensure the primary and secondary members have adequate capacity to resist connection forces.
3. Tabulated column section dimensions assume hangers are centered within each column face and are housed in the column as shown.

RIDGE

APEX

GIGANT

RICON SYS

MEGANT

Design

Detailing

Installation

Detailing - MEGANT Housing Details

Housing Possibilities

Primary Beam Housing

- Most common housing for concealed installation.
- Concealed from below, the rod(s) can be installed from the top down.

Secondary Beam Bottom Housing

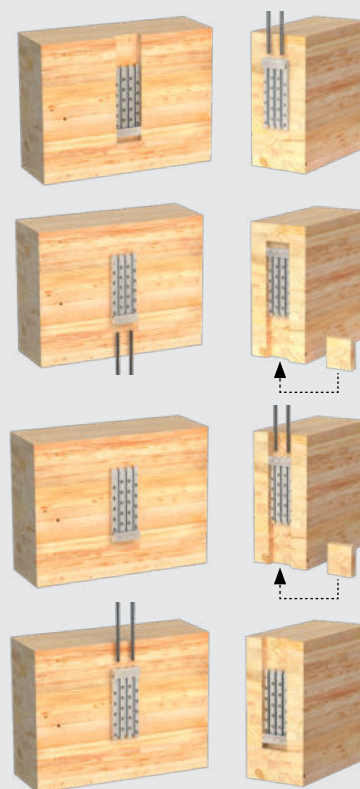
- Joist housing from bottom up.
- Concealed from below with a wood plug, requiring the rod(s) to be installed from bottom up.

Secondary Beam Through Housing

- Full-depth housing in joist.
- Concealed from below with a wood plug, the rod(s) can still be installed from the top.

Secondary Beam Top Housing

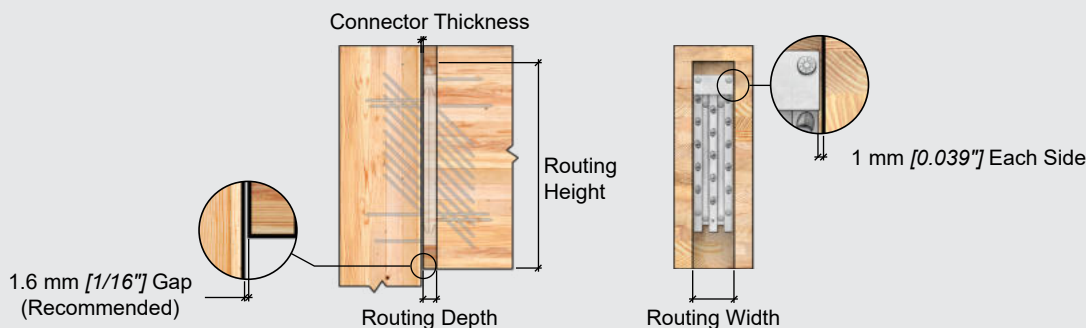
- Joist housing from top down. Concealed from below. No wood plug required.
- Threaded rod(s) can be installed from top down.



Housing and Surface Detailing

Parallel Surface: The members must be parallel at the location of the connection to ensure proper hanger alignment and load transfer.

Gap Size: The gap size between wood members balances installation ease and fire performance, with larger gaps simplifying installation but reducing fire protection. A gap of 1.6 mm [1/16 in.] is recommended for proper installation to allow the secondary member to slide into place. The gap should be no more than 3.2 mm [1/8 in.] to address fire protection considerations. For more information, refer to Appendix A: Fire Protection (Page 121).



Routing Depth: The routing depth is the depth of the housing, d_h , noted in the Geometry Requirements and Housing Dimensions sections. This depth takes into account the thickness of the connector and the gap between members (recommended 1.6 mm [1/16 in.] herein—larger gaps will reduce d_h accordingly).

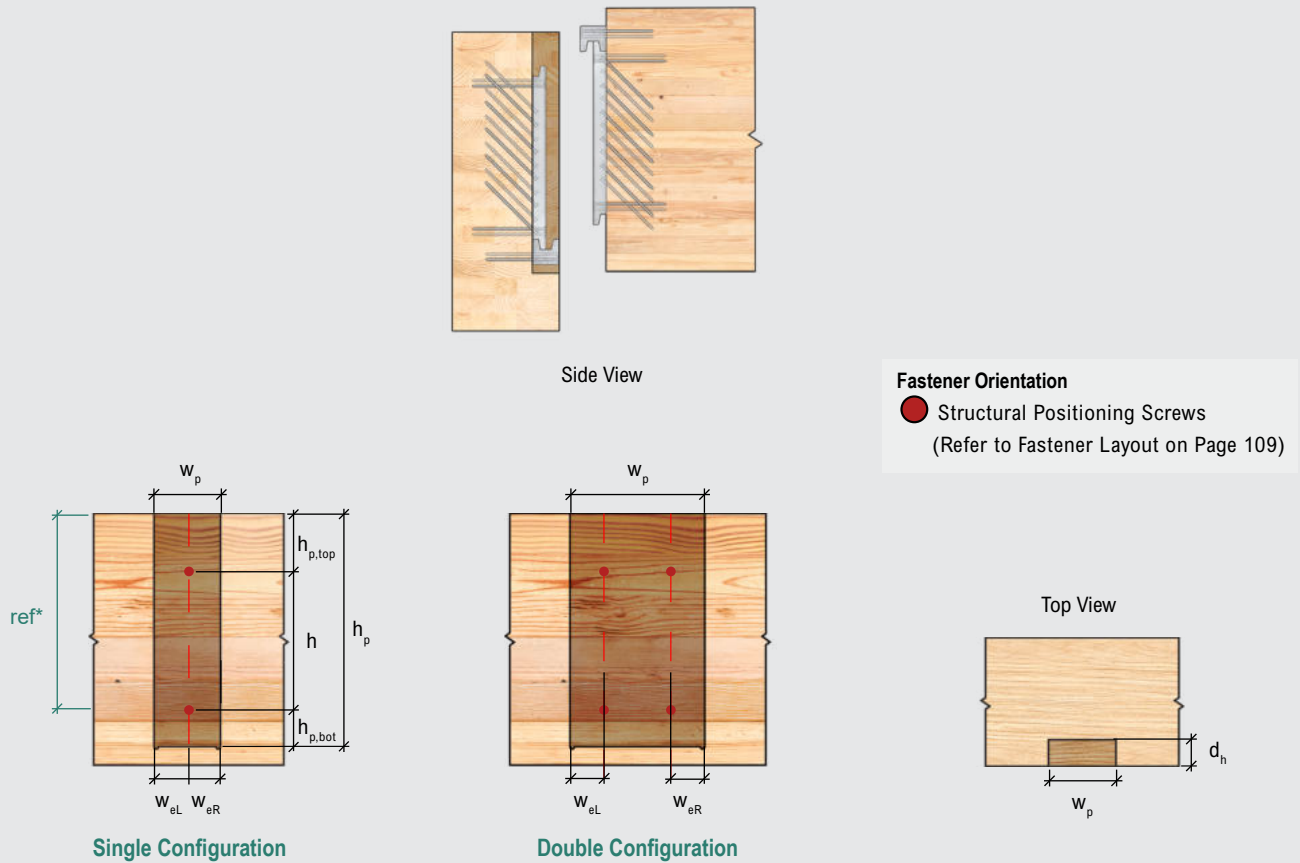
Routing Width: It is recommended to allow a clearance of 1 mm [0.039 in.] on each side of the connector:

- MEGANT 60 Series: 62 mm [2.441 in.]
- MEGANT 100 Series: 102 mm [4.016 in.]
- MEGANT 150 Series: 152 mm [5.984 in.]

Routing Height: The routing height must be coordinated with the EOR. The height of the connector in the beam section has an impact on connector performance. Refer to Positioning Considerations for Reinforcement (Page 95) for further information.

Detailing - MEGANT Housing Dimensions

Routing in Primary Member



* The reference point for routing and installation is the lower nonstructural positioning screw measured from the top of the beam. Refer to the Installation Guidelines (Page 110) for more information.

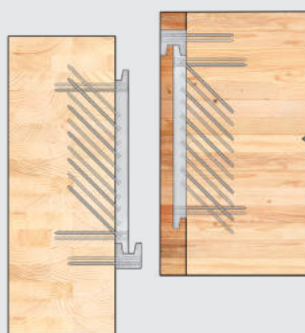
Table 6.18 - Routing Dimensions for MEGANT Housed in Primary Member

Model	Routing Dimensions, mm [in.]								
	h_p	$h_{p,top}$	h	$h_{p,bot}$	w_p		w_{eL}	w_{eR}	d_h
					Single	Double			
MEGANT 430 x 60	503 [19.803]	120 [4.724]	290 [11.417]	92 [3.622]	62 [2.441]	126.5 [4.980]	31 [1.220]	31 [1.220]	38 [1.512]
MEGANT 310 x 100	379 [14.921]	111 [4.370]	170 [6.693]	97 [3.819]	102 [4.016]	206 [8.110]	31 [1.220]	71 [2.795]	38 [1.512]
MEGANT 430 x 100	499 [19.646]	111 [4.370]	290 [11.417]	97 [3.819]	102 [4.016]	206 [8.110]	31 [1.220]	71 [2.795]	38 [1.512]
MEGANT 310 x 150	379 [14.921]	121 [4.764]	170 [6.693]	87 [3.425]	152 [5.984]	306 [12.047]	76 [2.992]	76 [2.992]	48 [1.906]
MEGANT 430 x 150	499 [19.646]	121 [4.764]	290 [11.417]	87 [3.425]	152 [5.984]	306 [12.047]	76 [2.992]	76 [2.992]	48 [1.906]

Notes:

1. Tabulated values are general guidelines for routing requirements. The EOR and fabricator are responsible for ensuring final routing dimensions account for all project-specific conditions.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for h are fixed. Tabulated values for d_h are maximum allowable.
3. Tabulated values for w_p , w_{eL} , and w_{eR} account for 1 mm [0.039 in.] on each side of the hanger. Larger installation tolerances will increase width values accordingly.
4. Tabulated values are based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
5. Tabulated values for h_p , $h_{p,top}$, and $h_{p,bot}$ account for a 30 mm [1.181 in.] gap above the connector for the nut assembly to allow for proper installation. The resulting hidden void should be protected from fire using industry-approved methods. Larger installation tolerances will increase height measurements accordingly.
6. Tabulated values assume square corners. Manufacturers should adjust the tabulated values based on their specific routing bit sizes. In order to account for the round corner created by routing tools, 6 mm [1/4 in.] overrun is permitted at the inside corners as indicated on the image above.
7. Refer to the Geometry Requirements tables for each respective beam hanger for additional information.

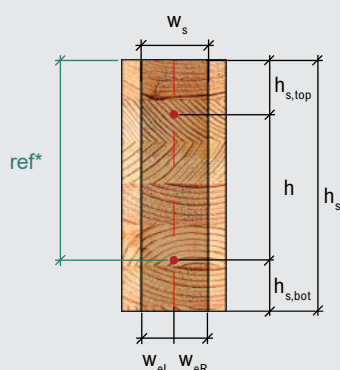
Routing in Secondary Member



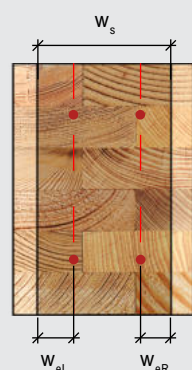
Side View

Fastener Orientation

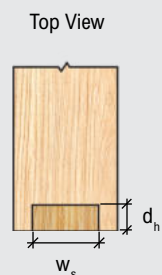
● Structural Positioning Screws
(Refer to Fastener Layout on Page 109)



Single Configuration



Double Configuration



Top View

* The reference point for routing and installation is the lower nonstructural positioning screw measured from the top of the beam. Refer to the Installation Guidelines (Page 110) for more information.

Table 6.19 - Routing Dimensions for MEGANT Housed in Secondary Member (Beam-End)

Model	Routing Dimensions, mm [in.]								
	h_s	$h_{s,top}$	h	$h_{s,bot}$	w_s		w_{eL}	w_{eR}	d_h
					Single	Double			
MEGANT 430 x 60	530 [20.866]	120 [4.724]	290 [11.417]	120 [4.724]	62 [2.441]	126.5 [4.980]	31 [1.220]	31 [1.220]	38 [1.512]
MEGANT 310 x 100	376 [14.803]	121 [4.764]	170 [6.693]	85 [3.346]	102 [4.016]	206 [8.110]	71 [2.795]	31 [1.220]	38 [1.512]
MEGANT 430 x 100	496 [19.528]	121 [4.764]	290 [11.417]	85 [3.346]	102 [4.016]	206 [8.110]	71 [2.795]	31 [1.220]	38 [1.512]
MEGANT 310 x 150	376 [14.803]	111 [4.370]	170 [6.693]	95 [3.740]	152 [5.984]	306 [12.047]	76 [2.992]	76 [2.992]	48 [1.906]
MEGANT 430 x 150	496 [19.528]	111 [4.370]	290 [11.417]	95 [3.740]	152 [5.984]	306 [12.047]	76 [2.992]	76 [2.992]	48 [1.906]

Notes:

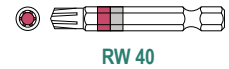
1. Tabulated values are general guidelines for routing requirements. The EOR and fabricator are responsible for ensuring final routing dimensions account for all project-specific conditions.
2. Tabulated values are minimum requirements unless noted otherwise. Tabulated values for h are fixed. Tabulated values for d_h are maximum allowable.
3. Tabulated values for w_s , w_{eL} , and w_{eR} account for 1 mm [0.039 in.] on each side of the hanger. Larger installation tolerances will increase width values accordingly.
4. Tabulated values are based on a recommended gap of 1.6 mm [1/16 in.] between the primary and secondary member. Larger gaps will reduce d_h accordingly.
5. Tabulated values for h_s , $h_{s,top}$, and $h_{s,bot}$ account for a 22 mm [0.866 in.] gap below the clamping jaw and an additional 30 mm [1.181 in.] above the connector for the nut assembly to allow for proper installation. The resulting hidden void should be protected from fire using industry-approved methods. Larger installation tolerances will increase height measurements accordingly.
6. Tabulated values assume square corners. Manufacturers should adjust the tabulated values based on their specific routing bit sizes in order to account for the round corner created by routing tools, 6 mm [1/4 in.] overrun is permitted at the inside corners as indicated on the image above.
7. Refer to the Geometry Requirements tables for each respective beam hanger for additional information.

Installation - MEGANT General Requirements

Tool Requirements

Tools - Use the Correct Bit

MTC Solutions fasteners should only be driven using either RW bits or appropriately sized star bits. This ensures good centering and positioning with optimal torque transmission. For the MEGANT, use an RW 40 bit for 8 mm [5/16 in.] MTC-FTC screws.



Tools - Use the Correct Drill

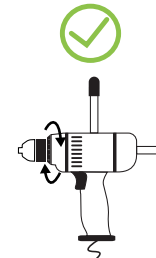
Use low-RPM, high-torque drills equipped with a feather (variable speed) trigger to install fasteners. Avoid excessive acceleration and deceleration during the drive-in process. Do not overtorque fasteners. Although impact drills are not expressly prohibited, their use is discouraged - particularly for beam hanger systems - due to an increased risk of overtightening. Use the appropriate drill chuck size according to the fastener.

Table 6.20 - Recommended Torque, Drill Bits, and Power Drill

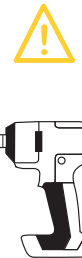
Nominal Fastener Diameter [D]		HSS Drill Bit Size		Power Drill Voltage	Allowable Insertion Torque
mm	[in.]	mm	[in.]	V	N · m [lb. ft.]
8	[5/16]	5	[3/16]	20	16.67 [12.30]



Cordless Clutched Drill



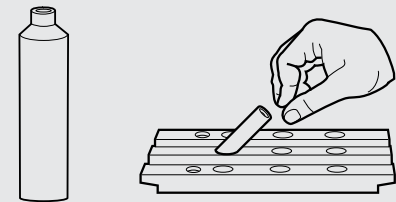
Double Handle Drill



Impact Drill

Tools - Predrilling Jig 5 mm [3/16 in.]

The Predrilling Jig ensures precise alignment of the MEGANT 45° inclined fasteners. It guides the drill bit to create accurate pilot holes, and ensures proper fastener seating. The hole in the jig accommodates standard imperial and metric drill bit diameters. For the 8 mm [5/16 in.] inclined fasteners, pilot holes 5 mm [3/16 in.] in diameter and 25 mm [1 in.] long are recommended.

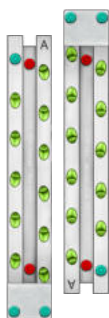


Predrilling Jig 5 mm [3/16"]

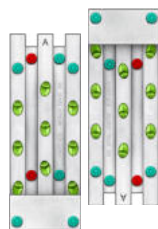
Fastener Layout

Fastener Orientation

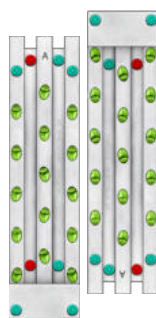
- Structural Positioning Screws
- Horizontal Screws
- Inclined Screws



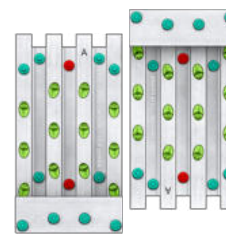
MEGANT
430 x 60



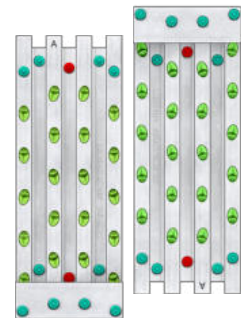
MEGANT
310 x 100



MEGANT
430 x 100



MEGANT
310 x 150



MEGANT
430 x 150

Installation - MEGANT Guidelines

General Installation Steps

Estimated Installation Time

The estimated installation time for a single person to install a complete MEGANT product is shown in Table 6.21.

This process includes the following steps:

1. Layout (~5-10%)
2. Positioning (~5-15%)
3. Pilot Holes (~20-30%)
4. Screw Installation (~40-50%)
5. Clamping Jaw Installation (~15-25%)
6. Optional Measures (not included in the time installation % breakdown)

Table 6.21 - MEGANT Estimated Installation Times

Megant Model	Average Installation Time [min.]
430 x 60	21
310 x 100	23
430 x 100	27
310 x 150	31
430 x 150	37

The estimated time can be improved upon with efficient fabrication and site practices such as:

1. Drilling pilot holes for the structural positioning screws at the time of fabrication
2. Utilizing templates to drill pilot holes for structural screws
3. Optimizing beam positioning to reduce work fatigue

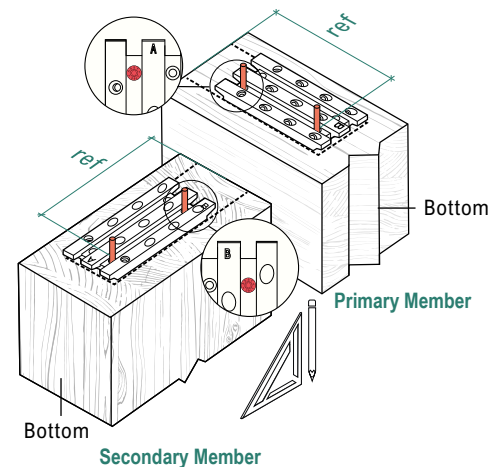
Step-by-Step Installation Guidelines

1.1 Layout - Reference Points

Begin by laying out the locations of the beam hanger on the primary and secondary members using a pencil and square. The **ref** dimension locates the connector relative to the top of the member and shall be used to establish its vertical position. Position the MEGANT's plates for installation, ensuring the proper orientation is set on both the primary and secondary members. Each MEGANT plate is marked with an "A" on one end and a "B" on the opposite end.

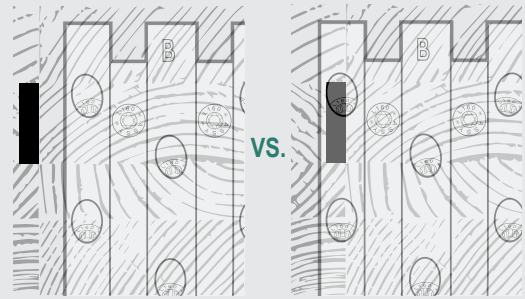
- The "A" shall be oriented towards the top of the primary member
- The "B" shall be oriented towards the top of the secondary member

Note: When the inclined screws are installed, they will incline towards the end of the plate marked with an "A". It is critical to lay the pieces out in the correct orientation on both members, as the capacity of the hanger is dependent on the withdrawal of the fasteners in this orientation.



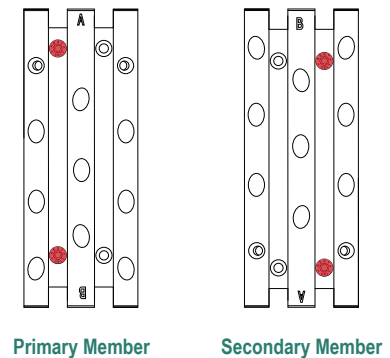
1.2 Layout - Split Lamination Considerations

Where lamination gaps are present, positioning fasteners away from the gap is recommended to promote uniform load transfer. The influence of lamination gaps on fasteners performance depends on their size relative to fastener geometry and their proximity to fasteners.



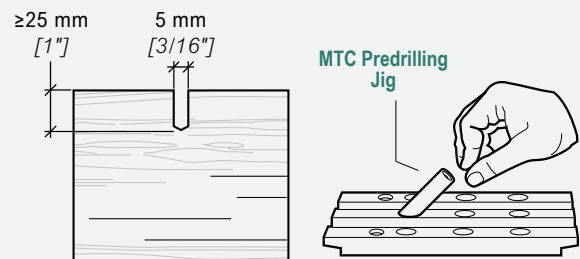
2.1 Positioning - Structural Positioning Screw Installation

Positioning screws ensure accurate placement of the MEGANT connector. To improve accuracy and reduce installation time, it is recommended to predrill the structural positioning screw locations during member fabrication. Note that structural screws cannot be reused if the connector requires adjustment. Install one structural positioning screw into the hole highlighted at the top of the plate. Check to ensure alignment is maintained, and then install the second structural positioning screw into the hole highlighted at the bottom of the plate.



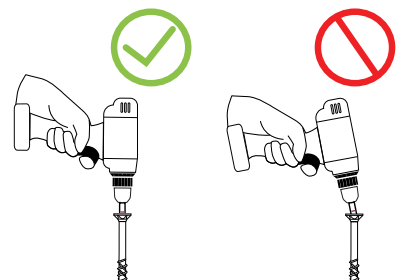
3.1 Pilot Holes - Recommendations

Pilot holes are optional; however, they allow for faster screw thread engagement, help reduce splitting risks, ensure a proper penetration path, reduce screw wandering, and reduce insertion torque. For the structural fasteners used with the MEGANT series, pilot holes 5 mm [3/16 in.] in diameter and 25 mm [1 in.] in length are recommended. The use of MTC Predrilling Jig for the inclined screws is recommended to ensure proper hole placement.



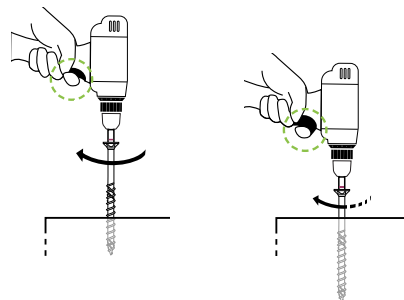
4.1 Screw Installation - Align Drill Bit Axis

Align the driver bit axis parallel to the fastener axis during installation to allow proper torque transmission and to avoid stripping.



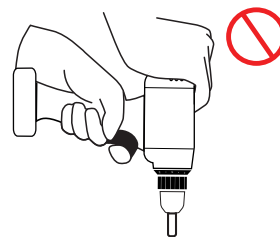
4.2 Screw Installation - Decrease RPM

To avoid overtightening the screw, decrease the rotation speed about 13 mm [1/2 in.] away from the final installed position. This is crucial to prevent wood crushing due to overtightening, which can impact beam hanger tolerances, potentially impeding overall connection assembly. This is especially important when using an impact drill.



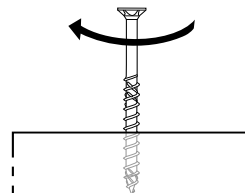
4.3 Screw Installation - Drill Pressure

Do not apply excessive pressure on the drill while driving the fastener to prevent fastener buckling or deviation during installation. Only apply the required force or use the recommended holder case to eliminate cam-out effects.



4.4 Screw Installation - One-Step Process

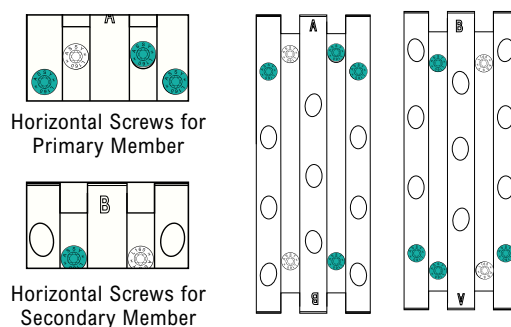
To avoid increased torque peaks caused by stopping and restarting the drive-in process, install the screw in one run until the head is lightly seated against the side member. If necessary, a torque wrench may be used to complete installation immediately after the screw has been driven.



4.5 Screw Installation - Remaining Shear Screws

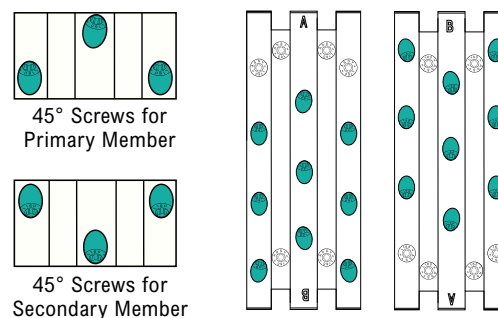
Install 8 x 160 mm [5/16" x 6-1/4"] MTC-FTC screws in the remaining horizontal holes, beginning adjacent to the structural positioning screws.

Note that some of the horizontal screws are angled inward by 15°.



4.6 Screw Installation - Inclined Screws

Install 8 x 160 mm [5/16" x 6-1/4"] MTC-FTC screws in all inclined holes after all horizontal screws have been installed.



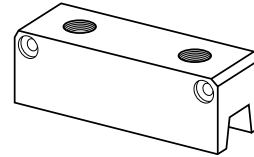
5.1 Clamping Jaws - General Information

Clamping jaws should be installed on each end of the connector plates with the countersunk holes facing away from the beam. Each MEGANT product kit comes with:

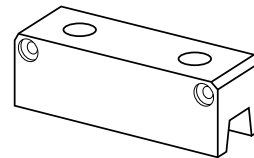
- One clamping jaw with threaded holes
- One clamping jaw with smooth/unthreaded holes

The threaded rods, without tightening, may be used to ensure both jaws are correctly positioned.

The unthreaded clamping jaw must remain accessible for tightening the connector plates together.

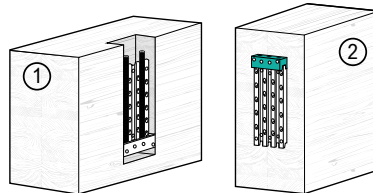
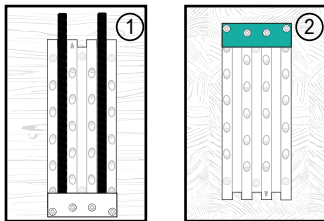


Threaded Clamping Jaw

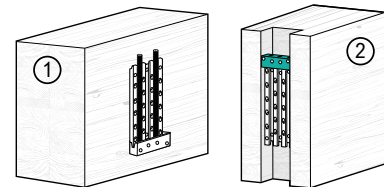


Unthreaded Clamping Jaw

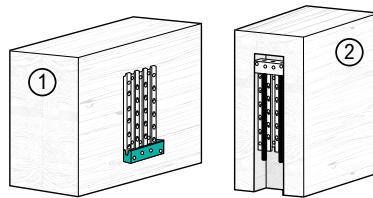
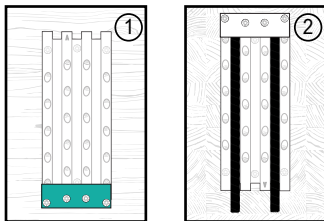
Drop-down Installation



Primary Member Housing



Secondary Member Through Housing



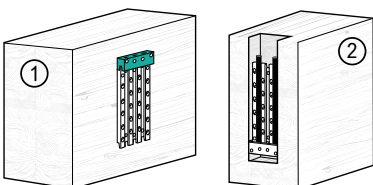
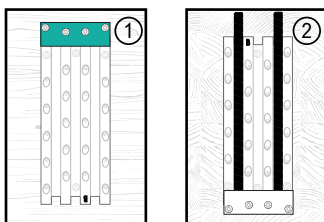
Secondary Member Bottom Housing

-  Unthreaded Clamping Jaw
- ① Primary Member
- ② Secondary Member

Notes:

1. With through housing, the unthreaded jaw can be at either the top or bottom depending on access

Bottom-up Installation

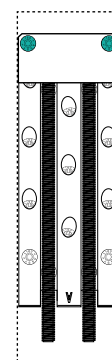


Secondary Member Top Housing

5.2 Clamping Jaws - Threaded Jaw Installation

Install the threaded clamping jaw on the housed member at the closed end with the grooved side seated firmly against the tongue of the connector plate. Insert the threaded rod(s) to help position the jaw on the connector plate.

Drill 5 mm x 25 mm [3/16 in. x 1 in.] pilot holes at the jaw screw locations, and then install MTC-FTC screws to secure the clamping jaw. Remove the threaded rod(s) and retain them for Step 5.3.



Secondary Member
Bottom Housing
Example

Clamping Jaw Screws, Secondary Member

5.3 Clamping Jaws - Unthreaded Jaw Installation

Install the unthreaded clamping jaw on the unhoused member at the same plate label (i.e., both jaws will be installed on either "A" end or "B" end). Insert the threaded rod(s) to help position the jaw on the connector plate.

Drill 5 mm x 25 mm [3/16 in. x 1 in.] pilot holes at the jaw screw locations, and then install MTC-FTC screws to secure the clamping jaw. Remove the threaded rod(s) and retain them for Step 5.4.

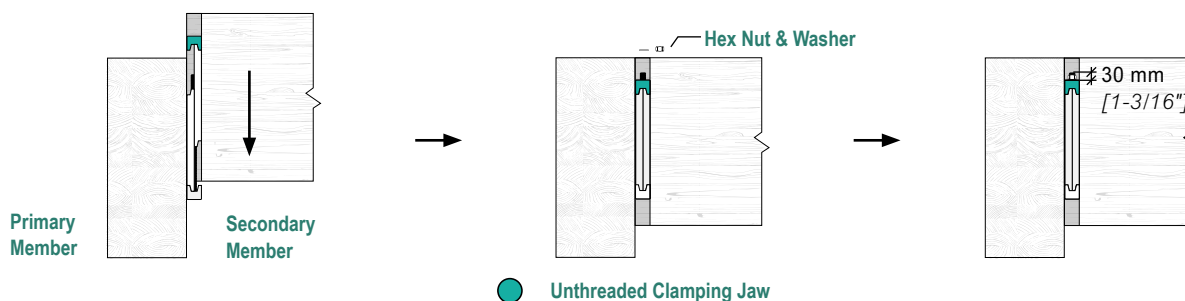


Secondary Member
Bottom Housing
Example

Clamping Jaw Screws, Primary Member

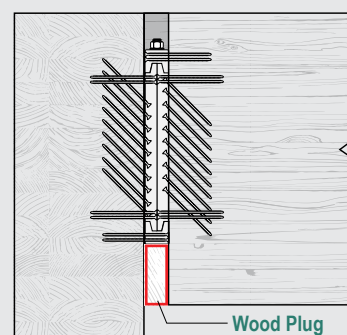
5.4 Clamping Jaws - Connecting the MEGANT Plates

Slide the two connector plates together. While the beam is unloaded, insert the rods through the unthreaded clamping jaw and until they are flush with the surface of the jaw. At this point, the threaded rod will be 30 mm [1-3/16 in.] proud of the unthreaded jaw. Each threaded rod is equipped with a hexagonal recess at one end. The end without this recess must be inserted into the threaded clamping jaw, allowing the accessible end to be turned using a hex key. Install the washer and nut on each rod. Tighten the nut to the recommended installation torque of 40 N·m [29.5 lb·ft.].



6.1 Optional Measures - Wood Plug

Where connectors are housed in the secondary beam, it is recommended to fill in the routed void below the connector for aesthetics and fire protection. A wood plug may be used, and installation instructions shall be provided by the Engineer of Record.





Formula 1 Paddock

Montreal, Quebec

Accessories

Bits

Patented Bits for ASSY Fasteners

The ASSY RW is a hardened bit designed for quick and efficient installation of MTC fasteners. Suitable bits for each fastener are listed in its specification table.



Snug Fit



Reduced Wobbling



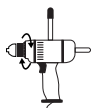
Optimum Torque Transfer



Bit Holder Socket

Bit Holder Socket for RW 50 Bits

The Bit Holder Socket is designed to hold RW 50 Bits on large double handle drills. The socket can be used with the magnetic bit holder case to facilitate the installation of larger-diameter screws which requires higher torque.



Suitable for Large Drills



RW 50 Compatible



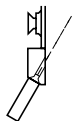
Optimum Torque Transfer



Predrilling Jig

Eases Predrilling for Inclined Fasteners

Our Predrilling Jig is a versatile installation accessory designed to support more consistent and precise fastener installation with less effort and in less time than conventional predrilling processes. The original predrilling jig is available in three sizes to accommodate 8 mm, 10 mm, and 12 mm [5/16 in., 3/8 in., and 1/2 in.] MTC-FTC fasteners, it is compatible with the inclined fasteners of the MEGANT and RICON S VS XL as well as custom steel-to-wood connections (with 45° Wedge Washers, 90° Cup Washers, or appropriately machined holes in steel plates of various thicknesses). The APEX predrilling jig accomodates 10 mm [3/8 in.] MTC-FTC fasteners for APEX connectors. The RIDGE predrilling jig accomodates 8 mm [5/16 in.] MTC-FTC fasteners for RIDGE connectors. The inner diameters, d, accommodate standard imperial and metric drill bit diameters recommended for predrilling (5 mm, 6 mm, and 7 mm [3/16, 1/4, and 17/64 in.] respectively). The outer diameters, D, and shoulder geometries mirror the head of the fastener for rapid positioning and alignment, while a tight tolerance at the tip ensures a snug fit with minimal play in the receiving hole.



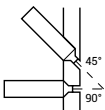
RICON S VS XL
Compatible



MEGANT
Compatible



APEX & RIDGE
Compatible



Compatible with
Multiple Angles

Recommended Diameters of Predrilled and Pilot Holes

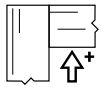
Nominal Fastener Diameter [D]	Predrilled Hole Diameter	Pilot Hole Diameter	Steel Plate Hole Diameter
mm [in.]			
6 [1/4]	4 [5/32]	≤ 4 [5/32]	7 [9/32]
8 [5/16]	5 [3/16]	≤ 5 [3/16]	9 [3/8]
10 [3/8]	6 [1/4]	≤ 6 [1/4]	11 [7/16]
12 [1/2]	7 [17/64]	≤ 7 [17/64]	13 [17/32]
14 [9/16]	8 [5/16]	≤ 8 [5/16]	N/A [N/A]

Notes:

1. The predrilling length should be equivalent to the embedment length of the fastener.
2. Pilot holes are intended to facilitate the installation of the fasteners by reducing splitting risks, ensuring a proper penetration path and faster thread engagement with the wood fiber. A minimum pilot hole depth of 25 mm [1 in.] is recommended to obtain the aforementioned benefits.
3. Predrilled holes that exceed the diameters listed above may reduce the capacity of the screws.
4. These recommendations are applicable to MTC fasteners.
5. Connection design must meet all the relevant requirements outlined in the Notes to the Designer section.

Clip Lock Brace System for Uplift

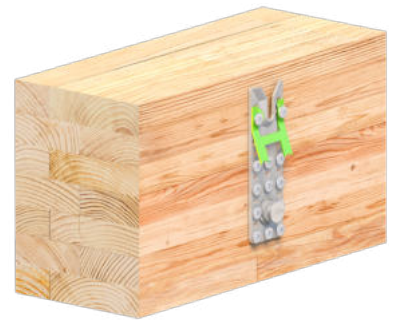
Clip Lock brace systems are additional components available for the RICON S VS beam hanger system. The Clip Lock is a special thin steel plate designed to fit into and lock the RICON S VS beam hanger plates together, providing a resistance to uplift forces. The Clip Lock is installed with the hanger on the primary beam or column, and as the secondary beam is lowered into place, providing resistance to uplift loads. These components are installed using the same screws used to fasten the beam hanger plates into the wood member. A new screw pattern applies to the primary member to allow the Clip Lock to be installed properly, which results in a reduced download capacity.



Uplift Force
Resistance



Reduced
Downward Force





Google at 1265 Borregas

Sunnyvale, California

Courtesy of Mark Wickens

Appendix

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Appendix A: Fire Protection

Mass timber assemblies can demonstrate required fire performance using the Encapsulated Mass Timber Construction (EMTC) methods defined in the NBCC or through exposed mass timber construction. EMTC requires timber elements to be protected by encapsulating materials, typically Type X gypsum board or concrete toppings, that delay charring and heat exposure. In contrast, exposed mass timber construction relies on the inherent charring behavior of wood and having sufficient wood cover around connectors to achieve the desired fire-resistance rating (FRR).

This appendix provides guidance for the design of beam hanger connections used in exposed mass timber construction, outlining calculation-based methods to determine the required wood cover around embedded steel components in accordance with CSA O86:24 Annex B and other recognized references.

Balancing Connector Fire Protection and Member Sizing

Exposed mass timber construction requires a comprehensive design approach such that connection details and fire-resistance ratings are both considered during the initial member sizing design. Sizing beam and column members without considering the required wood cover for the chosen connector can lead to conflicts during detailing. If the member is sized first and connector design is deferred, the required cover for fire protection may exceed the available section thickness, leaving no space to install the beam hanger or compromising the FRR.

Proposed Member Sizing Design Flow

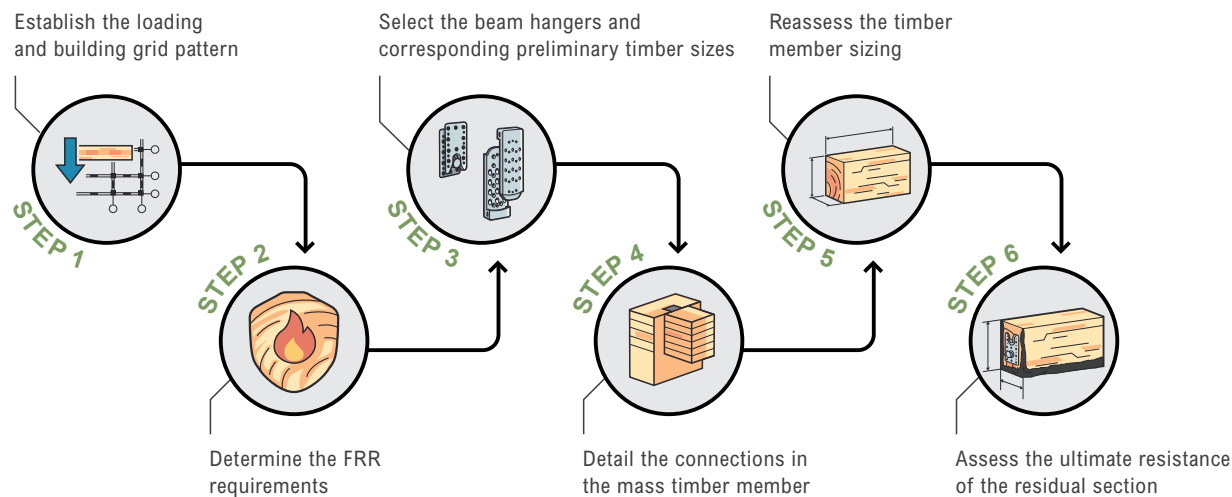


Figure A.1 - Proposed Member Sizing Design Flow

Design Note:

Identifying the connector system during preliminary design is key. This ensures that both the structural capacity of the member and the required wood cover can be satisfied without increasing member dimensions later in the project.

Fire-Resistance Rating (FRR) Methods for Beam Hanger Connections

The FRR of a timber connection can be established by calculated means or a tested approach. There are several recognized approaches in North America for demonstrating compliance with FRR requirements. These methods differ in assumptions, modeling approach, and documentation requirements, and are summarized below.

1. Full-scale testing per CAN/ULC-S101 (or ASTM E119).
2. Calculation Method per CSA O86:24 Annex B (Fire-Rated Joint Not Required), or
3. Alternative Calculation Method per American Wood Council (AWC) Fire Design Specification (FDS-24) (Fire-Rated Joint Required).

The fire-design basis used for the published MTC connector geometries may incorporate calculation methods, fire-test results, or a combination of both, as noted herein.

Method 1: Full-Scale Fire Testing (CAN/ULC-S101 and ASTM E119)

Full-scale fire testing may be used to establish the fire-resistance rating of a connection. A representative connection assembly is subjected to the standard fire exposure while carrying the prescribed structural load in accordance with CAN/ULC-S101 or ASTM E119. Test results may be used to establish connector-specific fire performance and associated detailing requirements, subject to the applicability of the tested configuration.

Method 2: Calculation per CSA O86:24 Annex B without Fire-Rated Joint

CSA O86:24 Annex B presents a calculation method assuming no fire-rated caulking or tape is present between the secondary and primary members. This method assumes the gap between members is small enough that heat transfer is negligible. Based on a series of fire tests of glulam beam-to-column joints connected with MTC hangers, MTC recommends a maximum gap of 3.2 mm [1/8 in.]. In this approach, metal connectors are considered to be properly protected from fire if the wood cover surrounding the connector is sufficient to insulate it from damaging temperatures. The char layer depth for one-dimensional charring, $x_{c,o}$, as defined in CSA O86:24 Annex B.4.3 may be used provided that corner rounding is explicitly considered in rectangular members.

Where: $x_{c,o} = \beta_o \cdot t$ **(eq. A.1)**

β_o one-dimensional charring rate, equal to 0.65 mm/min for glulam and CLT products

t fire exposure duration in minutes

In addition to the char layer depth, designers must determine the thickness of the zero-strength layer, x_t , in mm behind the char front. CSA O86:24 Clause B.5 prescribes a 7 mm thick zero-strength layer for fire exposures longer than 20 minutes.

Therefore, the required wood cover depth, d_p , in mm may be calculated, as follows:

$$d_p = x_{c,o} + x_t \quad \textbf{(eq. A.2)}$$

In addition, two- or three-sided exposure produces corner rounding where the intersecting char fronts meet. EORs must verify that there is sufficient wood cover at corners to account for this corner rounding effect and to permit the use of the one-dimensional char depth. This may require placing the connector slightly higher within the beam or increasing the member width.

Figure A.2 schematically illustrates the effect of corner rounding on connection geometry. The middle image shows a connection satisfying the required one-dimensional wood cover plus zero-strength layer along the sides and bottom of the member. The right image maintains the same member geometry and connector position but accounts for corner rounding at the intersection of the exposed surfaces, illustrating how the char front can extend beyond the limits established from one-dimensional cover alone. Accordingly, corner rounding must be considered when establishing the required member geometry and connector position.



Figure A.2 - Corner Rounding Effects

The corner-rounding radius, r_{corner} , in mm should be taken as equal to the char depth.

$$r_{\text{corner}} = x_{c,o} \quad (\text{eq. A.3})$$

When detailing connections with an FRR in accordance with CSA O86:24 Annex B, the following should be considered:

1. It is recommended that the gap between abutting members not exceed 3.2 mm [1/8 in.].
2. To allow construction tolerance, a gap of at least 1 mm [0.039 in.] is recommended between members.
3. Embedded steel shall be located within the effective cross-section of the wood element.

Method 3: Alternative Calculation per FDS-24 with Fire-Rated Joint

When an approved fire-rated joint is installed between the supported and supporting members, alternative fire design calculation methods such as FDS-24 result in reduced wood cover compared to the requirements of CSA O86:24, which can result in smaller member sizes. These methods may be used on a project-specific basis as an alternative to the CSA O86:24 procedures (Method 2), but this would require approval from the Authority Having Jurisdiction (AHJ). FDS-24 and CSA O86:24 Annex B.9 refer to AWC's Technical Report 10 (TR10) for further background. The most common solutions for an approved fire-rated joint include the use of fire caulking and/or intumescent tape, applied in accordance with the manufacturer's specifications.

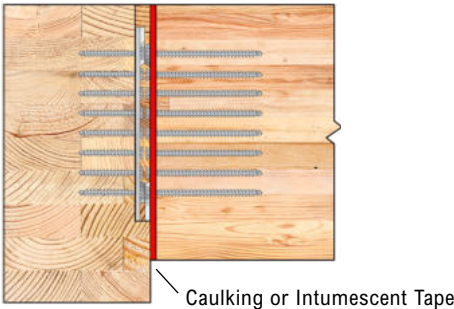


Figure A.3 - Fire-Resistant Joint

With an approved fire-rated joint and following FDS-24, the required depth of wood cover, d_p , can then be calculated based on the following equation:

$$d_p = 1.14 \cdot a_{char}$$

(eq. A.4)

Where:

a_{char} is given as $1.5(FRR)^{0.813}$ in in./hr for a standard char rate in FDS-24

The char depths and corresponding required wood cover for various FRR's are provided in Table A.1.

Table A.1 - Required Wood Cover for Connectors Protected by a Fire-Rated Joint (TR10 / FDS-24 Method)

FRR	Char Depth, a_{char}	Wood Cover Depth, d_p
hr	mm [in.]	mm [in.]
0.75	30 [1.2]	34 [1.4]
1	38 [1.5]	43 [1.7]
1.5	53 [2.1]	60 [2.4]
2	67 [2.6]	76 [3.0]

Basis of Published MTC Fire-Rated Geometries

The minimum member sizes and geometry requirements published in this guide are based on the applicable fire-design method and supporting test data for each connector system. GIGANT, RICON S VS, and MEGANT fire-rated geometries are based on the calculation method presented in CSA O86:24 Annex B.

APEX 45-minute and 1-hour fire-rated geometries are based on CSA O86:24 Annex B, including consideration of corner rounding. The minimum member sizes and geometry requirements presented for 2-hour FRR are based on full-scale fire testing conducted in accordance with CAN/ULC-S101 and ASTM E119.

RIDGE fire-rated geometries are based on a rational analysis incorporating the charring and corner-rounding principles of CSA O86:24 Annex B, together with supporting MTC fire-test results. Because side and bottom cover are interdependent where corner rounding governs, the published RIDGE member sizes represent practical width-and-depth combinations. Alternative member proportions may be possible; contact MTC Technical Support for project-specific evaluation.

Standard Detailing Guidelines for MTC Products

Void Below Connectors: Some connector models, such as the RICON S VS XL and the MEGANT series, require a void below them to facilitate proper installation. Unless otherwise indicated, the void must be filled with appropriate fire-stopping materials such as mineral wool insulation, intumescent tape, fire sealants, or a wood plug.

Wood Plug: In some installation configurations, the housing extends the full depth of the secondary member, leaving a void at the bottom. Thus, a wood plug is necessary to ensure the required FRR during the service life of the connection.

RIDGE and APEX connectors include pre-drilled diagonal holes to facilitate installation of the wood plug prior to erection (in the shop or at grade), reducing the need for installation at elevation.

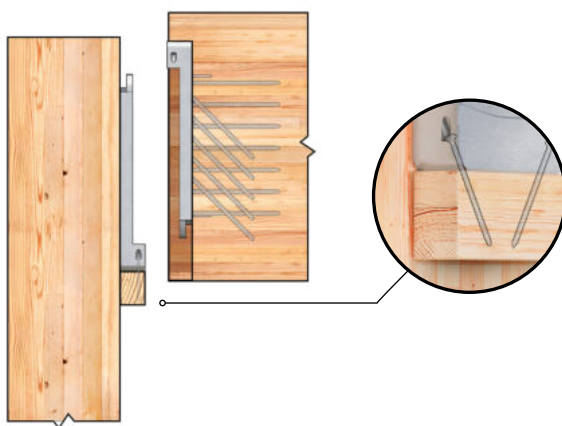


Figure A.7 - Apex Wood Plug Installation

Additional Fire Design Considerations for MEGANT Connectors: The threaded rod assembly must be taken into account when determining the placement of the connector in the beam section and evaluating its FRR. The threaded rods extend 30 mm [1-3/16 in.] above the edge of the clamping jaw in all MEGANT connectors.

For MEGANT connectors, the inclined screw extends below the clamping jaw and may penetrate the wood cover. Despite this, the residual capacity of the fasteners exceeds the demand under fire conditions.

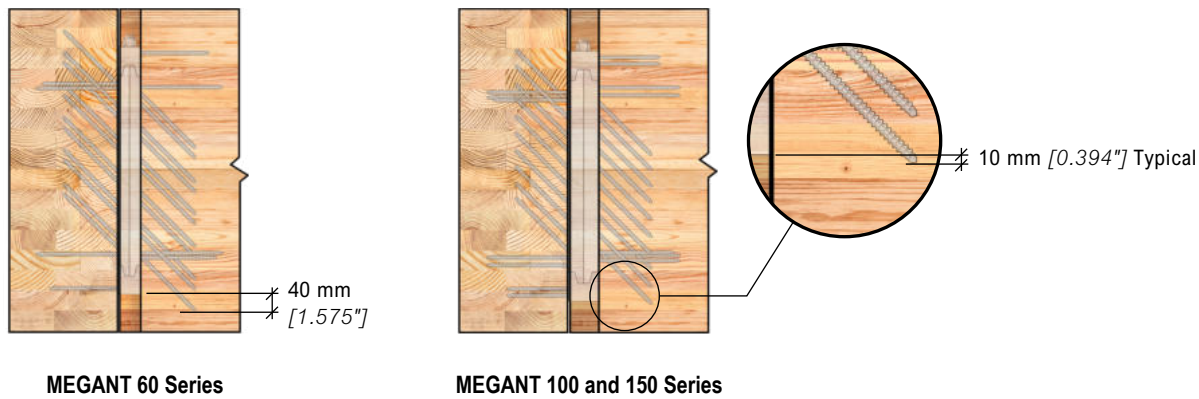


Figure A.6 - Distance Between Screw Tip and Connector for Megant

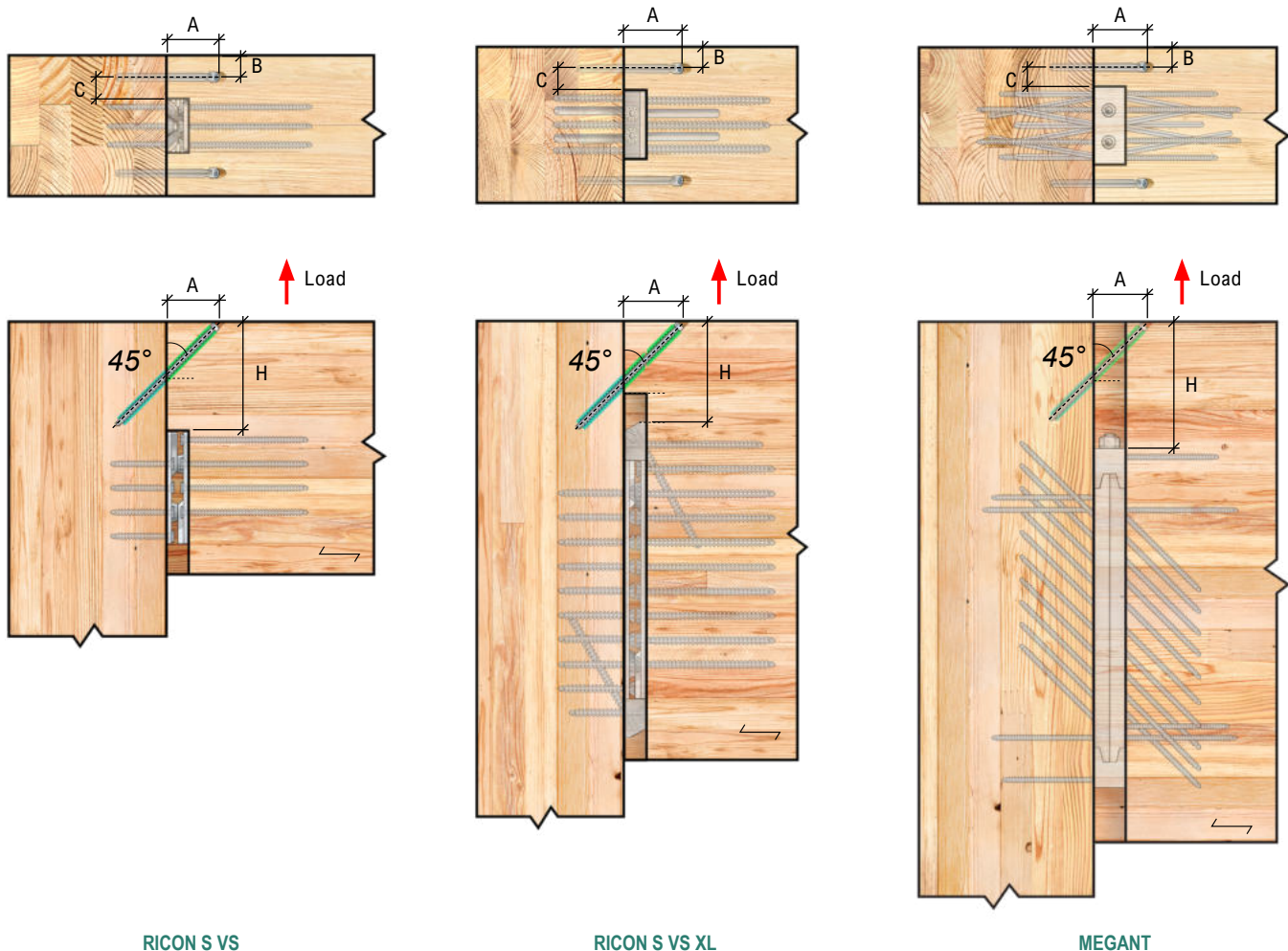
Appendix B: Uplift Resistance Design

Additional hardware is required to resist uplift forces with beam hanger systems. This can be achieved by installing fully threaded toe screws after the connectors are in place. The orientation of each screw relative to the joint ensures that the screw primarily resists uplift through tension. Fully threaded screws are compatible with all beam hanger systems.

For RICON S VS hangers, uplift resistance can also be achieved using a Clip Lock system. More details on this option are presented in the RICON S VS chapter.

To ensure proper performance, installation of the beam hanger system and toe screw is essential. Minimum spacing requirements must be satisfied to prevent interference between fasteners and ensure the integrity and performance of the connection.

Example of Toe Screw Installation



Design Information for Toe Screw Connections

Table B.1. - Geometry Requirements

Toe Screw Diameter	Minimum Screw Length	Minimum Insertion Point End Distance	Minimum Distance to Edge of Beam	Minimum Distance to Edge of Hanger
D	L	A	B	C
mm				
—	20D	10D	3D	3D
8	160	80	24	24
10	200	100	30	30

Notes:

1. All connection design must meet all the relevant requirements of the Notes to the Designer section.
2. Geometry requirements are in accordance with CCMC 13677-R.
3. In wood species sensitive to splitting, minimum geometry requirements may be required to be increased.
4. If the insertion point end distance is greater than the distance from the top of the beam to the top of the hanger minus four times the diameter of the screw (i.e., $A > H - 4D$), then each inclined screw should be located at least a distance of C from the hanger.

Table B.2. - Factored Uplift Resistances for Toe Screws Pairs

Fasteners		Insertion Point End Distance [mm]	Factored Resistance [kN]		Cost
Type	Qty.	A	G = 0.42	G = 0.49	
MTC-FTCY	2	8 x 220 mm	85	7	9
		8 x 240 mm	95	7	9
		8 x 260 mm	100	8	11
		8 x 280 mm	110	9	N/A
		8 x 300 mm	115	10	N/A
		8 x 330 mm	125	11	N/A
MTC-FTCY	2	10 x 300 mm	115	12	15
		10 x 320 mm	125	12	16
		10 x 340 mm	130	13	18
		10 x 360 mm	135	15	N/A
		10 x 380 mm	145	15	N/A
		10 x 400 mm	150	16	N/A
		10 x 430 mm	160	18	N/A

Notes:

1. Tabulated factored resistances are based on a short-term load duration, K_D , of 1.15.
2. Tabulated factored resistances are for two fasteners installed at 45° in a beam-to-column configuration as shown on the previous page.
3. Tabulated factored resistances assume the fasteners are not installed in a void between lamellas of split-laminated glulam members.
4. Tabulated factored resistances are based on both glulam members (i.e., column and beam) having the same relative density. Where specific gravities between the primary and secondary members differ, the lower value shall be used.
5. Tabulated factored resistances are only valid for Limit States Design (LSD).
6. Highlighted factored resistances indicate a value where the tensile strength of the fastener governs the design. No further increase in strength can be achieved with longer screws.

Appendix C: Survey of Literature on Reinforcement for Tension Perpendicular to Grain

Connecting beams by side-loading or end-support in mass timber structures requires careful placement of fasteners and consideration of perpendicular-to-grain tensile stresses. When required, reinforcing screws can be used to prevent wood splitting by providing a load path for tension perpendicular to grain. This appendix provides a **literature review** of current best practices, focusing on advanced techniques such as self-tapping screws, based on the latest research and CSA O86:24. All engineering work must be completed by a licensed Professional Engineer of Record (EOR) to ensure safety and compliance with the applicable codes and standards.

Strength of Members for Brittle Failure in Tension Perpendicular to Grain

This appendix focuses exclusively on perpendicular-to-grain brittle failure modes in wood connections, emphasizing the importance of careful design. EORs should be particularly attentive to tension-induced splitting at points of load application and beam-end splitting at points of support. CSA O86:24 introduces design provisions addressing these failure modes, including splitting resistance for connections loaded perpendicular to grain. However, interpretation and application of these provisions—especially for beam-end and end-grain conditions—still requires engineering judgement. This literature review provides EORs with context, reference practices, and recommendations informed by testing and industry experience.

Splitting Resistance of Members in Side-Loaded Connections

Perpendicular-to-grain tension-induced splitting can occur if loads are applied without engaging enough of the member's depth, such as in a connection placed low on a member's side (see Figure C.1). In these scenarios, reinforcement may be required depending on fastener height and load magnitude.

Splitting is a concern when a connection applies load to a member, unless the connection includes fasteners that engage at least 70% of the beam's depth from the loaded edge, as indicated by CSA O86:24 and Eurocode 5 EN 1995-1-1:04.

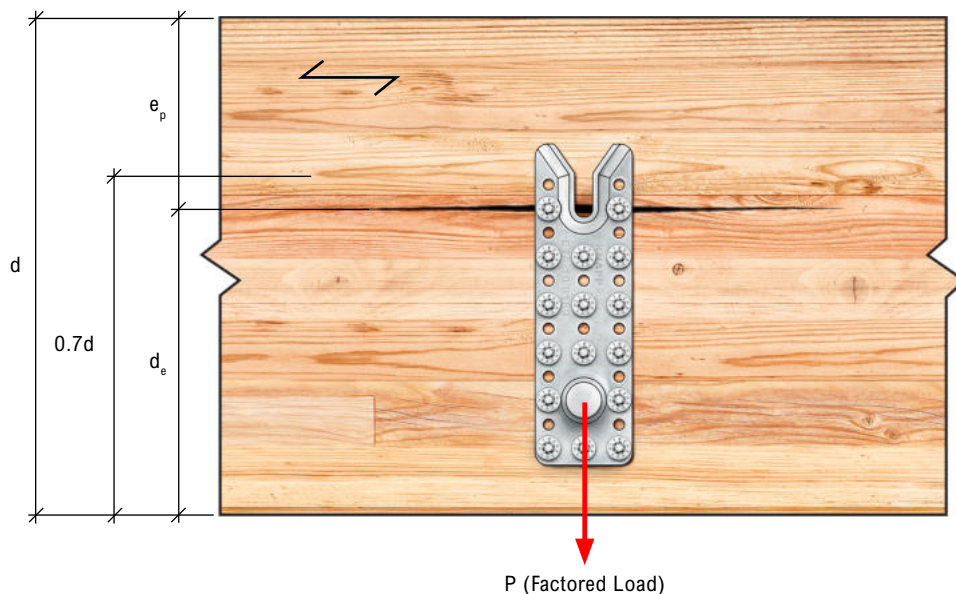


Figure C.1 - Splitting at Low Connection on Primary Member's Side

To evaluate the splitting strength of members in connections loaded perpendicular to grain, CSA O86:24 Clause 12.12.10.8 provides an equation for the factored splitting resistance, $Q_{S,T}$, of a wood member and notes that splitting resistance need not be considered when the ratio of $d_e/d \geq 0.7$.

Note: CSA O86:24 defines d_e as the distance from the loaded edge of the member to the furthest fastener and e_p as the distance from the unloaded edge to the closest fastener. Throughout this guide, fastener placement is expressed from the unloaded edge, e_p . Therefore, a depth ratio of $d_e/d \geq 0.7$ corresponds to a fastener placement of $e_p/d \leq 0.3$.

CSA O86:24 does not explicitly distinguish between side-grain and end-grain applications within this provision. Testing has demonstrated that the equation for splitting perpendicular to grain provides good correlation in both conditions, but engineering judgement is required when interpreting the exception that omits a splitting check for fastener placement $e_p/d \leq 0.3$. This threshold originates from testing performed on side-grain applications and may be unconservative when applied to beam-end or end-grain conditions.

Splitting Resistance of Members at End Supports

Beam-end splitting in members can be induced by excessive cross-grain tension. Connections that provide support to beams may require reinforcement to prevent beam-end splitting if they do not support the bottom of the member, as illustrated in Figures C.2 through C.5.

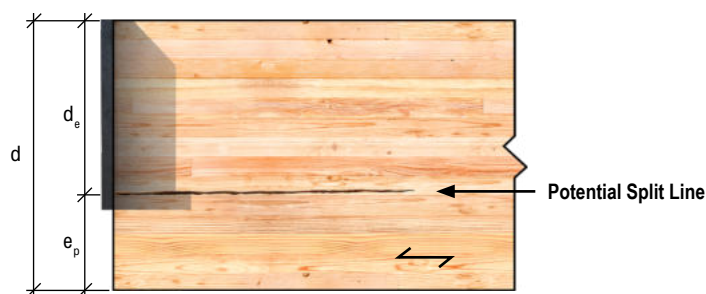


Figure C.2 - Concealed Bearing Plate Does Not Support Bottom of Member

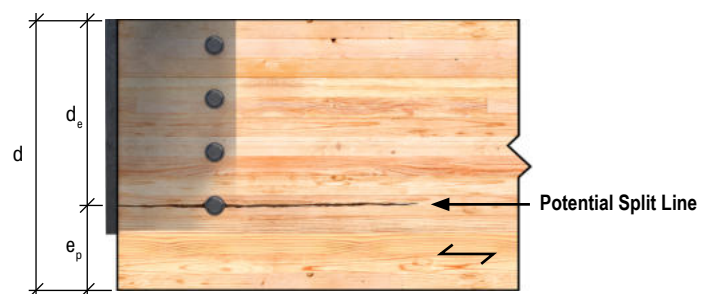


Figure C.3 - Lowest Dowel in Knife Plate Connection Does Not Support Bottom of Member

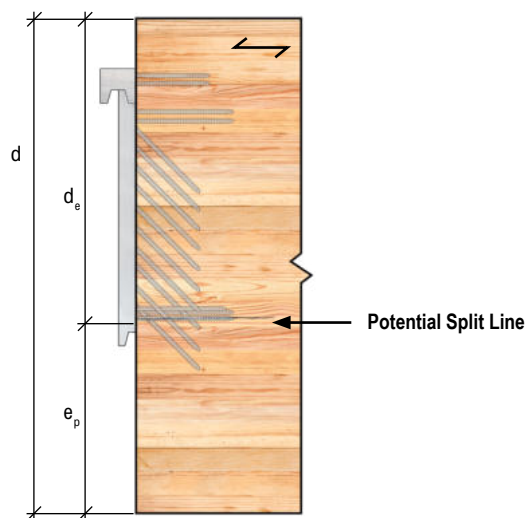


Figure C.4 - Lowest Inclined Fastener in Beam Hanger Does Not Support Bottom of Member

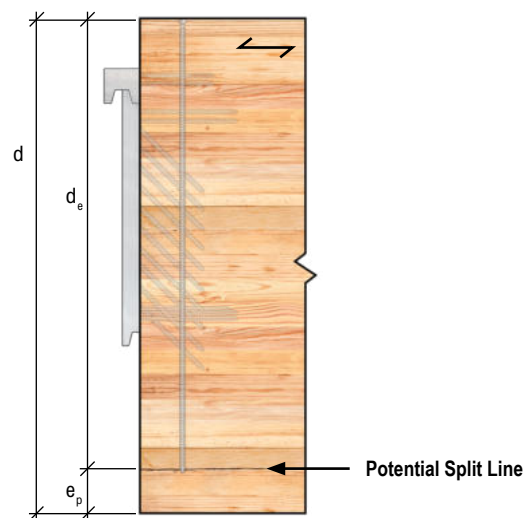


Figure C.5 - Effective Threads of Reinforcing Screw Does Not Extend to Bottom of Member

Because beam-end splitting depends on support conditions and load levels, the EOR must ensure that end splitting does not occur. Testing has shown that beams are safe from end splitting when supported by MTC hangers at their factored resistances and positioned according to Table C.1.

Table C.1 - Relative Connector Positioning at Beam-End Locations

Product	Maximum e_p in Secondary Member
GIGANT	$0.3 \cdot d$
RICON S VS	$0.2 \cdot d$
MEGANT	$0.3 \cdot d$
RIDGE XS, S, M and L	158 mm
RIDGE XL	148 mm
APEX 100 series	162 mm
APEX 150 series	168 mm

For end grain connections, the following verifications should be reviewed in addition to the general design requirements of CSA O86:24:

Splitting Resistance

If MTC Solutions' hangers will have fastener placement outside the recommended limits in Table C.1, the supported member should be checked for splitting perpendicular to grain using the factored splitting-resistance model in CSA O86:24 Clause 12.12.10.8. For hangers such as APEX which have inclined screws that cross the potential splitting plane, the vertical component of the resistance provided by the inclined screws can be added to the splitting resistance. The resistance provided by the inclined screws is governed by the lesser of their tensile resistance or their withdrawal resistance from embedment in the wood beyond the splitting plane.

Note: CSA O86:24 permits omission of this check when fastener placement is less than $e_p/d \leq 0.3$ ($d_e/d \geq 0.7$); however, this threshold is historically based on loads being applied to the side of a beam in beam-end or end-grain conditions, splitting resistance should always be checked. When a connection supports the end of a beam this threshold limit may not be appropriate.

Effective Shear Resistance

Regardless of fastener placement, the shear resistance of the secondary member should be verified in accordance with CSA O86:24 Clause 12.2.1.6, using the appropriate effective shear depth. This verification checks if the shear resistance is adequate based on fastener position and reinforcement details.

Note: The notch provisions in Clauses 6.5.4.4 and 7.5.7.5.2 address geometric section reductions with re-entrant corners, such as traditional notched beams. Concealed beam hanger connections do not result in any loss to the beam's cross section; therefore, the effective shear depth method of Clause 12.2.1.6 is a more appropriate approach.

When verifying splitting resistance, only the portion of the member directly influenced by the connection should be considered effective. Research and test data indicate that perpendicular-to-grain tension disperses at approximately a 15° angle from the loaded region, meaning that the effective width, b_{eff} , may be taken as the fastener-group width plus twice the dispersion length as shown in Figure C.6, limited by the available side cover. Engineering judgment is required where geometry, multiple connectors, or reinforcement may alter this distribution.

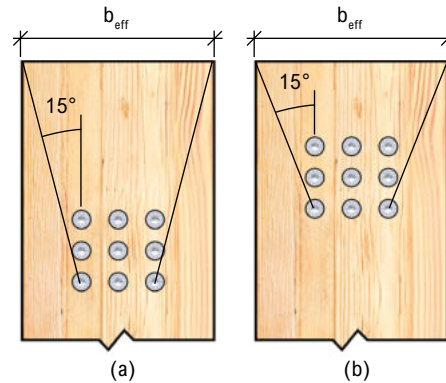


Figure C.6 - Effective Width of Secondary Member where (a) Beam Width Governs (b) Dispersion Width Governs

Near-end beam connections behave similarly to end-grain conditions, where there is a risk of splitting perpendicular to grain. Therefore, when a member is supported close to its end as shown in Figure C.7, the EOR should verify the splitting resistance in accordance with CSA O86:24 Clause 12.12.10.8 when the fastener placement in the supporting member falls outside the limits in Table C.1.

As a point of reference, the National Design Specification (NDS) 2024 requires special consideration of connections that support the end of a member compared to connections located at least five times the member depth from the beam end. While CSA O86:24 does not provide an equivalent geometric limit, the same design rationale applies—connections located near a beam end should be evaluated for both splitting and shear resistance to ensure adequate performance.

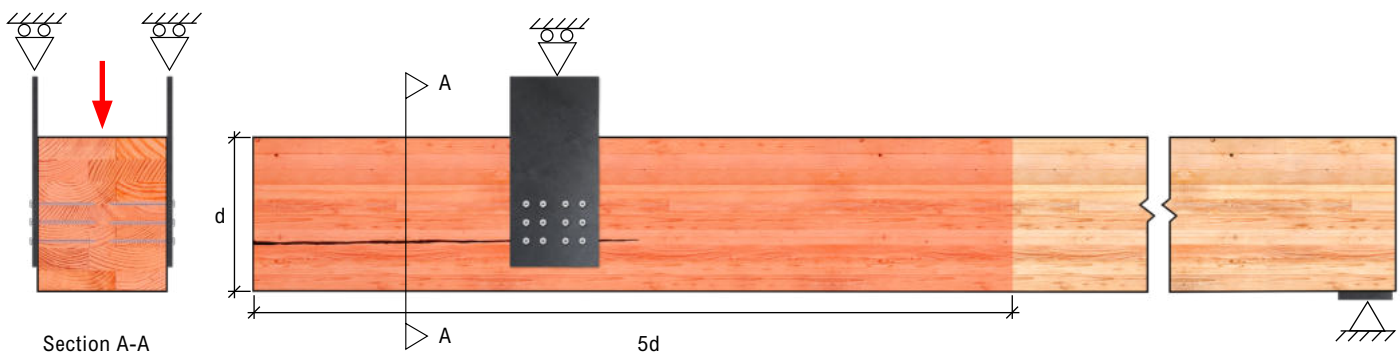


Figure C.7 - Splitting of Beam Supported Near its End

Best Practices for Designing Reinforcement

Reinforcement for Preventing Splitting at Points of Load Application

When a secondary member connects too low on the side of a primary member and engages less than 70% of its depth, it is necessary to calculate the factored splitting resistance, QS_{rT} , of the primary member. Should the factored load, P_f , exceed this value, reinforcing the member with self-tapping screws often proves more economical than increasing the member's size. This approach is especially critical for connections where prioritizing placement in the primary member can significantly minimize the forces associated with beam-end splitting perpendicular to the grain in the secondary member.

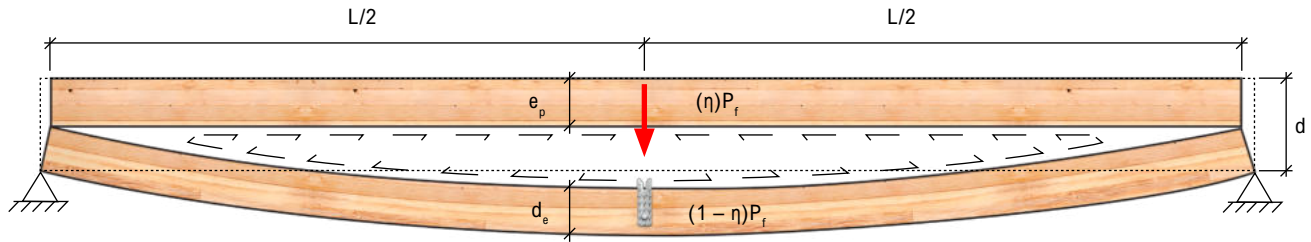


Figure C.8 - Primary Member Splitting with Hanger Installed at Mid-Span

Figure C.8 illustrates a split beam due to a load applied by a hanger installed at mid-span, where the top fasteners are located at a distance of d_e from the bottom edge. In this scenario, the lower beam section, with a depth of d_e , supports the entire load, P_f . If reinforcing screws connect the upper and lower beam sections at mid-span, they will distribute a portion of the load, ηP_f , to the upper section and its remaining portion, $(1 - \eta)P_f$, to the lower section. The formula below ensures deflection compatibility between the upper and lower portions of the split beam and is applicable to various loading configurations, not just at mid-span.

$$P_{Rf} = \eta \cdot P_f \quad (\text{eq. C.1})$$

Where:

$$\eta = 1 - 3 \left(\frac{d_e}{d} \right)^2 + 2 \left(\frac{d_e}{d} \right)^3 \quad (\text{eq. C.2})$$

With the factored load for the reinforcing screws, P_{Rf} , now able to be calculated, all information needed to design the reinforcing screws is available. Typical practice would be to provide a fully threaded self-tapping screw on each side of the hanger. Fasteners should be spaced 1.5D from the nearest beam hanger and 3D from the front edge of the primary beam, where D is the nominal diameter of the fastener. In such a case, each screw would be designed to support half of the calculated design load (i.e., $P_{Rf}/2$) given by the formula above.

Fully threaded reinforcing screws supplied by MTC should be designed following the requirements of the structural screw catalog and CSA O86:24. As outlined above, the location of the top row of fasteners in the hanger defines the location where splitting would occur in the member. The split can be considered to create an upper member and a lower member at its location. The upper member at this location equates to the “side” member that defines its thickness, $t_{s,w}$, as follows:

$$t_{s,w} = d - d_e \quad (\text{eq. C.3})$$

Assuming the head of the screw is set flush with the top surface of the beam, the effective thread lengths above, $L_{eff,s}$, and below, $L_{eff,m}$, the location of the split can then be calculated as:

$$L_{eff,s} = t_{s,w} - L_{un} \quad (\text{eq. C.4})$$

$$L_{eff,m} = L - t_{s,w} - L_{tip} \quad (\text{eq. C.5})$$

Where:

L_{un} length of the unthreaded portion of the screw, measured from screw head to the start of the threads

L_{tip} length of the screw tip, equivalent to the nominal fastener diameter, D

In addition, in scenarios where the hanger will be subjected to uplift loads greater than the factored splitting resistance for this condition, to prevent splitting at the screw tip, embed it at least $0.7d$ below the top of the member, as shown in Figure C.9.

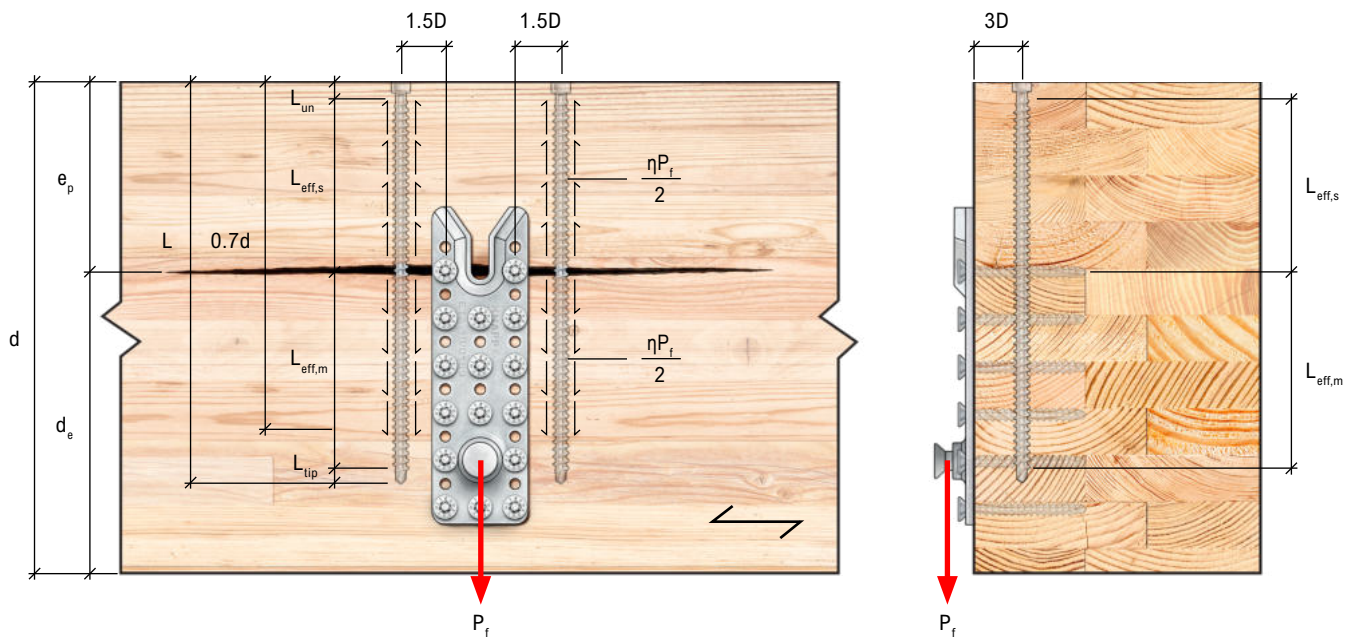


Figure C.9 - Force Distribution and Reinforcement Placement in Side of Member

Reinforcement for Preventing Beam-End Splitting at Points of Support

CSA O86:24 does not offer specific guidance for designing reinforcement for members susceptible to beam-end splitting; therefore, mechanics-based methods from literature are recommended herein. For beams determined to have insufficient splitting resistance at end supports, the EOR can reference Timber Engineering Principles for Design by H.J. Blaß and C. Sandhaas which offers the following equation for determining the factored load transferred by reinforcing screws, P_{Rf} , across the fracture plane at the end of a beam:

$$P_{Rf} = 1.3 \cdot \left[3 \left(1 - \frac{d_e}{d} \right)^2 - 2 \left(1 - \frac{d_e}{d} \right)^3 \right] \cdot V_f \quad (\text{eq. C.6})$$

Where:

V_f factored shear load in the member being transferred to the support in kN

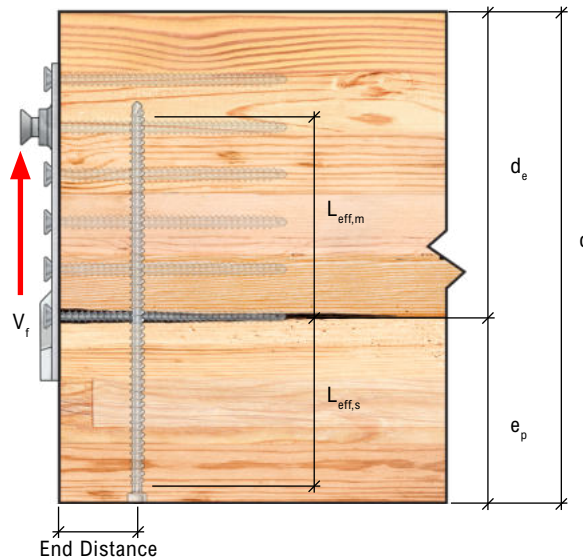


Figure C.10 - Reinforcement Placement in Beam-End

Only one row of reinforcing screws should be used to ensure even load distribution among all screws. Existing literature suggests that for typical gravity applications in beam-end connections, these fasteners should be installed from the bottom and penetrate as close to the top of the beam as possible. When designing reinforcement, it is best practice to position the row of reinforcing screws as close to the end of the beam as possible. The spacing, end distance, and edge distance requirements for MTC fully threaded self-tapping screws can be found in the MTC Solutions Structural Screw Catalog.

Detailing Reinforcing Screws

C.1 Placement of Reinforcing Screws for Equal Load Sharing

To ensure equal load sharing among reinforcing screws:

- In the primary member, reinforcing screws should be oriented in a single row on each side of the hanger, with all screws positioned the same distance, s , from the centerline of the hanger.
- In the secondary member, reinforcing screws should be oriented in a single row, with all screws positioned the same distance, a , from the end of the secondary member.

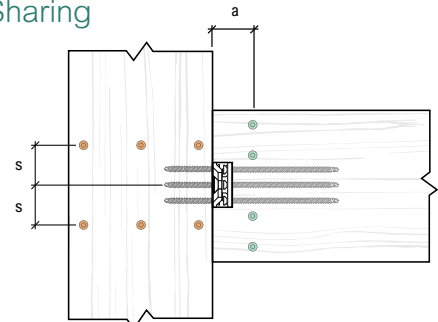


Figure C.11 - Reinforcing Screw Placement for Equal Load Sharing

C.2 Avoiding Screw Collisions

To avoid screw collisions, reinforcing screws should be installed beside the beam hanger rather than between its fasteners. If two beam hangers are placed side-by-side to support the end of a member, a reinforcing screw should be installed on each side of the dual-hanger assembly and ideally between the two hangers.

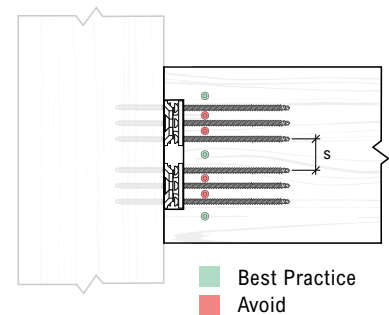


Figure C.12 - Reinforcing Screw Placement for Avoiding Screw Collisions

C.3 Installing Reinforcing Screws Near Edges

Screws installed near an edge of a member may be angled slightly inward (up to 5°) to mitigate the risk of deviating during installation and protruding from the side of the member.

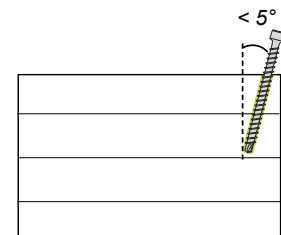


Figure C.13 - Reinforcing Screw Placement Near an Edge

C.4 Considering Tool Requirements for Installation

Typically, reinforcing screws should be installed before the member is placed in its final configuration. When this is not possible, the EOR must consider the space required for installation tools, the length of the reinforcing screws, and the installation sequence of adjacent components.

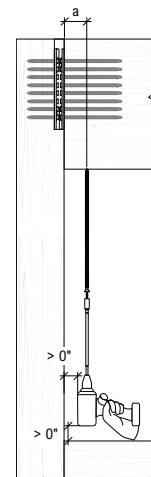


Figure C.14 - Accommodation of Tools During Installation

Summary of Recommendations

Recommendation	Reasoning
Only install a single row of reinforcing screws	Forces are not evenly distributed across multiple rows of fasteners
Prioritize placement of the secondary member to avoid reinforcement, helping isolate reinforcement only to the primary member	This results in more efficient design and more space for reinforcement in the primary member
Ensure screw spacing meets manufacturer's guidelines	This helps prevent screw collisions and wood splitting
Reinforcing screws near beam edges may be angled slightly inward (by approximately 5°) if geometry can be accommodated	This minimizes the risk of screw deviation from the side of the beam during installation
Pilot holes should be drilled as close to the full length of the screws as possible	This facilitates a proper penetration path for screws and reduces the risk of screw collisions

References

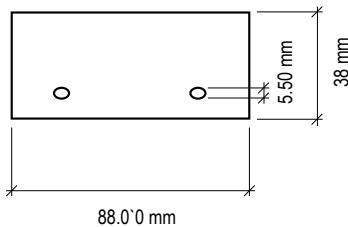
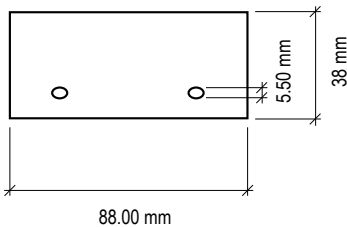
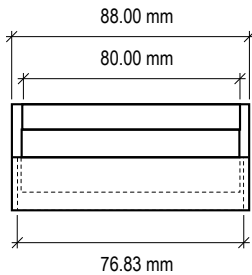
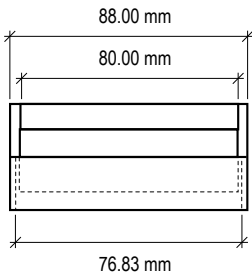
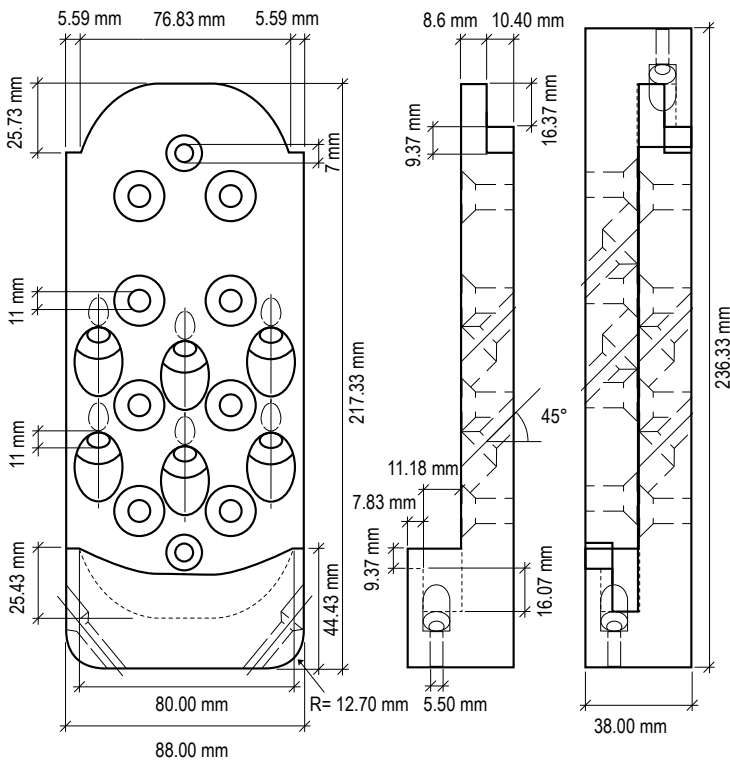
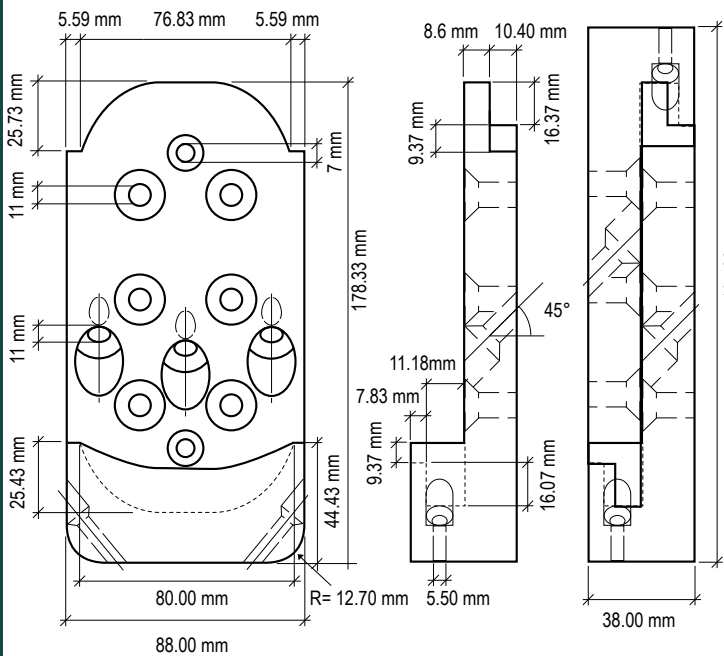
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Appendix D: Product Specifications

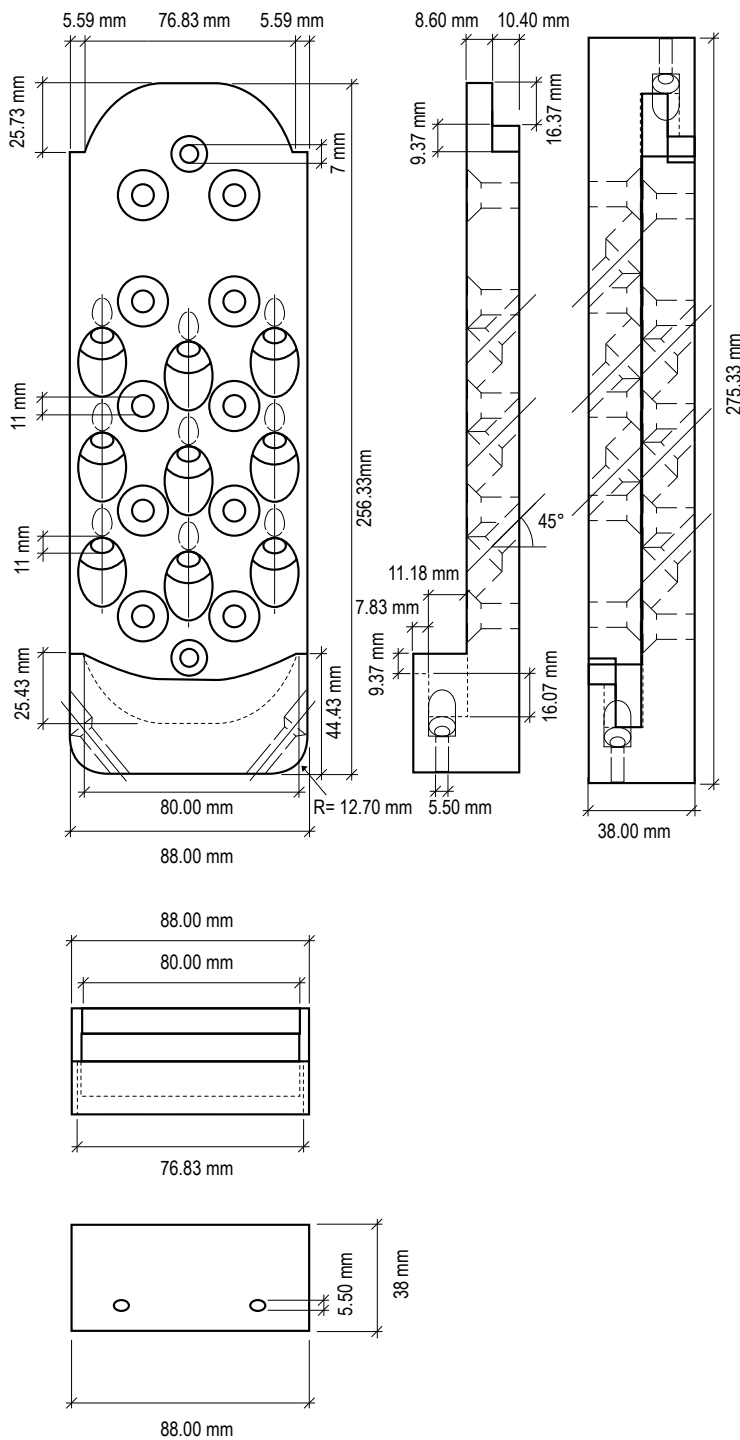
This appendix provides more precise dimensions for the different beam hanger components referenced in this design guide. Detailed 2D and 3D geometry files are available for download on the respective product pages.

RIDGE XS

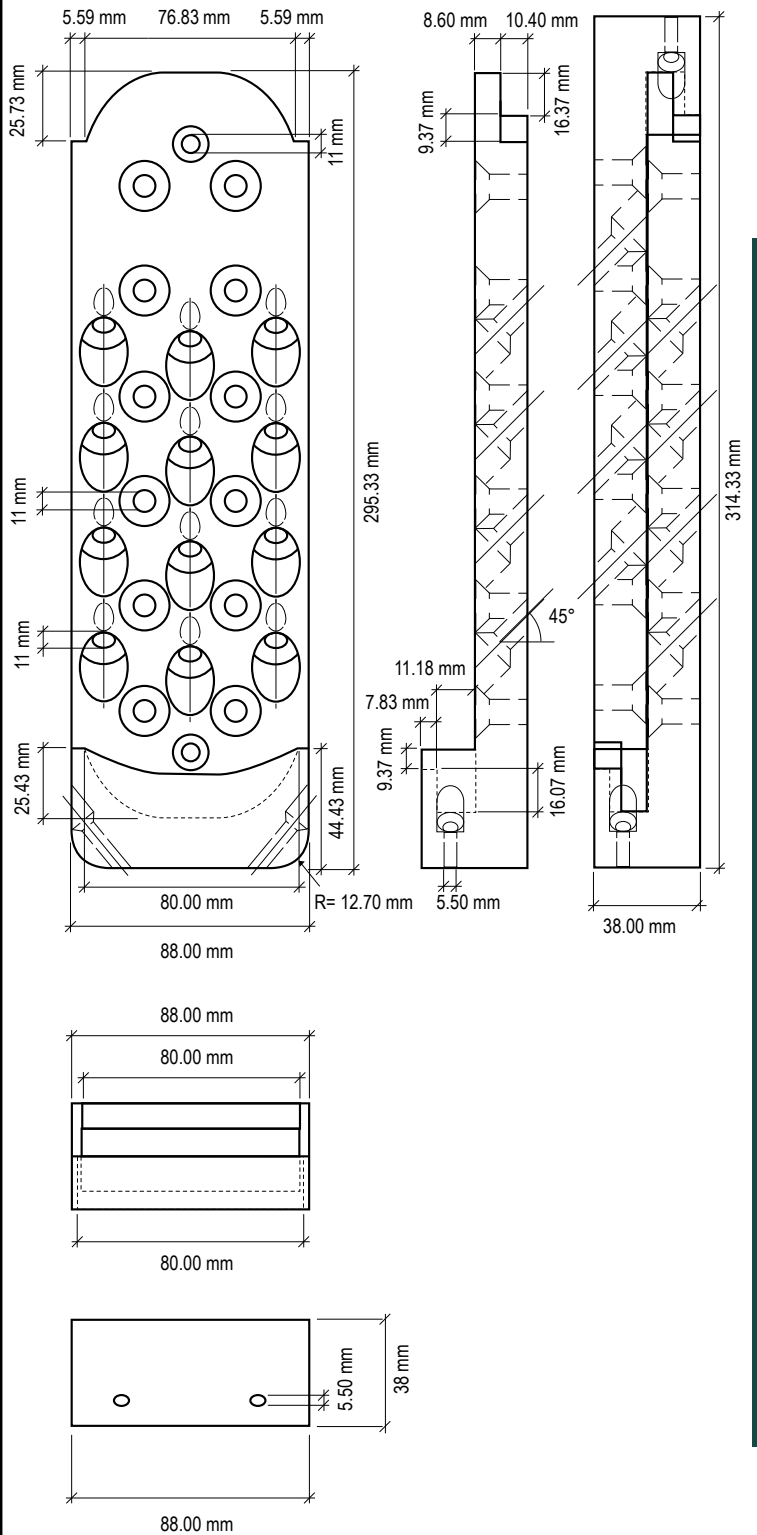
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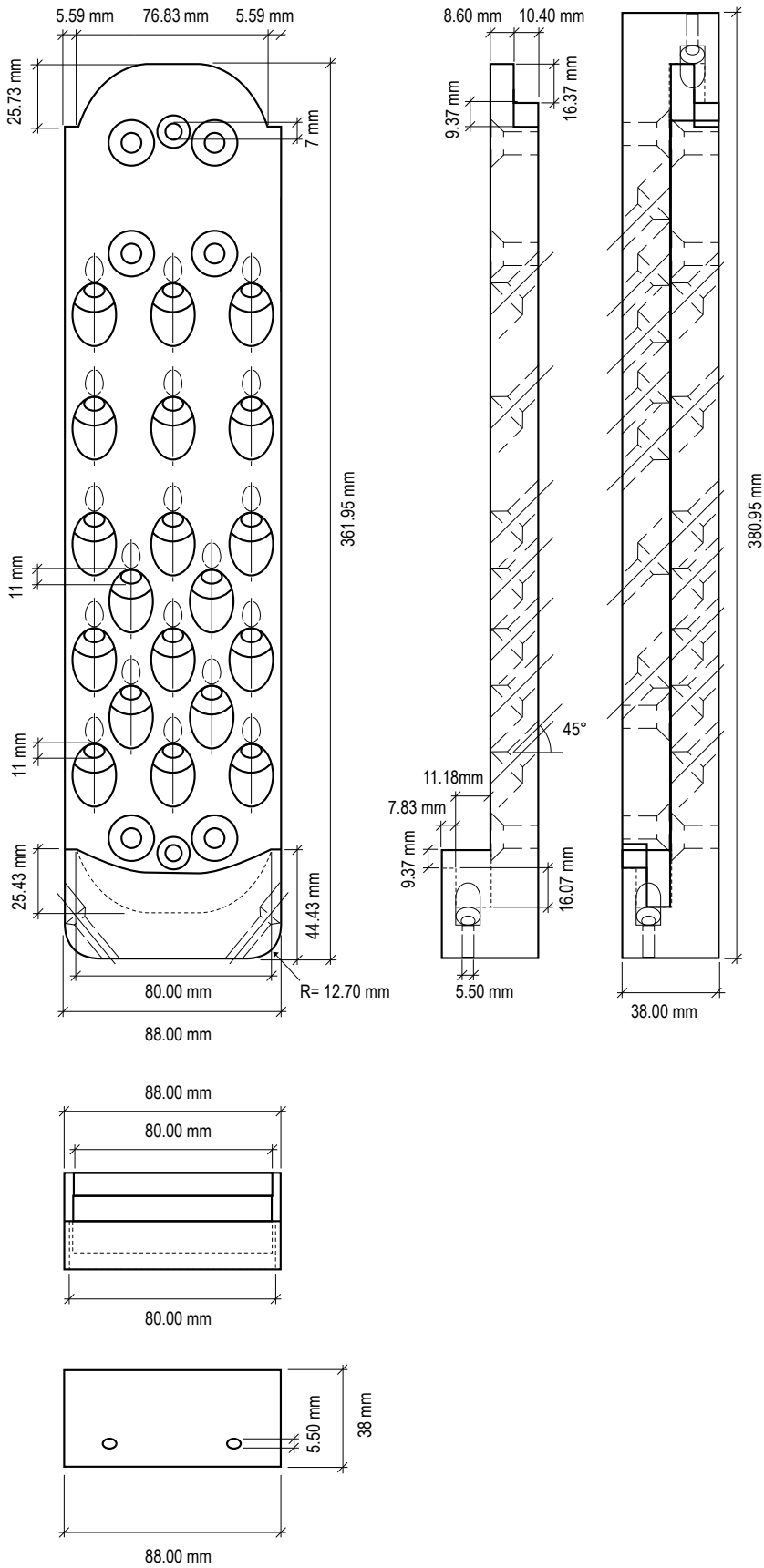
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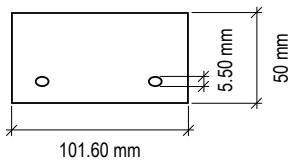
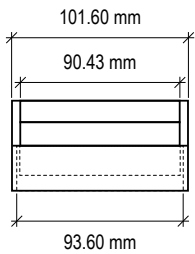
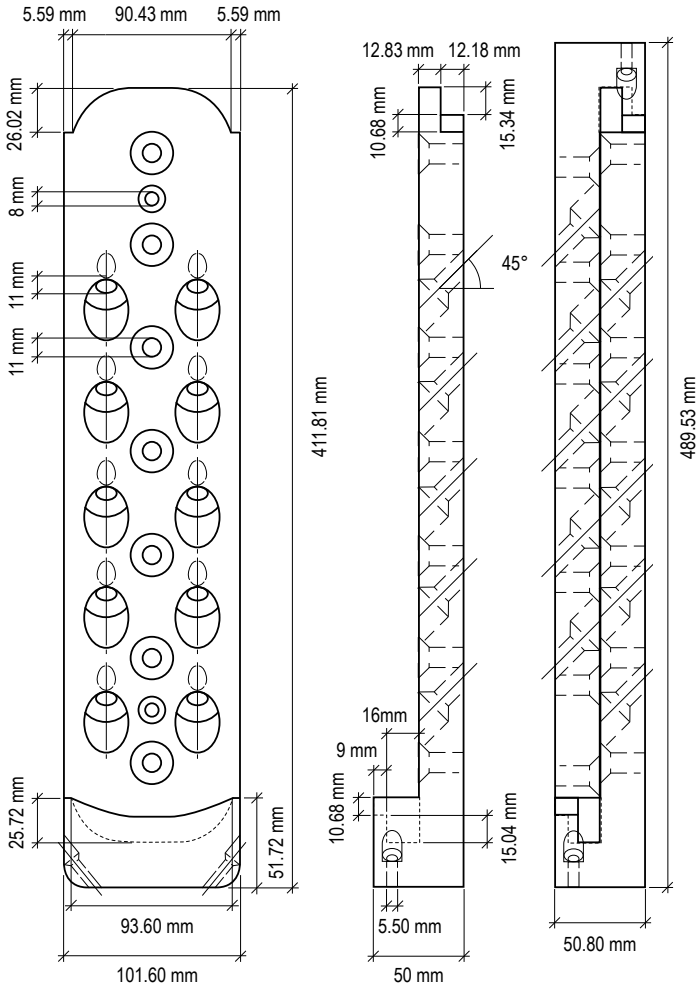
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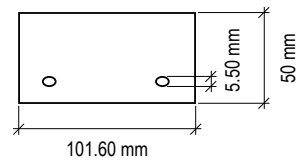
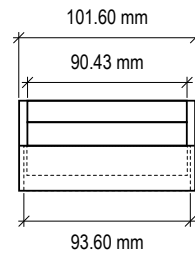
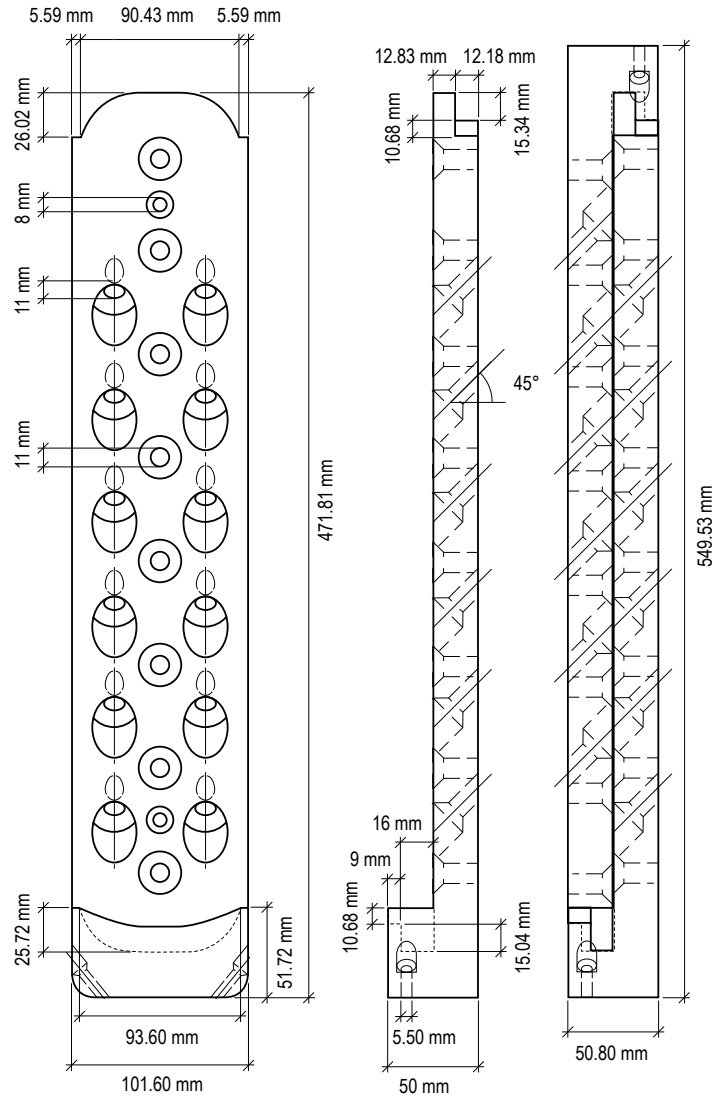
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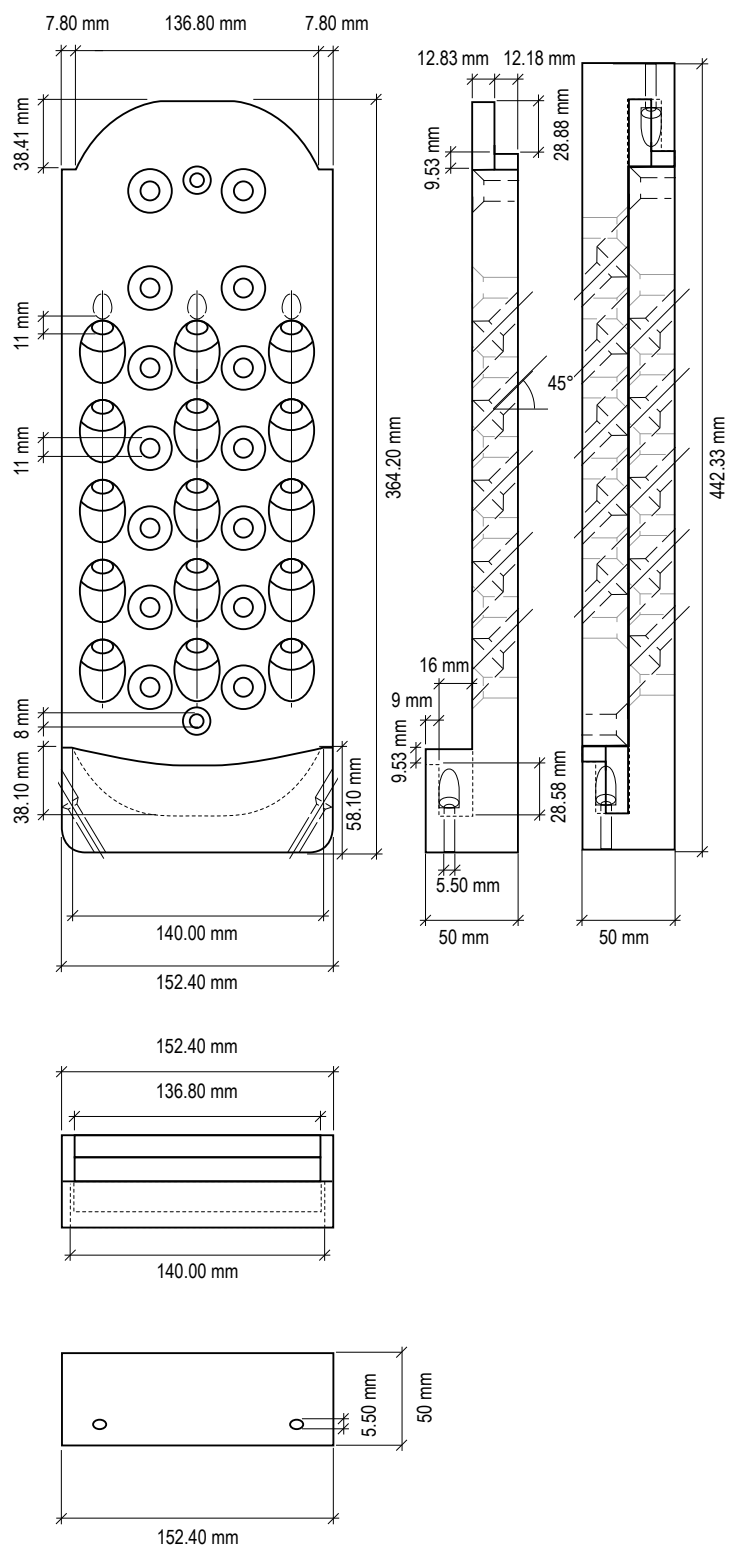
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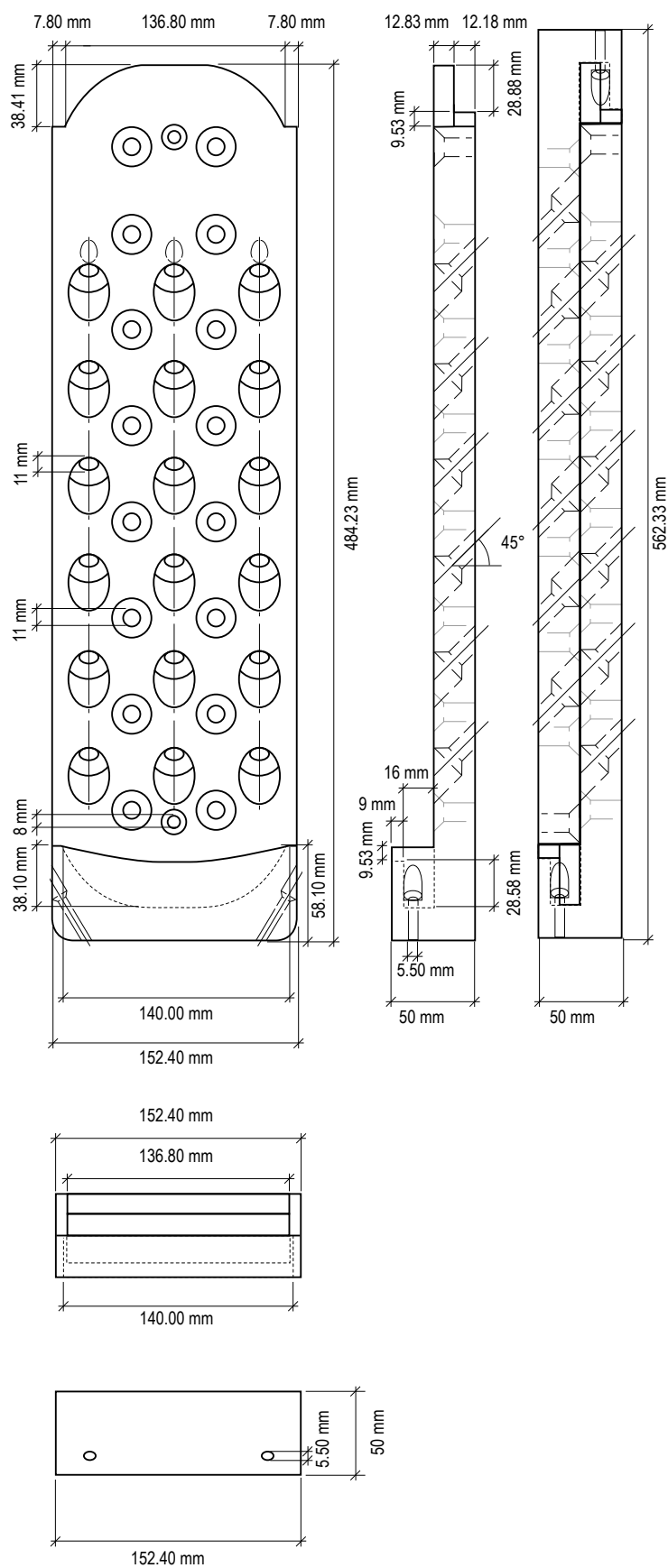
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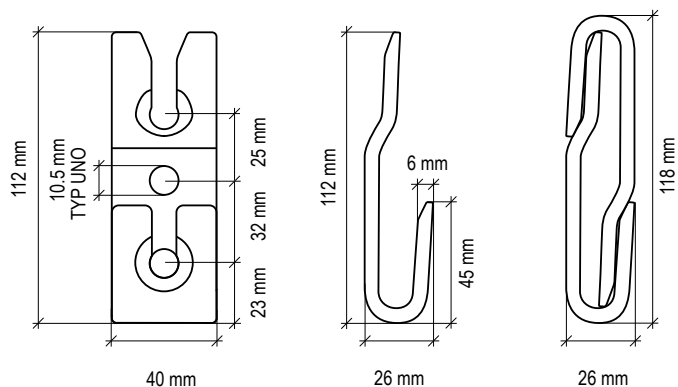
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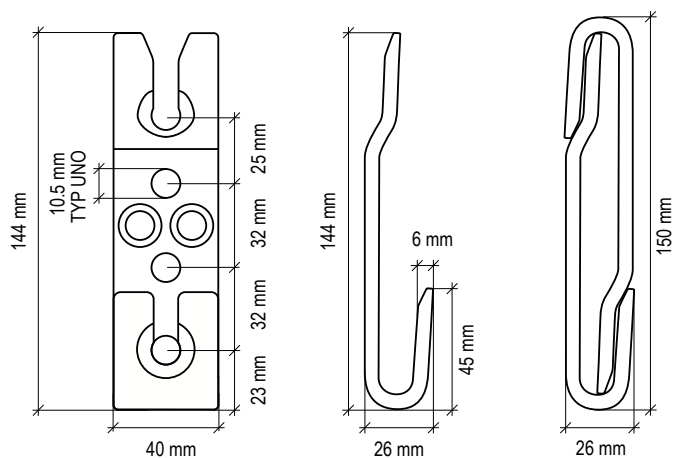
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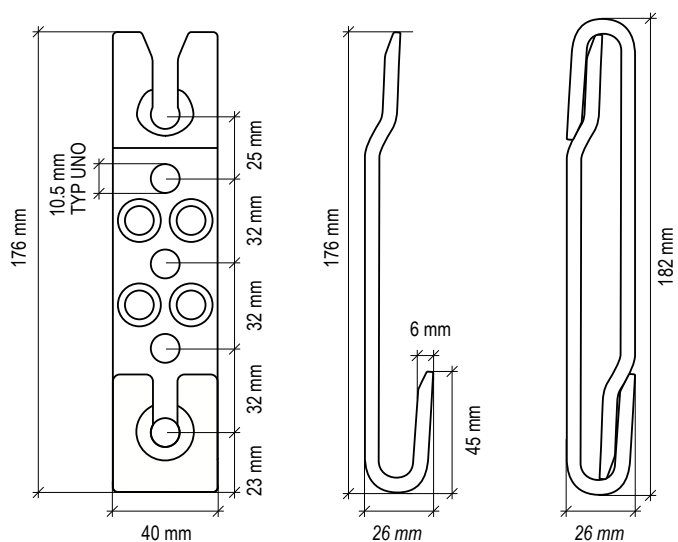
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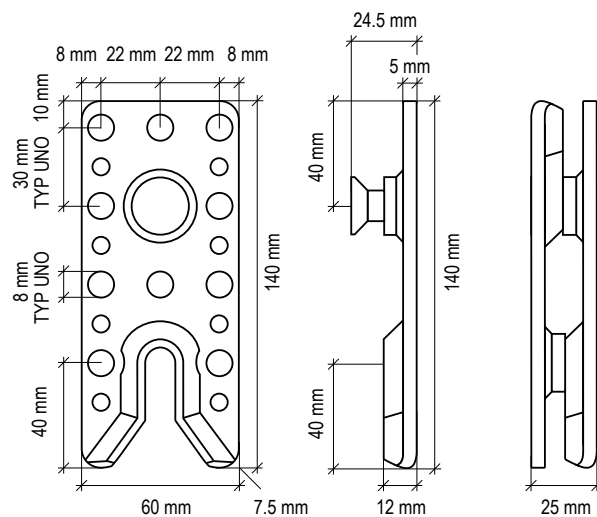
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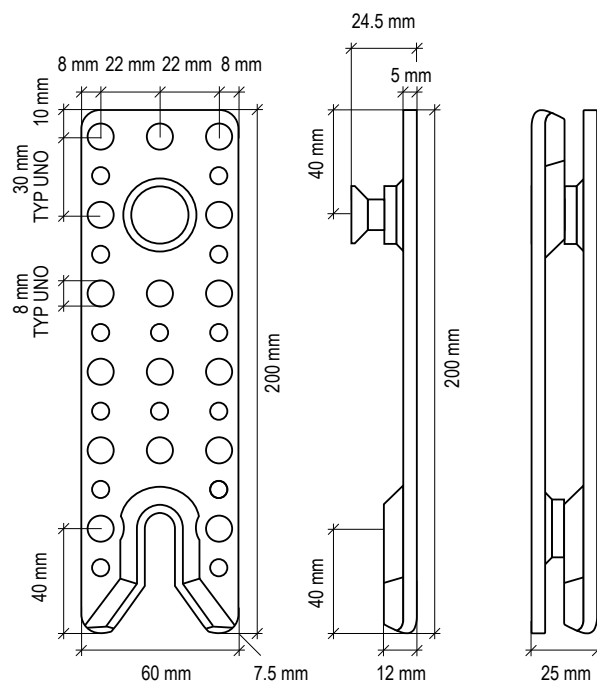
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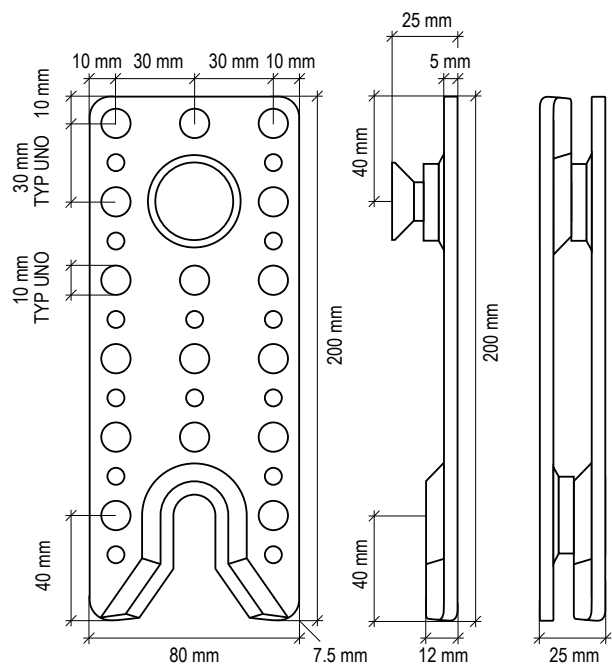
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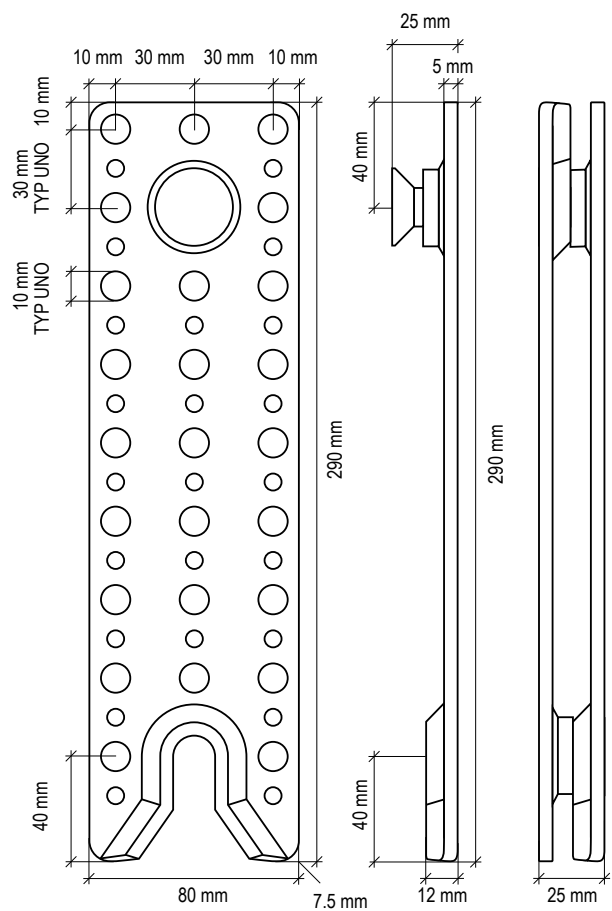
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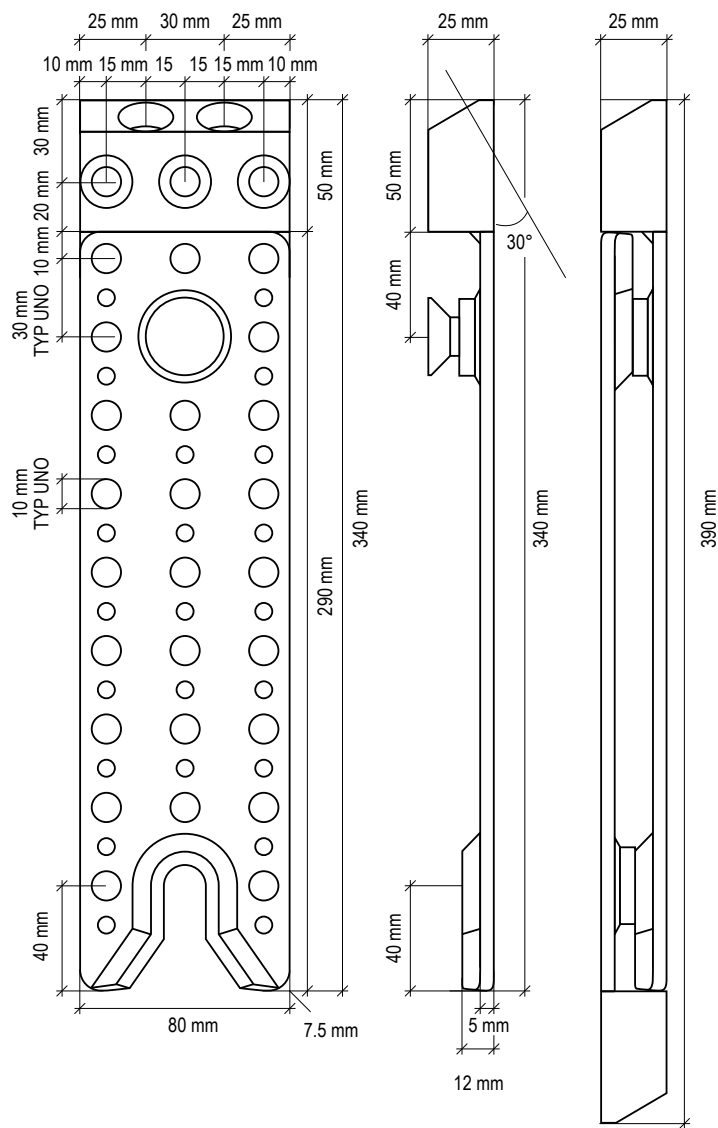
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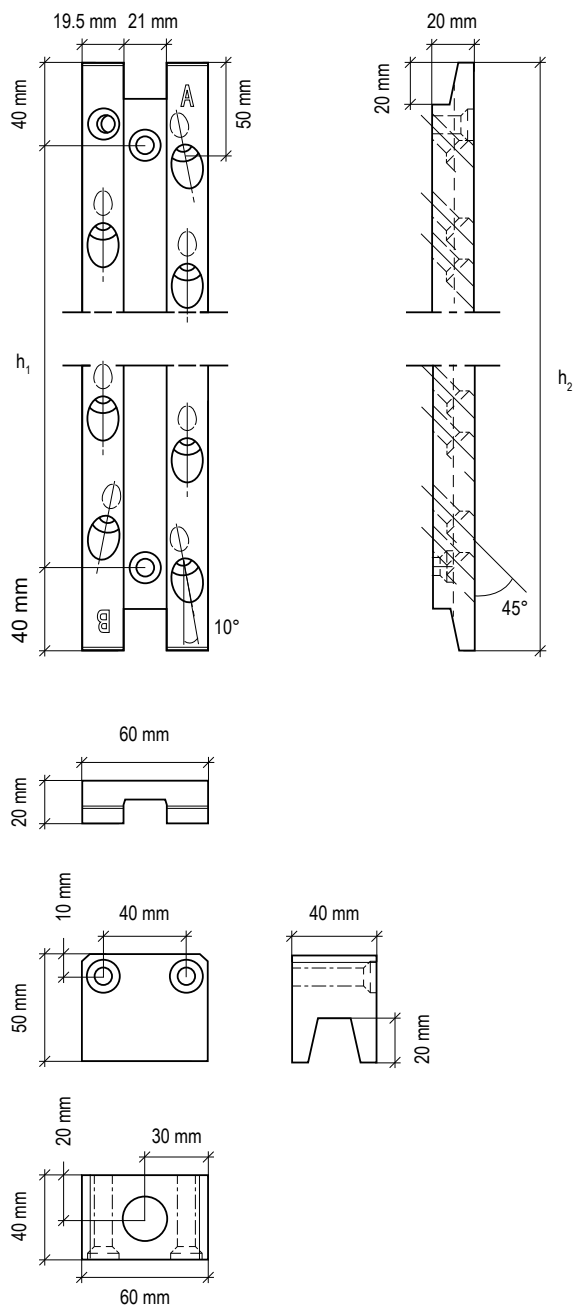
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RICON S VS XL 390 x 80

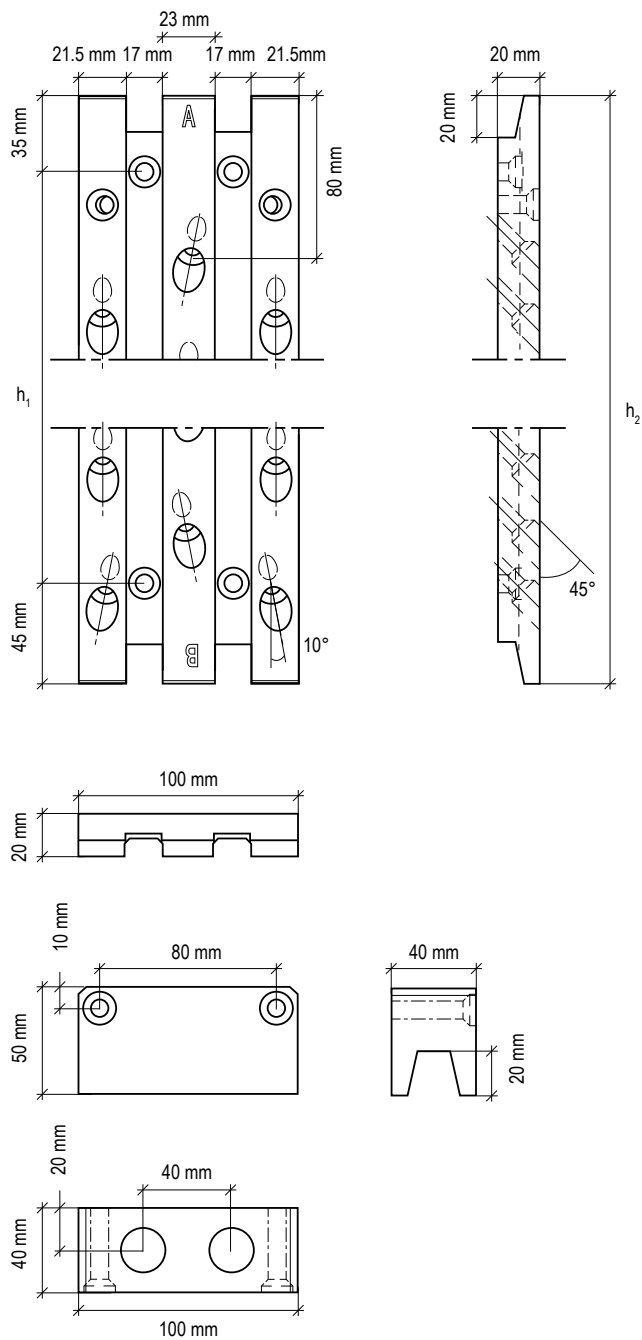


MEGANT 60 SERIES



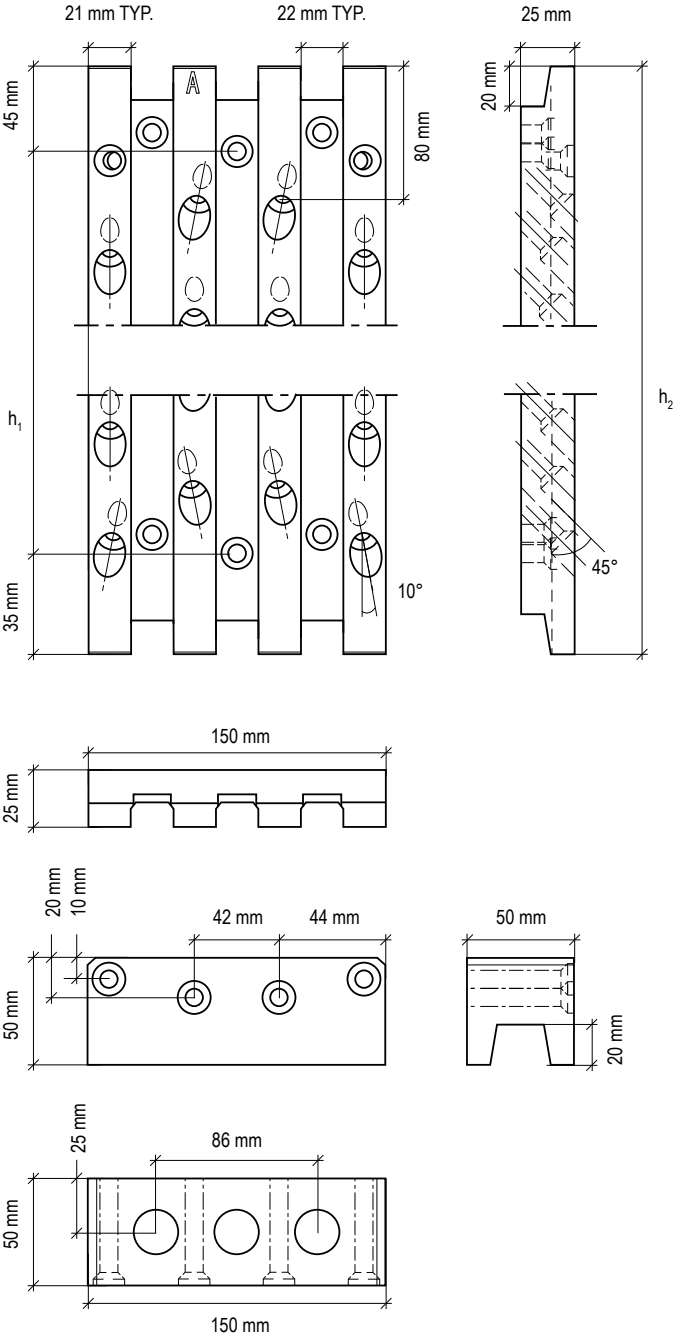
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MEGANT 430 x 60	290	370

MEGANT 100 SERIES



Model	h_1	h_2
	mm	
MEGANT 310 x 100	170	250
MEGANT 430 x 100	290	370

MEGANT 150 SERIES



Model	h_1	h_2
	mm	
MEGANT 310 x 150	170	250
MEGANT 430 x 150	290	370

MTC Solutions provides sustainable, high-quality mass timber connection solutions to a rapidly evolving and thriving industry. We drive innovation through certified research and development, while contributing to the education of young talent and experienced professionals in the technology used in sustainable design.





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