MTC SOLUTIONS

Beam Hanger Design Guide

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First Tech Credit Union

Portland, Oregon 2017

Courtesy of: Oregon Forest Resources Institute

Building Forests in Cities

MTC Solutions is a specialty supplier of connection solutions for modern mass timber applications in commercial, industrial and residential projects. We are proud to be working with the most innovative partners on cutting-edge projects across North America. Our goal is to see the wood construction industry thrive and help to maintain a low carbon footprint through education, research, and cost-effective approaches.

WE SUPPLY

MTC Solutions stocks more than 450 mass timber connection solutions ready for delivery throughout North America.

WE FUND

We do extensive research with leading North American universities to innovate Mass Timber Connections Solutions, reduce costs and extend the reach of mass timber in the market.

WE GUIDE

We offer free educational sessions on mass timber solutions in forms of webinars, technical learning sessions and event participation throughout North America.

WE EDUCATE

We provide the support needed to design efficient connection solutions. Our North American Support team is available to answer any design questions.

THE BEAM HANGER REVOLUTION

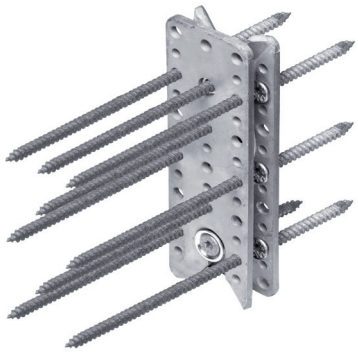
Recent Advances in mass timber fabrication technology and the use of virtual modeling software have changed the way modern mass timber structures are built. It is now possible to fully pre-install connection systems and have them ready for on-site assembly

Pre-engineered connections make it possible to reduce installation error by installing connections in a controlled shop environment. This reduces the cost and complexity of labour required on site.

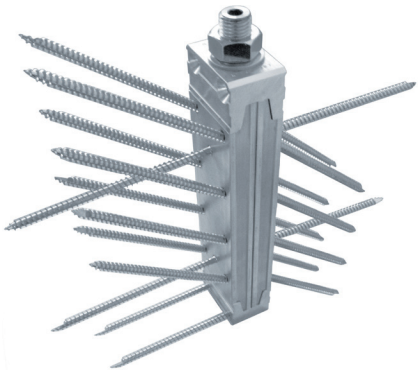
The Beam Hanger System pushes the industry to the next level by allowing pre manufacturing of connections. The Beam Hanger Systems presented in this guide are a revolutionary solution that allows for simple, fully concealed and fire rated connections in mass timber structures.

It is an off the shelf high capacity system, cost competitive as a structural package and delivered on site in record time.

GIGANT System



RICON S VS System



MEGANT System

Simple and Fast Installation

The Beam Hanger System typically consists of two identical parts, one installed in the primary member and the other in the secondary member.

These components are pre-installed into the members using structural wood screws. Depending on the Beam Hanger type, the system could include other required installation hardware. For more information, see hardware section, pages 8 to 10.

A simple, efficient and repetitive installation which reduces shop time and overall mass timber system supply cost.

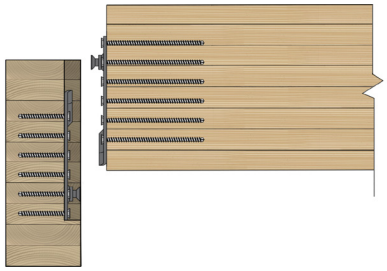
Once the connection is ready in the shop, it is transported to the job site so it can be simply dropped-in place with no further installation work required. This allows for a more streamlined workflow.

Install of pre manufactured Post to Beam connection
First Tech building, Portland Oregon

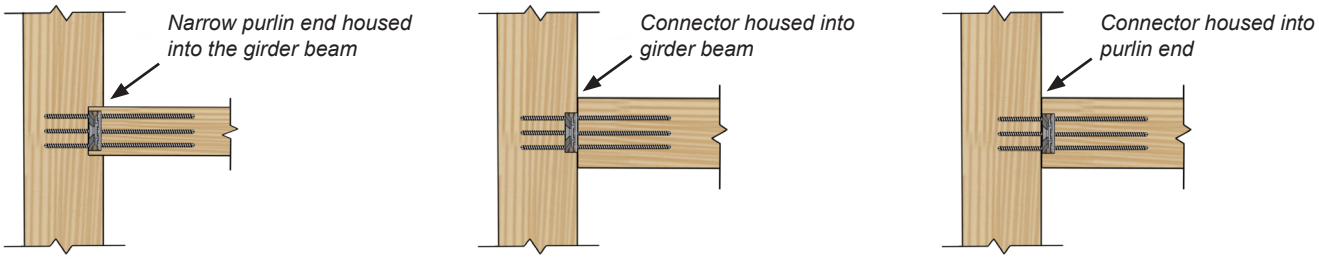
Fully Concealable System

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

This concealed arrangement also helps provide fire protection as explained in the following section.



Typical Concealed Configuration Achieved through Routing for Fire-Rated Connections



Top View of Three Concealed Installation Options

Fire-Rated

Full-scale fire resistance testing of loaded specimens connected with the Beam Hanger System were preformed at the Southwest Research Institute in San Antonio Texas.

The fire testing was conducted to verify the char layer calculations provided in North American Design standards. The tested Beam Hanger Systems were awarded with a 1-hour fire rating with a specified minimum char layer thickness.

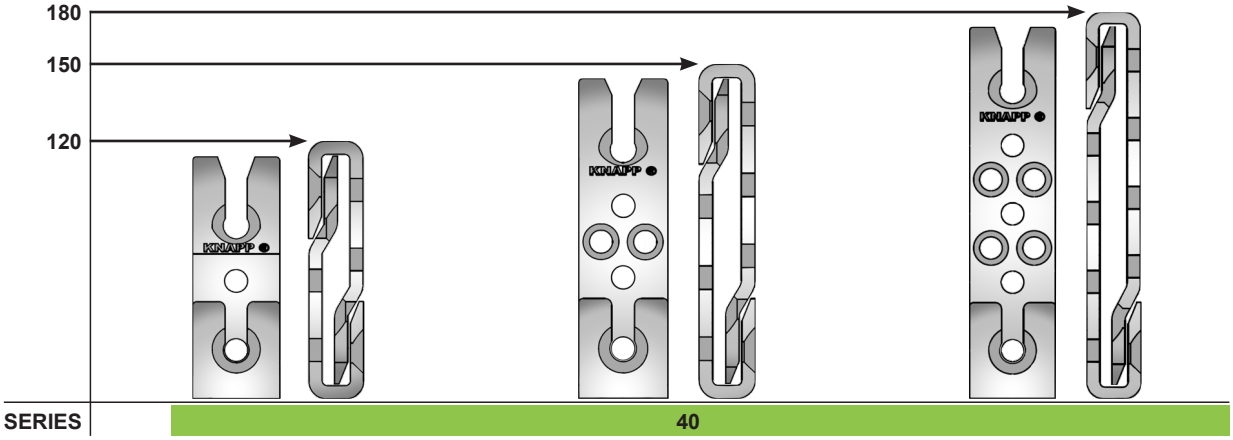
It is also possible to calculate the fire rating for a Beam Hanger System using the appropriate codes and guidelines.

This is recommended for the Beam Hanger Systems that were not a part of the full-scale testing at the published date of this guide.

RICON S VS and MEGANT Connectors After Fire Testing

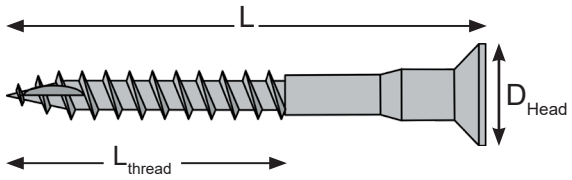
HARDWARE

GIGANT



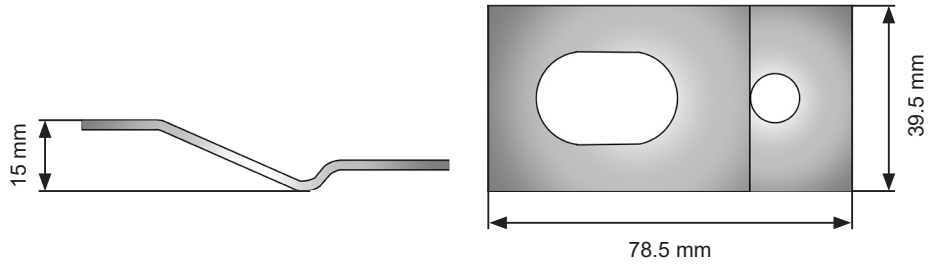
Note:
1. Product kit includes two identical connector plates.

Fastener - Gigant CSK



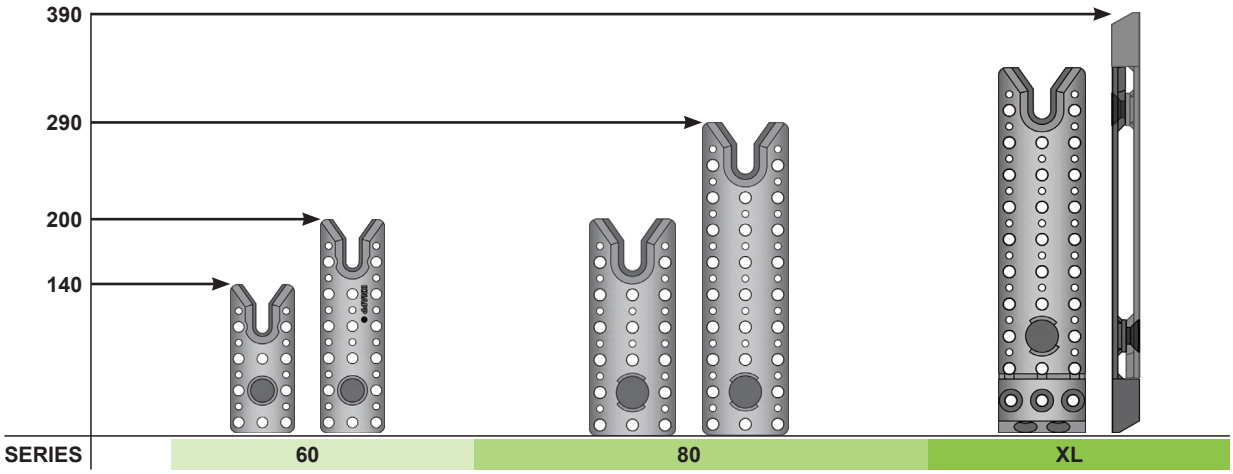
Item #	Type	D		L		L_{thread}		D_{Head}		Bit
		mm	[in]	mm	[in]	mm	[in]	mm	[in]	
170110080000100	Gigant CSK Screws	10	[3/8”]	80	[3-1/8”]	54	[2-1/4”]	18	[3/4”]	T40
170110120000100				120	[4-3/4”]	84	[3-3/8”]	18	[3/4”]	

Uplift Option - Clip Lock System



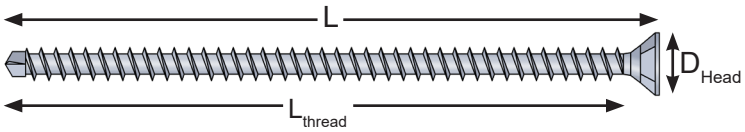
Side View **Front View**

RICON S VS



Note:
1. Product kit includes two identical connector plates.

Fastener - ASSY VG CSK



Item #	Type	D		L		L_{thread}		D_{Head}		Bit
		mm	[in]	mm	[in]	mm	[in]	mm	[in]	
140080080000102	ASSY VG CSK	8	[5/16”]	80	[3-1/8”]	61	[2-1/2”]	15	[5/8”]	AW 40
140080160000102				160	[6-1/4”]	143	[5-5/8”]			
140100100000102		10	[3/8”]	100	[4”]	77	[3”]	18.5	[3/4”]	AW 50
140100200000102				200	[7-7/8”]	185	[7-1/4”]			

Notes:
1. Apply 160mm or 200mm screw into the end grain.
2. The suggested maximum installation torque for the 8mm diameter VG CSK screw is 16 Nm
3. The suggested maximum installation torque for the 10mm diameter VG CSK screw is 32 Nm

Bit - AW® Drive

The AW® Bits are engineered and patented for proper installation of all ASSY® screws and offer exceptional fit and durability. The AW® Bit series is engineered for:

- Optimum torque transfer
- Snug fit
- Self centering
- Reduced wobbling

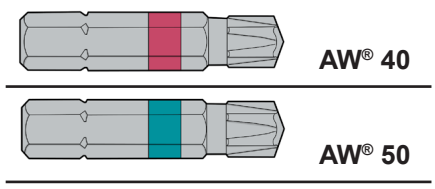
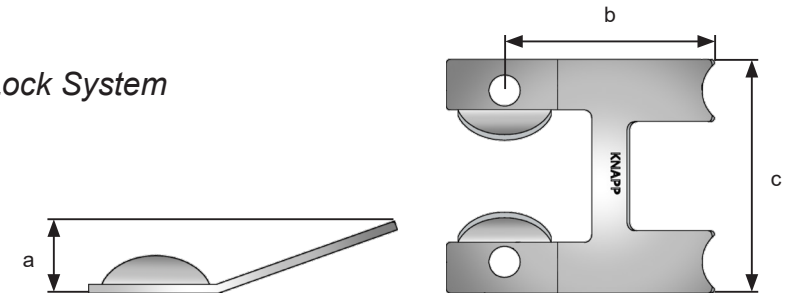
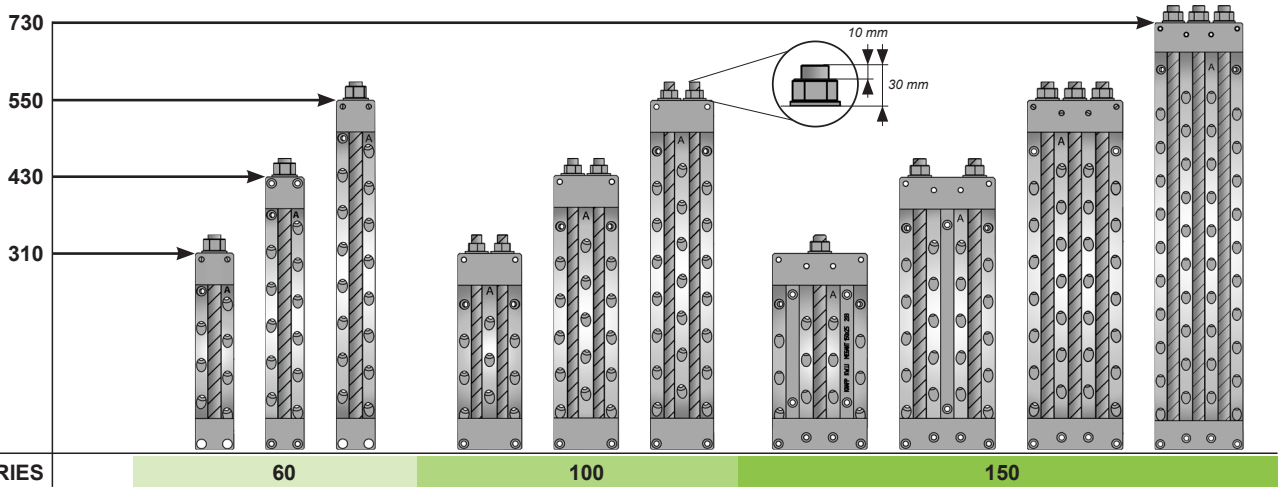


Table Uplift Options - Clip Lock System

SERIES	60	80
a *[mm]*	15.7	16
b *[mm]*	51	50
c *[mm]*	60	80



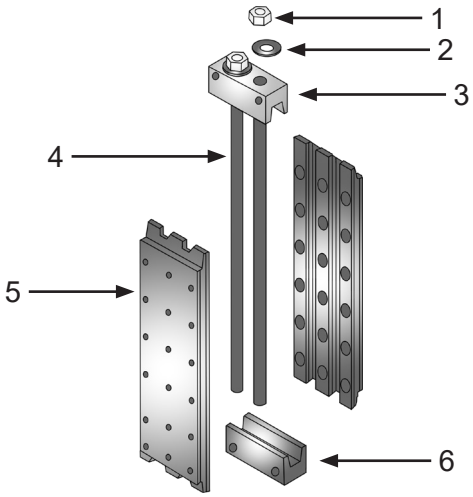
MEGANT



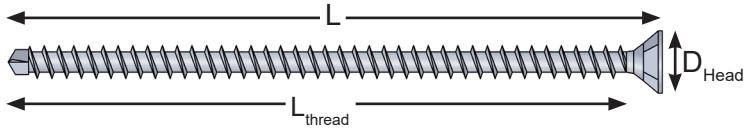
Note:
1. The suggested installation torque of the top nut for the MEGANT is 40 Nm

Product Kit Details

Number	Description
1	Hex Nut
2	Washer
3	Top Clamping Jaws [Without Thread]
4	Threaded Rod
5	Connector Plate [x 2]
6	Bottom Clamping Jaws [With Thread]



Fastener - ASSY VG CSK



Item #	Type	D		L		L_{thread}		D_{Head}		Bit
		mm	[in]	mm	[in]	mm	[in]	mm	[in]	
140080160000102	ASSY VG CSK	8	[5/16"]	160	[6-1/4"]	143	[5-5/8"]	15	[5/8"]	AW 40

Note:
1. The suggested maximum installation torque for the 8mm diameter VG CSK screw is 16 Nm

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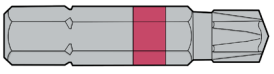


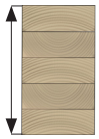
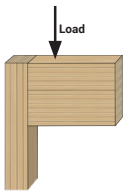
AW® 40

BEAM HANGER : SELECTION TOOL

The following pre-selection table helps the designer in choosing the right Beam Hanger System. The table lists the allowable loads for each system based on the minimum beam width and minimum beam depth.

More detail on a specific Beam Hanger System can be found in the pages listed in the table. Other requirements such as geometry and special connections should also be taken into consideration.

Table 1 Beam Hanger Selection guide for Douglas Fir Glulam Members

Minimum Beam Width		Minimum Beam Depth		Factored Capacity		Connector	
							
mm	[inch]	mm	[inch]	kN	kN 50 100 150 200 250 300		Page
60	[2-3/8"]	160	[6-1/4"]	9		Gigant 120x40	16
		200	[7-7/8"]	14		Gigant 150x40	17
		222	[8-3/4"]	18		Gigant 180x40	18
100	[4"]	180	[7"]	26		Ricon S VS 140x60	20
		240	[9-1/2"]	39		Ricon S VS 200x60	22
		400	[15-3/4"]	60		Megant 310x60	30
		520	[20-1/2"]	94		Megant 430x60	32
		640	[25-1/4"]	125		Megant 550x60	34
120	[4-3/4"]	240	[9-1/2"]	58		Ricon S VS 200x80	24
		330	[13"]	71		Ricon S VS 290x80	26
		430	[17"]	131		Ricon XL 390x80	28
140	[5-5/8"]	400	[15-3/4"]	77		Megant 310x100	36
		530	[20-7/8"]	128		Megant 430x100	38
		650	[25-5/8"]	166		Megant 550x100	40
190	[7-1/2"]	400	[15-3/4"]	100		Megant 310x150	42
		520	[20-1/2"]	166		Megant 430x150	44
		640	[25-1/4"]	232		Megant 550x150	46
		830	[33-1/8"]	318		Megant 730x150	48

Notes:

1. Factored resistances listed are only valid for limit states design in Canada. This table is a pre-selection tool, please refer to each respective connector section and the CSA for complete design guideline.
2. Factored resistance listed here are only valid for use in D-Fir, please refer to each respective connector section for more values.
3. In the table:
   - ■ Single connector factored resistance.
   - ■ Double connectors factored resistance, minimum beam width is larger than listed value, refer to respective connector section.

HOW TO USE THIS GUIDE

About This Guide

All factored resistances presented in this document have been derived following the applicable provisions from the 2018 Canadian Standards Association (CSA-O86) for Wood Construction.

Design Table Explanation

Item #

Product Item number

Min. Beam Size

The minimum beam cross section requirements needed to install the Beam Hanger System

Fastener Information

Fasteners are used to install the system in both the Primary member and the Secondary member

Type: Corresponds to the names and dimensions of the screws used
Quantity: Number of screws used

Factored Resistances

Factored resistances are derived in accordance with Canadian standards.

For more information please see “Factored Resistance Derivation” section, page 14.

Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners: Primary Member Type	Fasteners: Primary Member Quantity	Fasteners: Secondary Member Type	Fasteners: Secondary Member Quantity	Factored Resistance, N_r: Down Load kN	Factored Resistance, N_r: Down Load [lbs]	Uplift
SINGLE RICON 140X60 S VS 170214060000900	100 x 180	0.42 (SPF)	VG CSK 8 x 80	7	VG CSK 8 x 160	7	19	[4,250]	See uplift design p. 50 - 52
				10		10	26	[5,820]	
		0.49 (D.Fir)		7		7	21	[4,700]	
				10		10	29	[6,490]	
DOUBLE RICON 140X60 S VS 170214060000900	170 x 180	0.42 (SPF)	VG CSK 8 x 80	14	VG CSK 8 x 160	14	32	[7,160]	
				20		20	44	[9,850]	
		0.49 (D.Fir)		14		14	36	[8,060]	
				20		20	49	[10,970]	

Assigned Specific Gravities (G)

S-P-F G = 0.42

Douglas Fir G = 0.49

Table Color Code

The colors represent the diameter of the fasteners used in the system:

- 6 mm
- 8 mm
- 10 mm
- 12 mm

Special Connections

If available, uplift design details will be presented for the Beam Hanger Systems in this guide. All other special connections will be listed in the table of content.

Icons Explanation

This design guide includes special icons intended to help the designer to select the right Beam Hanger System.

Compatible Material

This category highlights the compatible building materials with each beam hanger system.

The Beam Hanger System can be installed to wood elements

The Beam Hanger System can be installed to steel material

The Beam Hanger System can be installed to concrete material

The Beam Hanger System can be welded to the main or secondary member

Factored Resistance Evaluation

This category identifies the approval bodies that have awarded the Beam Hanger System with the appropriate certifications.

Factored resistance for the Beam Hanger Systems were derived in accordance with CSA-O86

European Technical Approval (EU)

Canadian Construction Materials Centre

International Code Council

Fire Rating

This catagory identifies the fire rating method for the Beam Hanger systems.

Full scale fire testing certifying system for 1.5 hours fire rating

Fire design may be calculated up to 3 hours

Installation Possibilities

The Beam Hanger Systems can be installed from different orientations. The orientations are relative to the main member. They also include special installation possibilities. Each installation orientation is general and does not take into consideration specific project constraints.

The Beam Hanger System can be installed and dropped in from above only

The Beam Hanger System can be installed and positioned from all sides (left, right, up and down)

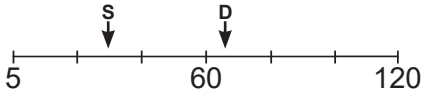
The Beam Hanger System can be fully concealed and housed into the members

The Beam Hanger System can not be fully concealed

The Beam Hanger System can be pre-installed in a shop to the members before arriving on-site

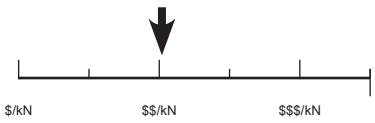
Number of Fasteners to Install

This category shows a summary of the number of fasteners required for fastening the system. The minimum screw quantity required for the Beam Hanger Systems is presented on the left and the maximum quantity on the right. The S indicates single connections, and D double connections



Cost to Capacity Ratio

This category shows a general cost to capacity ratio within the Beam Hanger Systems. This is meant to provide the designer with information on the cost of the Beam Hanger System relative to the capacities reached.



NOTES TO THE DESIGNER

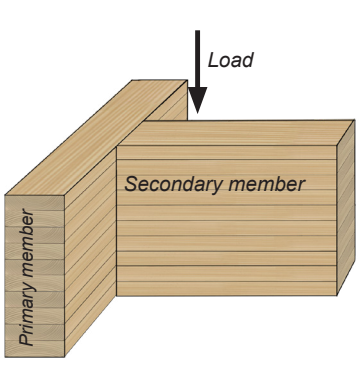
1. Factored resistances are derived in accordance with CSA-O86. Values given in the design tables are LSD (Limit State Design) equivalent and need to be adjusted in accordance with all parameters listed in the CSA-O86.
2. Connectors in combination with carbon steel ASSY VG CSK fasteners are to be used in dry service conditions and temperatures below 122F so that K_T = 1.0 and K_S=1.0.
3. Connectors are to be aligned with the resultant vertical force, with the plates installed symmetrically about the vertical axis. Horizontal eccentricities shall be avoided.
4. Connectors, if subjected to rotational forces, must be designed accordingly and appropriate additional measures must be defined by the designer.
5. If splitting of the wood or wood-based material is observed during installation or prior to installation of the fasteners, a design professional must be contacted immediately, and appropriate measures must be taken. In case of fastener damage or breakage, a design professional must also be notified.
6. Pilot holes may be used to facilitate the installation of the fasteners for the sake of greater precision. Pilot hole diameters shall not exceed 60% of the outer thread diameter of the fastener.
7. Factored resistances may exceed the shear capacity of the glulam member or cross-laminated timber or other material properties. The specifying designer must verify the capacity of all members of the connection accordingly.
8. Installation must respect all minimum beam size requirements.
9. Connection geometry requirements must be respected, otherwise connections must be reinforced.
10. Listed factored resistances apply to different timber species according to their respective relative densities (G) as per CSA-O86.
11. The sample beam depths listed in this design guide are for guidance purposes only. Note that tolerances for glulam finished dimensions provided within manufacturing standards CSA 0122 may not provide the adequate squareness and depth consistency required to ensure a problem-free field installation. A 1/4” (6mm) undersize in depth and 1/8” (3 mm) in width may be required. Verify glulam finished dimensions with the timber provider for more information.

Factored Resistance Derivation

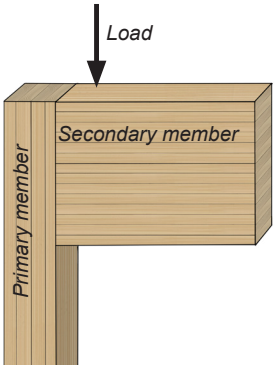
Factored resistance for the Beam Hanger System was derived in accordance with CSA-O86 clause 12.10 referencing ASTM D7147.

Fastener factored resistances were evaluated following the analysis presented in CSA-O86. ASSY fully threaded fasteners are in accordance with the CCMC evaluation report.

Typical Load Application



Typical Beam to Girder Installation



Typical Post to Beam Installation

Carbon 12

Portland, Oregon 2017

Courtesy of: Andrew Poque

GIGANT 120 X 40

*Connector Parameters and Dimensions**

Compatible Material

Load Rating

Fire Rating

up to 3h

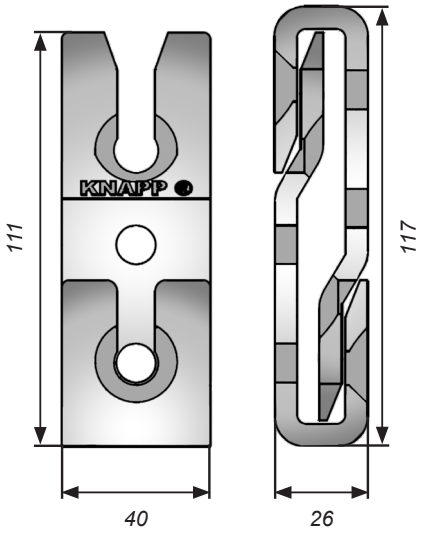
Installation Possibilities

Number of Fasteners to Install

5 60 120

Ratio Cost/Capacity

$/kN $$/kN $$$/kN



* Dimensions in mm

Table 2.1 Factored Resistances for GIGANT 120 x 40

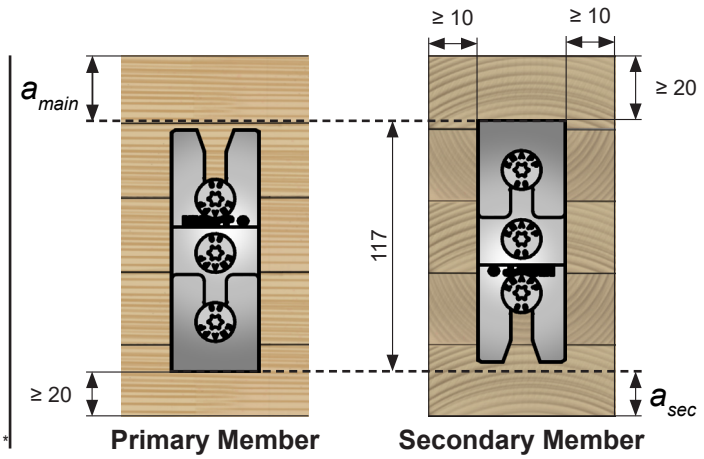
Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners				Factored Resistance, N_r		Uplift
			Primary Member		Secondary Member		Down Load		
			Type	Quantity	Type	Quantity	kN	[lbs]	
GIGANT 120 x 40 170112040000100	60 x 160	0.42 (SPF)	Gigant CSK 10 x 80	3	Gigant CSK 10 x 120	3	8	[1,790]	See uplift design p. 51 - 53
		0.49 (D.Fir)	Gigant CSK 10 x 80	3	Gigant CSK 10 x 120	3	9	[2,020]	

Table 2.2 Geometry Requirements - Minimum and Maximum Distances (a_{main}, a_{sec})

Beam Depth		[mm]	160	198	236	274	312	350	388	426	464
a_{main} & a_{sec}	min	[mm]	20								
	max	[mm]	20	22	34	45	57	68	80	91	102

Notes:

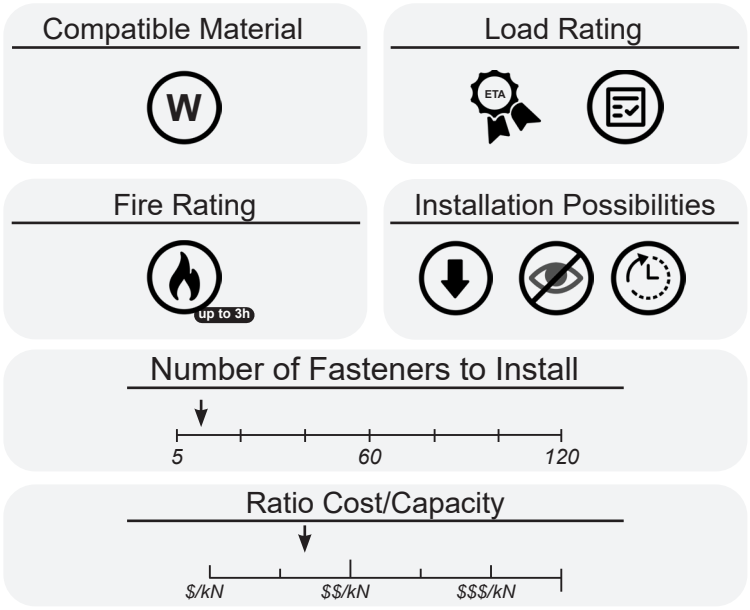
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed Gigant CSK screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the adjacent figures.
6. All connection design must meet all relevant requirements of the Notes to the Designer section.
7. The secondary member must be prevented from twisting.
8. All icons are described in section “How to use this guide” on page 9.
9. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
10. For the beam sizes not listed in table 2.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
11. For deeper than listed beams in table 2.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

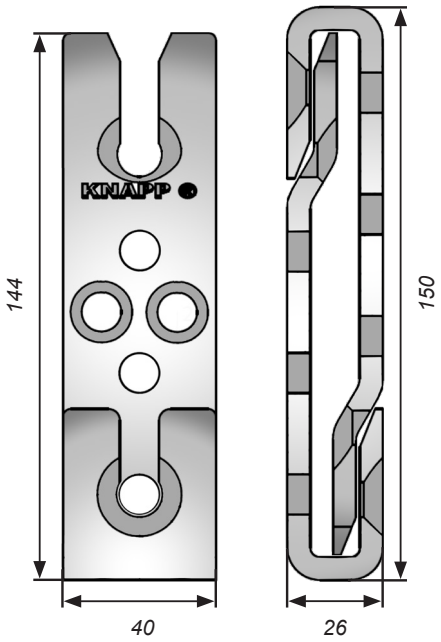


Geometry requirements in mm *

GIGANT 150 X 40

*Connector Parameters and Dimensions**





* Dimensions in mm

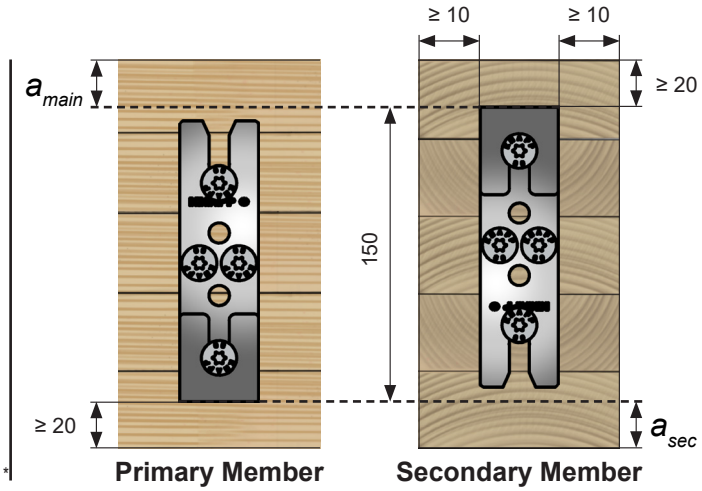
Table 3.1 Factored Resistances for GIGANT 150 x 40

Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners				Factored Resistance, N_r		Uplift
			Primary Member		Secondary Member		Down Load		
			Type	Quantity	Type	Quantity	kN	[lbs]	
GIGANT 150 x 40 17011504000100	60 x 200	0.42 (SPF)	Gigant CSK 10 x 80	4	Gigant CSK 10 x 120	4	12	[2,690]	See uplift design p. 51 - 53
		0.49 (D.Fir)	Gigant CSK 10 x 80	4	Gigant CSK 10 x 120	4	14	[3,140]	

Table 3.2 Geometry Requirements - Minimum and Maximum Distances (a_{main}, a_{sec})

Beam Depth			200	238	276	314	352	390	448	466	504
a_{main} & a_{sec}	min	[mm]	20								
	max		22	33	45	56	68	79	96	102	113

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed Gigant CSK screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the adjacent figures.
6. All connection design must meet all relevant requirements of the Notes to the Designer section.
7. The secondary member must be prevented from twisting.
8. All icons are described in section "How to use this guide" on page 9.
9. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
10. For the beam sizes not listed in table 3.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
11. For deeper than listed beams in table 3.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.



Geometry requirements in mm *

GIGANT 180 X 40

*Connector Parameters and Dimensions**

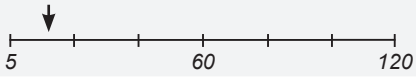
Compatible Material

Load Rating

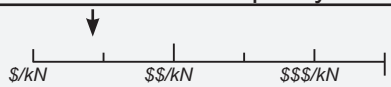
Fire Rating

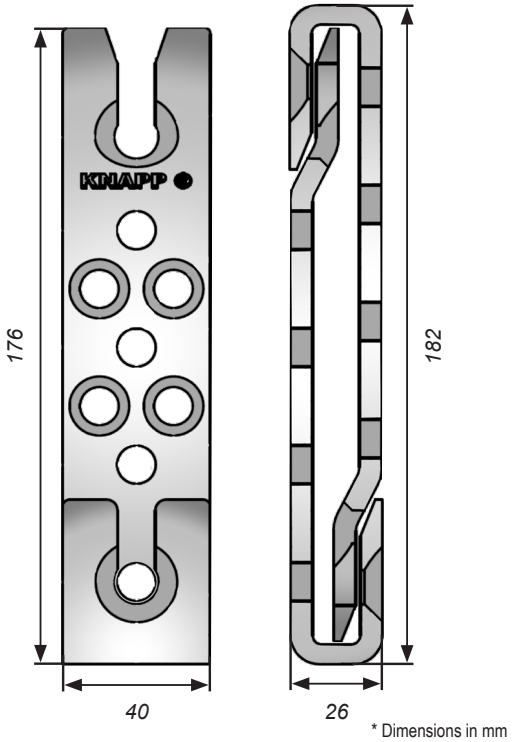
Installation Possibilities

Number of Fasteners to Install



Ratio Cost/Capacity





* Dimensions in mm

Table 4.1 Factored Resistances for GIGANT 180 x 40

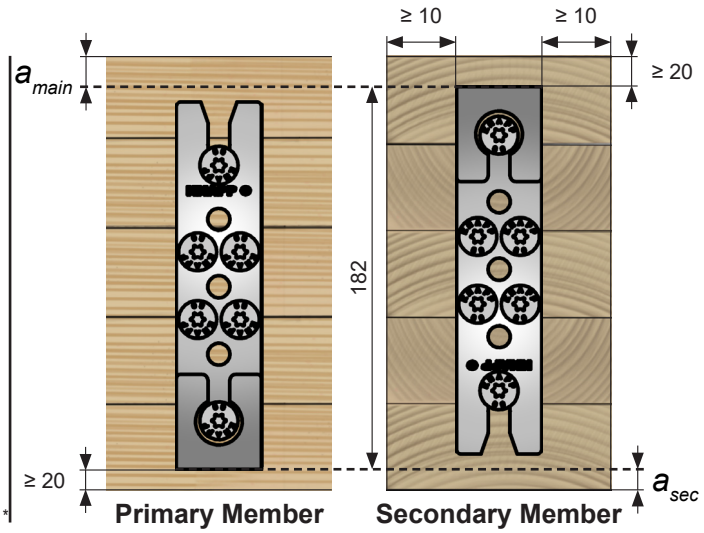
Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners				Factored Resistance, N_r		Uplift
			Primary Member		Secondary Member		Down Load		
			Type	Quantity	Type	Quantity	kN	[lbs]	
GIGANT 180 x 40 170118040000100	60 x 222	0.42 (SPF)	Gigant CSK 10 x 80	6	Gigant CSK 10 x 120	6	16	[3,590]	See uplift design p. 51 - 53
		0.49 (D.Fir)	Gigant CSK 10 x 80	6	Gigant CSK 10 x 120	6	18	[4,040]	

Table 4.2 Geometry Requirements - Minimum and Maximum Distances (a_{main}, a_{sec})

Beam Depth		[mm]	222	258	296	334	372	410	448	486	524
a_{main} & a_{sec}	min	[mm]	20								
	max		20	39	50	62	73	85	96	108	119

Notes:

1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed Gigant CSK screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the adjacent figures.
6. All connection design must meet all relevant requirements of the Notes to the Designer section.
7. The secondary member must be prevented from twisting.
8. All icons are described in section “How to use this guide” on page 9.
9. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
10. For the beam sizes not listed in table 4.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
11. For deeper than listed beams in table 4.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.



Geometry requirements in mm *

Rocky Ridge YMCA

Calgary, Alberta 2016

RICON S VS 140 X 60

*Connector Parameters and Dimensions**

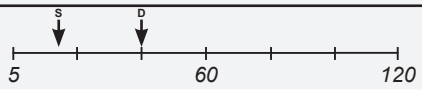
Compatible Material

Load Rating

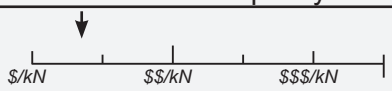
Fire Rating

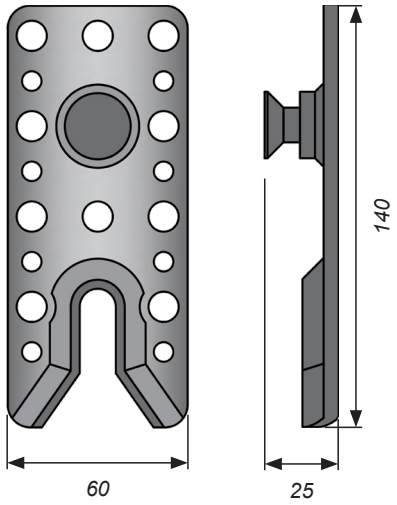
Installation Possibilities

Number of Fasteners to Install



Ratio Cost/Capacity



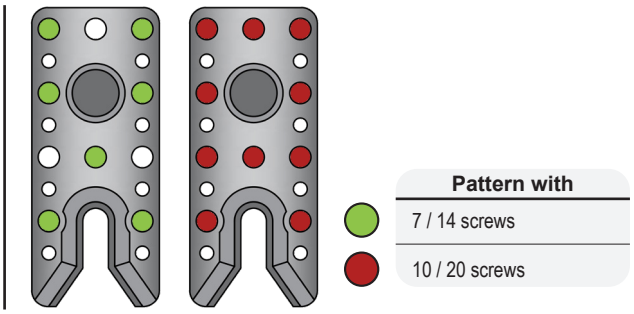


* Dimensions in mm

Table 5.1 Factored Resistances for RICON S VS 140 x 60

Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners				Factored Resistance, N_r		Uplift
			Primary Member		Secondary Member		Down Load		
			Type	Quantity	Type	Quantity	kN	[lbs]	
SINGLE RICON 140X60 S VS 17021406000900	100 x 180	0.42 (SPF)	VG CSK 8 x 80	7	VG CSK 8 x 160	7	19	[4,270]	See uplift design p. 51 - 53
				10		10	24	[5,390]	
		0.49 (D.Fir)		7		7	21	[4,720]	
				10		10	26	[5,840]	
DOUBLE RICON 140X60 S VS 17021406000900	170 x 180	0.42 (SPF)	VG CSK 8 x 80	14	VG CSK 8 x 160	14	32	[7,190]	
				20		20	40	[8,990]	
		0.49 (D.Fir)		14		14	36	[8,090]	
				20		20	44	[9,890]	

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.21). If not fulfilled, additional reinforcement in accordance with Reinforcement Section (p. 64-69) must be applied.
6. The secondary member must be prevented from twisting.
7. All icons are described in section “How to use this guide” on page 9.
8. Screw installation must follow the patterns presented under the design table.
9. All connection design must meet all relevant requirements of the Notes to the Designer section.



*Connection Geometry Requirements**

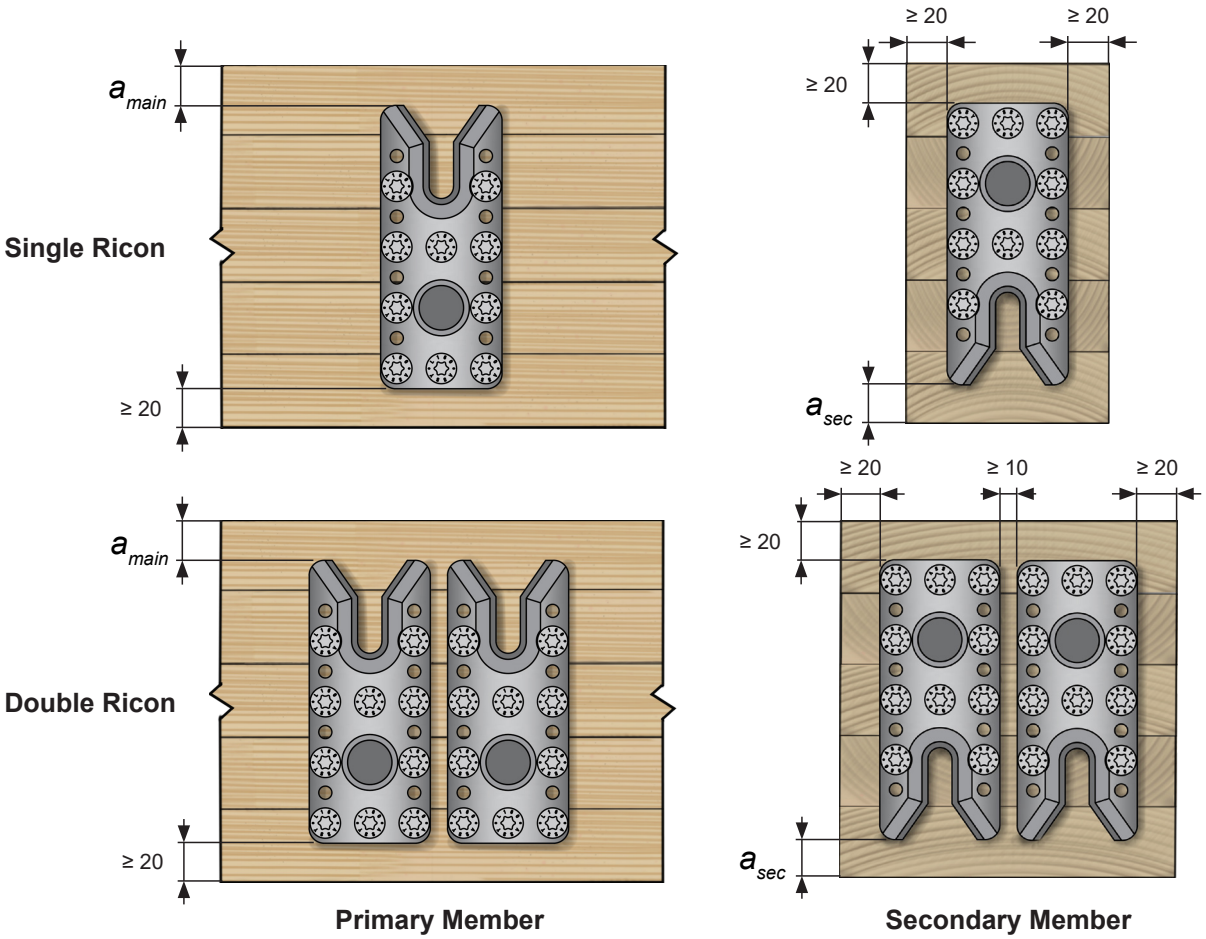
Table 5.2 Minimum and Maximum Distances (a_{main} , a_{sec})

Beam Depth			180	228	266	304	342	380	418	456	494	532	570	608
a_{main} & a_{sec}	min	[mm]	20											
	max		20	28	40	51	63	74	85	97	108	120	131	142

Notes:

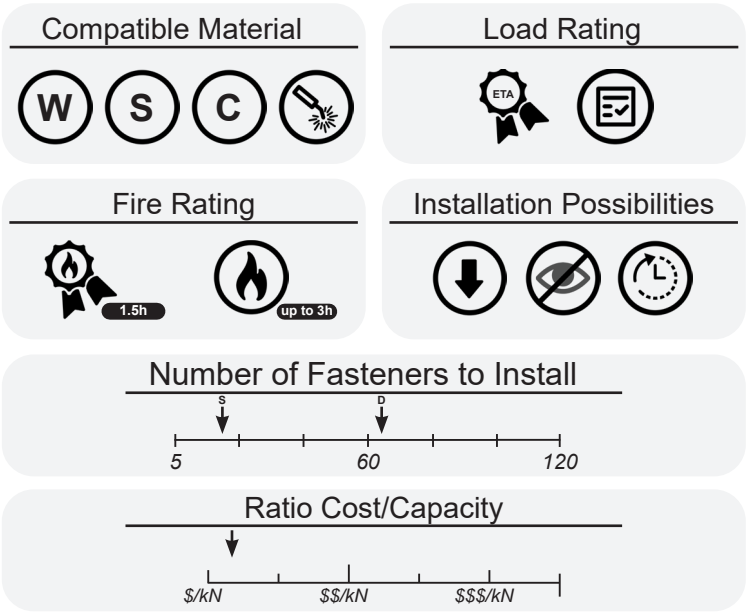
1. The connector may be used without reinforcement if $a_{min} \leq [\, a_{main} \,\&\, a_{sec} \,] \leq a_{max}$. If $a_{sec} > a_{max}$, the connection must be reinforced following the reinforcement section (p.64-69).
2. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
3. For the beam sizes not listed in table 5.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 5.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

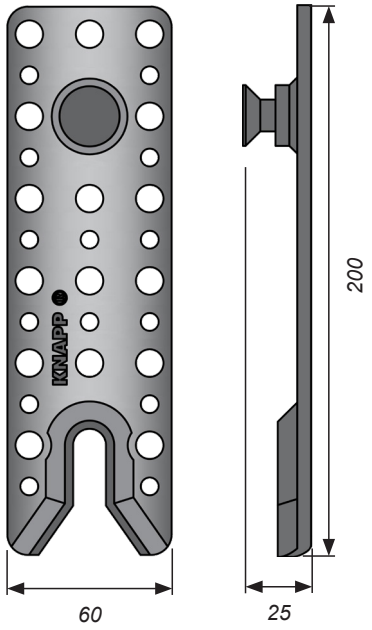
* Geometry requirements in mm



RICON S VS 200 X 60

*Connector Parameters and Dimensions**



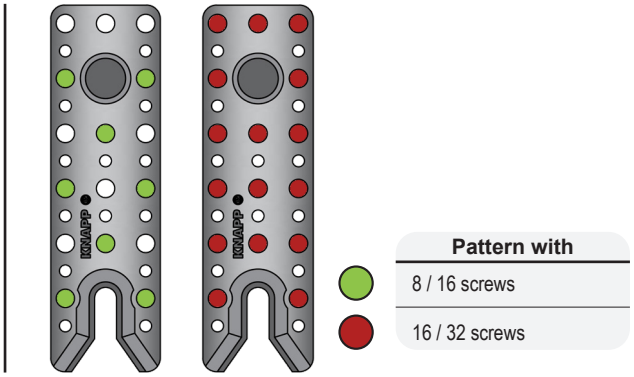


* Dimensions in mm

Table 6.1 Factored Resistances for RICON S VS 200 x 60

Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners				Factored Resistance, N_r		Uplift
			Primary Member		Secondary Member		Down Load		
			Type	Quantity	Type	Quantity	kN	[lbs]	
SINGLE RICON 200X60 S VS 17022060000900	100 x 240	0.42 (SPF)	VG CSK 8 x 80	8	VG CSK 8 x 160	8	20	[4,490]	See uplift design p. 51 - 53
				16		16	36	[8,090]	
		0.49 (D.Fir)		8		8	22	[4,940]	
				16		16	39	[8,760]	
DOUBLE RICON 200X60 S VS 17022060000900	170 x 240	0.42 (SPF)	VG CSK 8 x 80	16	VG CSK 8 x 160	16	34	[7,640]	
				32		32	61	[13,710]	
		0.49 (D.Fir)		16		16	37	[8,310]	
				32		32	66	[14,830]	

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.23). If not fulfilled, additional reinforcement in accordance with Reinforcement Section (p. 64-69) must be applied.
6. The secondary member must be prevented from twisting.
7. All icons are described in section “How to use this guide” on page 9.
8. Screw installation must follow the patterns presented under the design table.
9. All connection design must meet all relevant requirements of the Notes to the Designer section.



*Connection Geometry Requirements**

Table 6.2 Minimum and Maximum Distances (a_{main}, a_{sec})

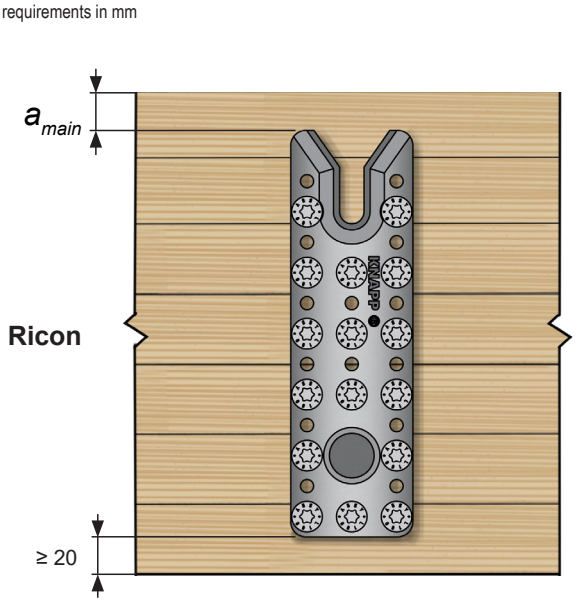
Beam Depth			240	266	304	342	380	418	456	494	532	570	608	646	684
a_{main} & a_{sec}	min	[mm]	20												
	max		20	40	51	63	74	85	97	108	120	131	142	154	165

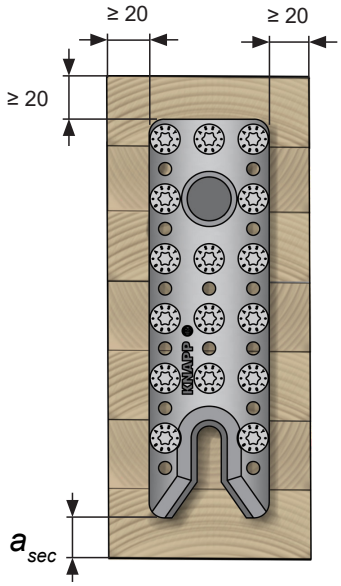
Notes:

1. The connector may be used without reinforcement if $a_{min} \leq [\, a_{main} \,\&\, a_{sec}\,] \leq a_{max}$. If $a_{sec} > a_{max}$, the connection must be reinforced following the reinforcement section (p.64-69).
2. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
3. For the beam sizes not listed in table 6.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 6.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

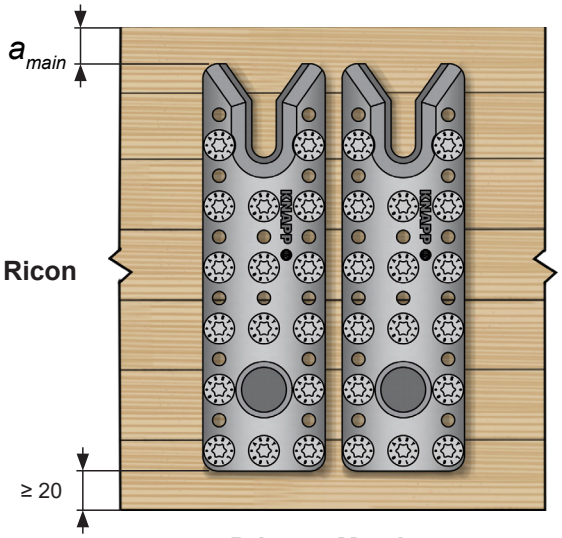
* Geometry requirements in mm

Single Ricon

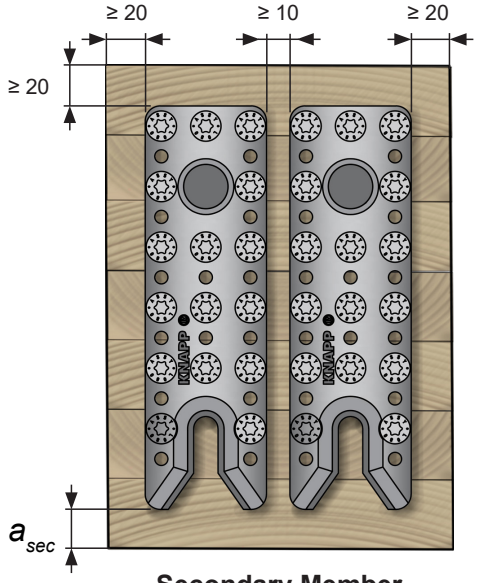




Double Ricon



Primary Member



Secondary Member

RICON S VS 200 X 80

*Connector Parameters and Dimensions**

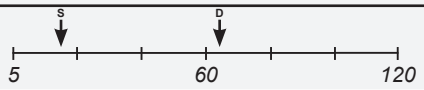
Compatible Material

Load Rating

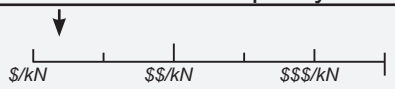
Fire Rating

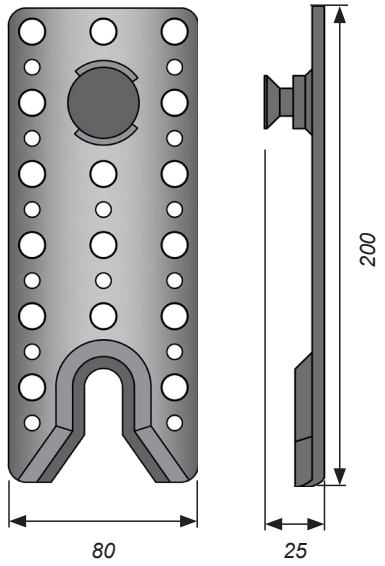
Installation Possibilities

Number of Fasteners to Install



Ratio Cost/Capacity



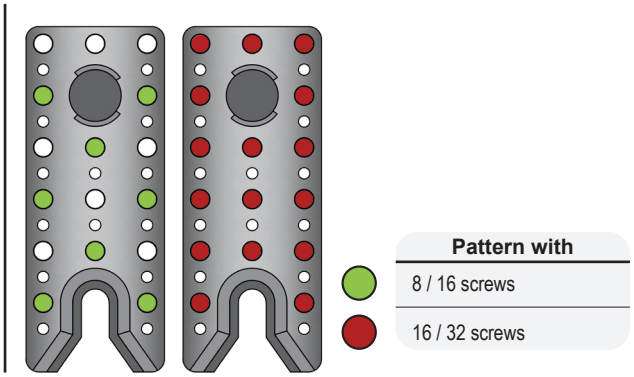


* Dimensions in mm

Table 7.1 Factored Resistances for RICON S VS 200 x 80

Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners				Factored Resistance, N_r		Uplift
			Primary Member		Secondary Member		Down Load		
			Type	Quantity	Type	Quantity	kN	[lbs]	
SINGLE RICON 200X80 S VS 170220080000900	120 x 240	0.42 (SPF)	VG CSK 10 x 100	8	VG CSK 10 x 200	8	28	[6,290]	See uplift design p. 51 - 53
				16		16	53	[11,910]	
		0.49 (D.Fir)		8		8	31	[6,960]	
				16		16	58	[13,030]	
DOUBLE RICON 200X80 S VS 170220080000900	210 x 240	0.42 (SPF)	VG CSK 10 x 100	16	VG CSK 10 x 200	16	50	[11,240]	
				32		32	92	[20,680]	
		0.49 (D.Fir)		16		16	55	[12,360]	
				32		32	102	[22,930]	

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.25). If not fulfilled, additional reinforcement in accordance with Reinforcement Section (p. 64-69) must be applied.
6. The secondary member must be prevented from twisting.
7. All icons are described in section “How to use this guide” on page 9.
8. Screw installation must follow the patterns presented under the design table.
9. All connection design must meet all relevant requirements of the Notes to the Designer section.



*Connection Geometry Requirements**

Table 7.2 Minimum and Maximum Distances (a_{main}, a_{sec})

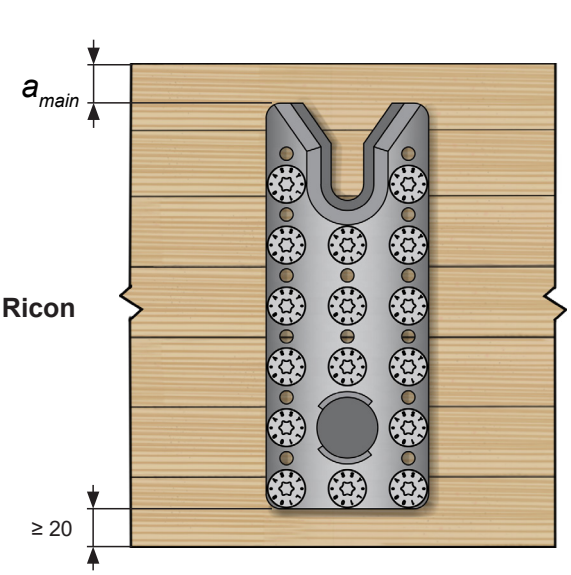
Beam Depth			240	266	304	342	380	418	456	494	532	570	608	646	684
a_{main} & a_{sec}	min	[mm]	20												
	max		20	40	51	63	74	85	97	108	120	131	142	154	165

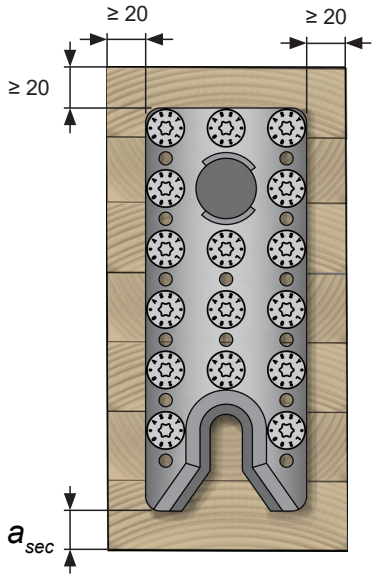
Notes:

1. The connector may be used without reinforcement if $a_{min} \leq [\, a_{main} \,\&\, a_{sec}\,] \leq a_{max}$. If $a_{sec} > a_{max}$, the connection must be reinforced following the reinforcement section (p.64-69).
2. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
3. For the beam sizes not listed in table 7.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 7.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

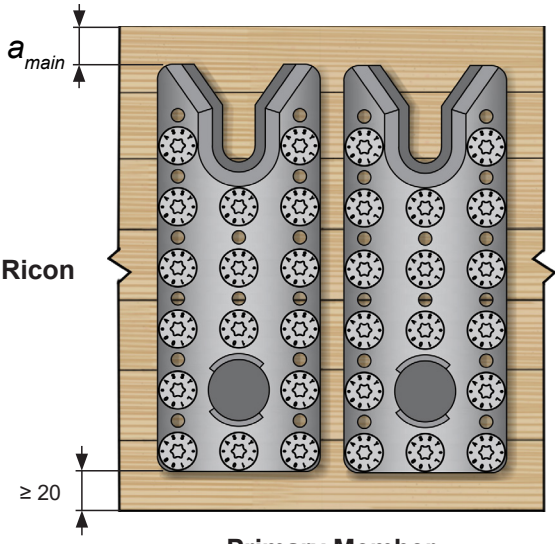
* Geometry requirements in mm

Single Ricon

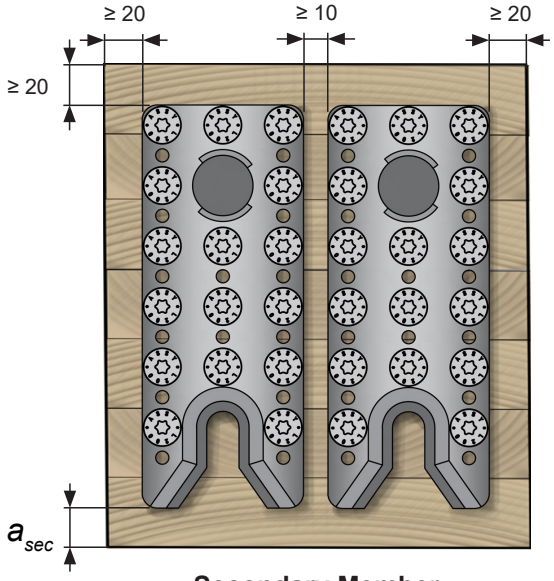




Double Ricon



Primary Member



Secondary Member

RICON S VS 290 X 80

*Connector Parameters and Dimensions**

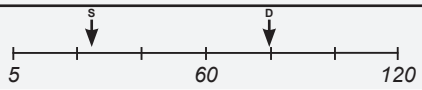
Compatible Material

Load Rating

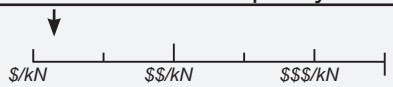
Fire Rating

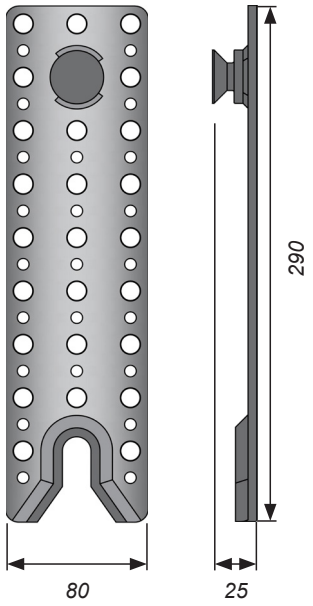
Installation Possibilities

Number of Fasteners to Install



Ratio Cost/Capacity



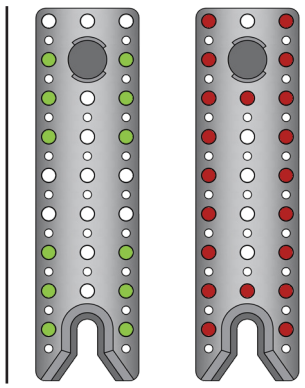


* Dimensions in mm

Table 8.1 Factored Resistances for RICON S VS 290 x 80

Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners				Factored Resistance, N_r		Uplift
			Primary Member		Secondary Member		Down Load		
			Type	Quantity	Type	Quantity	kN	[lbs]	
SINGLE RICON 290X80 S VS 170229080000900	120 x 330	0.42 (SPF)	VG CSK 10 x 100	12	VG CSK 10 x 200	12	41	[9,210]	See uplift design p. 51 - 53
				20		20	65	[14,610]	
		0.49 (D.Fir)		12		12	45	[10,110]	
				20		20	71	[15,960]	
DOUBLE RICON 290X80 S VS 170229080000900	210 x 330	0.42 (SPF)	VG CSK 10 x 100	24	VG CSK 10 x 200	24	71	[15,960]	
				40		40	113	[25,400]	
		0.49 (D.Fir)		24		24	79	[17,750]	
				40		40	124	[27,870]	

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.27). If not fulfilled, additional reinforcement in accordance with Reinforcement Section (p. 64-69) must be applied.
6. The secondary member must be prevented from twisting.
7. All icons are described in section “How to use this guide” on page 9.
8. Screw installation must follow the patterns presented under the design table.
9. All connection design must meet all relevant requirements of the Notes to the Designer section.



Pattern with
12 / 24 screws
20 / 40 screws

*Connection Geometry Requirements**

Table 8.2 Minimum and Maximum Distances (a_{main}, a_{sec})

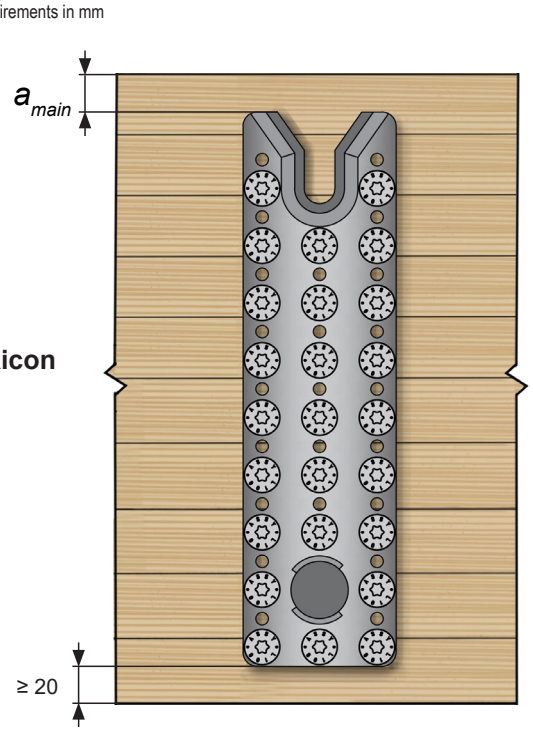
Beam Depth			330	342	380	418	456	494	532	570	608	646	684	722	760
a_{main} & a_{sec}	min	[mm]	20												
	max		20	32	70	85	97	108	120	131	142	154	165	177	188

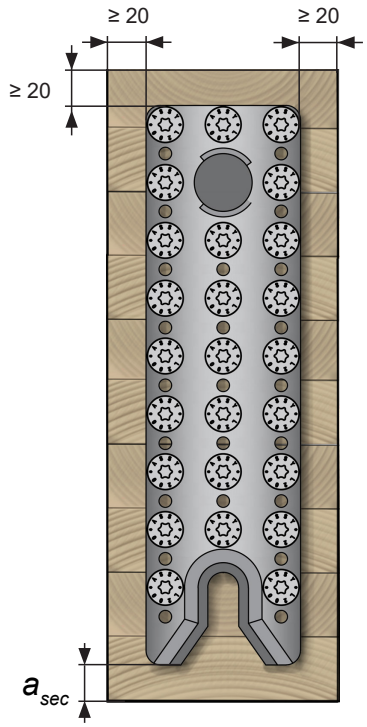
Notes:

1. The connector may be used without reinforcement if $a_{min} \leq [\, a_{main} \,\&\, a_{sec} \,] \leq a_{max}$. If $a_{sec} > a_{max}$, the connection must be reinforced following the reinforcement section (p.64-69).
2. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
3. For the beam sizes not listed in table 8.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 8.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

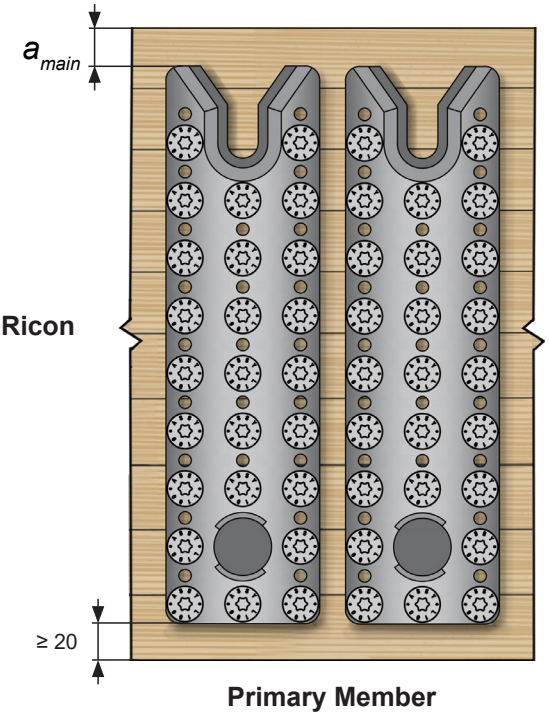
* Geometry requirements in mm

Single Ricon

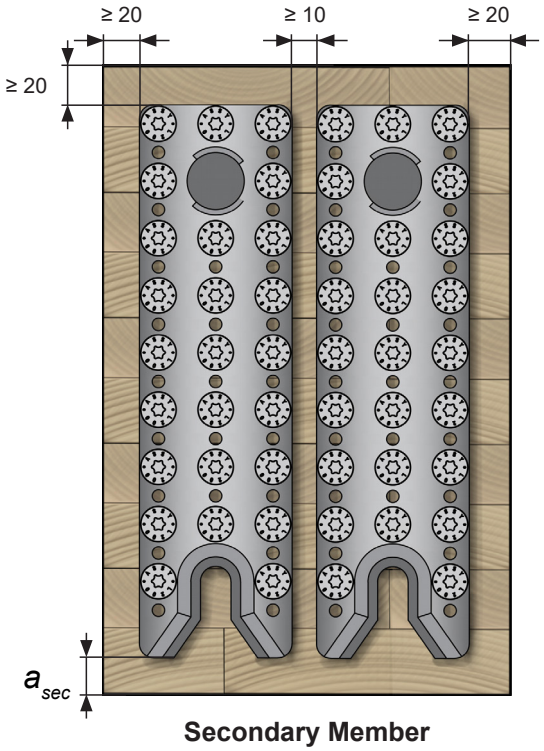




Double Ricon



Primary Member



Secondary Member

RICON XL 390 X 80

*Connector Parameters and Dimensions**

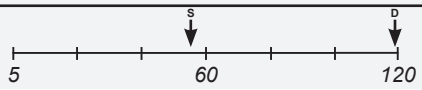
Compatible Material

Load Rating

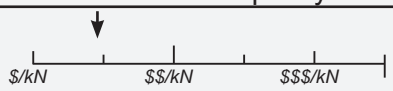
Fire Rating

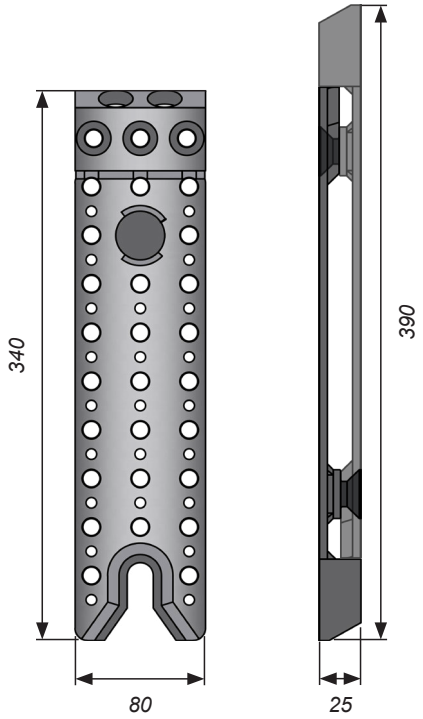
Installation Possibilities

Number of Fasteners to Install



Ratio Cost/Capacity





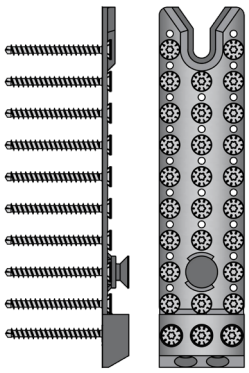
* Dimensions in mm

Table 9.1 Factored Resistances for RICON S VS 390 x 80

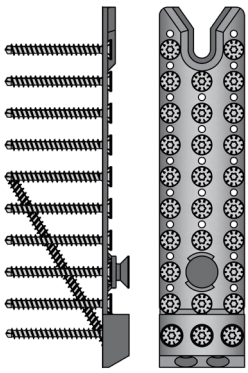
Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners				Factored Resistance, N_r		Uplift
			Primary Member		Secondary Member		Down Load		
			Type	Quantity	Type	Quantity	kN	[lbs]	
SINGLE RICON XL 390X80 170239080000900	120 x 430	0.42 (SPF)	VG CSK 10 x 100 [+ 10 x 200]	28	VG CSK 10 x 200 [+ 10 x 200]	28	86	[19,330]	See uplift design p. 51 - 53
				28 [+ 2]		28 [+ 2]	119	[26,750]	
		0.49 (D.Fir)		28		28	95	[21,350]	
				28 [+ 2]		28 [+ 2]	131	[29,450]	
DOUBLE RICON XL 390X80 170239080000900	210 x 430	0.42 (SPF)	VG CSK 10 x 100 [+ 10 x 200]	56	VG CSK 10 x 200 [+ 10 x 200]	56	151	[33,940]	
				56 [+ 4]		56 [+ 4]	209	[46,980]	
		0.49 (D.Fir)		56		56	166	[37,310]	
				56 [+ 4]		56 [+ 4]	230	[51,700]	

Notes:

1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.29). If not fulfilled, additional reinforcement in accordance with Reinforcement Section (p. 64-69) must be applied.
6. The secondary member must be prevented from twisting.
7. All icons are described in section “How to use this guide” on page 9.
8. Screw installation must follow the patterns presented under the design table.
9. All connection design must meet all relevant requirements of the Notes to the Designer section.



Pattern with 28 / 56 screws



Pattern with 28+2 / 56+4 screws

Connection Geometry Requirements*

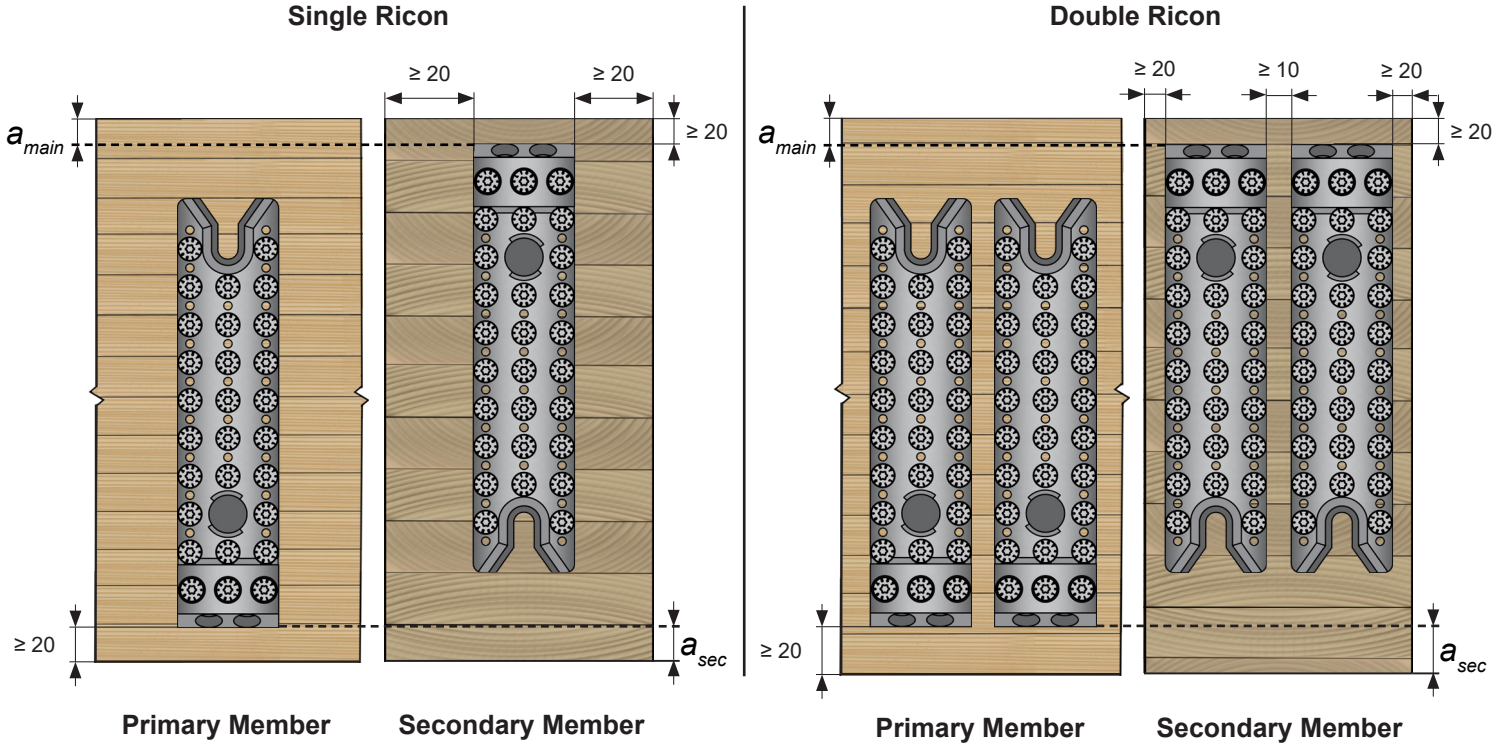
Table 9.2 Minimum and Maximum Distances (a_{main}, a_{sec})

Beam Depth		[mm]	430	456	494	532	570	608	646	684	722	760	798	836	874
a_{main} & a_{sec}	min		20												
	max		20	46	58	70	81	92	104	115	127	138	149	161	172

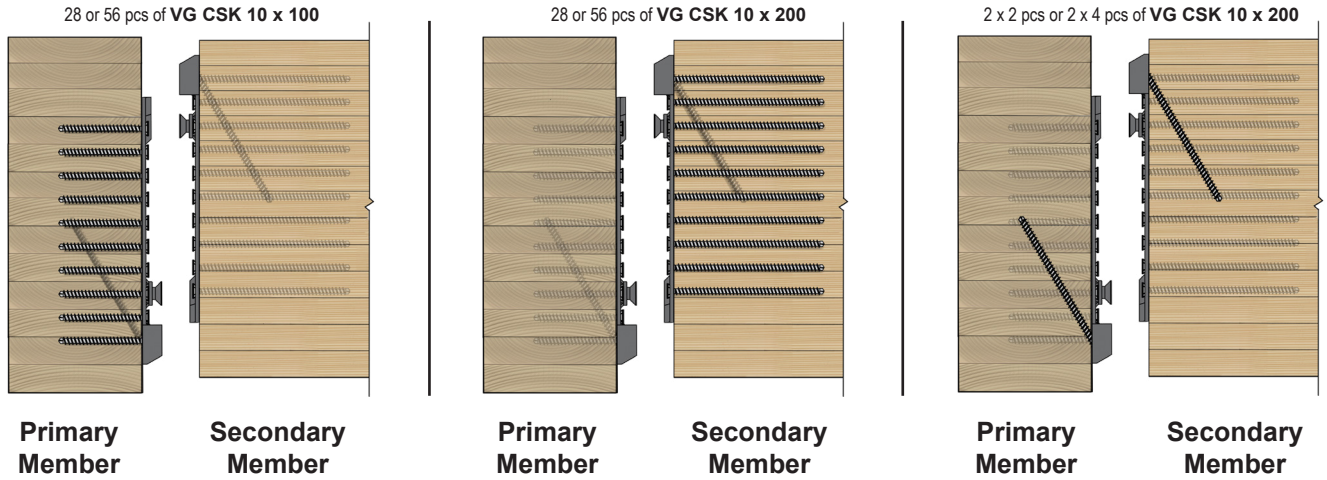
Notes:

1. The connector may be used without reinforcement if $a_{min} \leq [\, a_{main} \,\&\, a_{sec} \,] \leq a_{max}$. If $a_{sec} > a_{max}$, the connection must be reinforced following the reinforcement section (p.64-69).
2. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
3. For the beam sizes not listed in table 9.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 9.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

* Geometry requirements in mm



Screw Location Instructions



MEGANT 310 X 60

*Connector Parameters and Dimensions**

Compatible Material

Load Rating

Fire Rating

1.5h

up to 3h

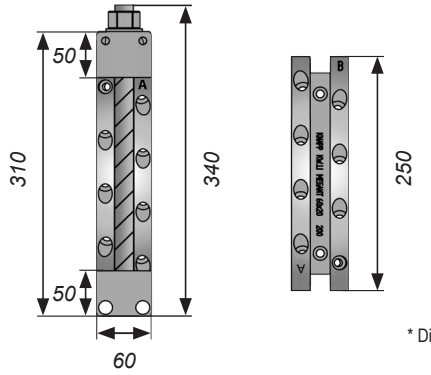
Installation Possibilities

Number of Fasteners to Install

5 60 120

Ratio Cost/Capacity

$/kN $$/kN $$$/kN



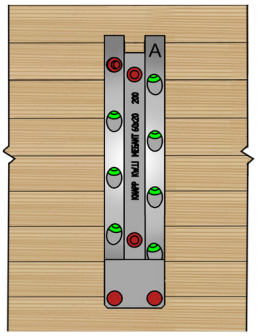
* Dimensions in mm

Table 10.1 Factored Resistances for MEGANT 310 x 60

Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners		Threaded Rod	Factored Resistance, N_r		Uplift
			Type	Quantity		Down Load		
						kN	[lbs]	
MEGANT 310 x 60 17070310060200	100 x 400	0.42 (SPF)	VG CSK 8 x 160	24	1 pcs of M20 x 340 Grade 8.8	53	[11,910]	See uplift design p. 51
		0.49 (D.Fir)	VG CSK 8 x 160	24	1 pcs of M20 x 340 Grade 8.8	60	[13,480]	

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.31).
6. The minimum primary member width must be ≥ 160 mm.
7. The secondary member must be prevented from twisting.
8. All icons are described in section “How to use this guide” on page 9.
9. Screw installation must follow the patterns presented in the figures below.
10. All connection design must meet all relevant requirements of the Notes to the Designer section.

Fasterners	
Orientation	Quantity
90°, Horizontal	10
45°, Inclined	14



Primary Member

Secondary Member

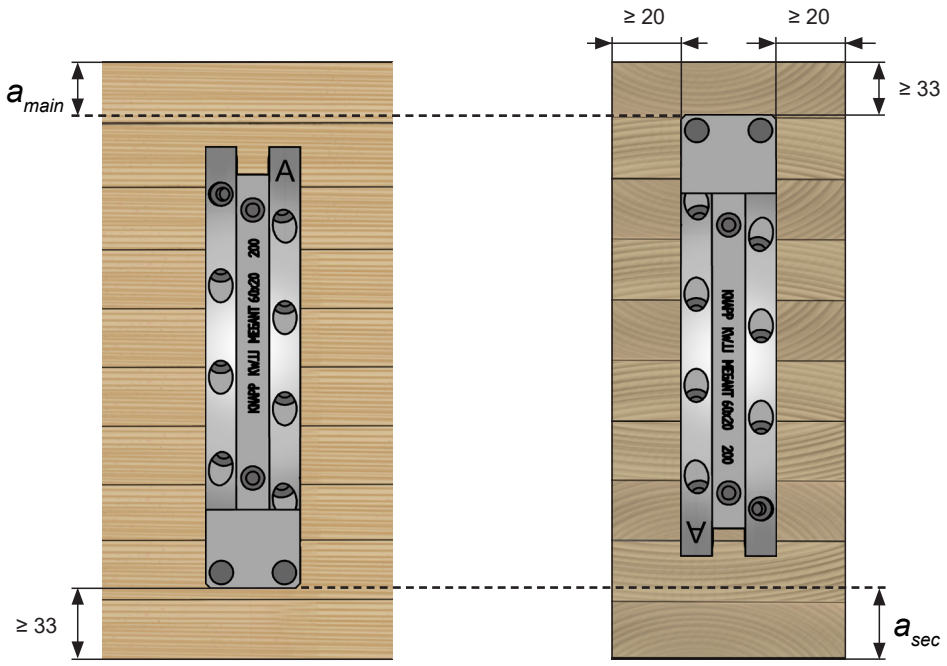
Connection Geometry Requirements*

Table 10.2 Minimum and Maximum Distances (a_{main}, a_{sec})

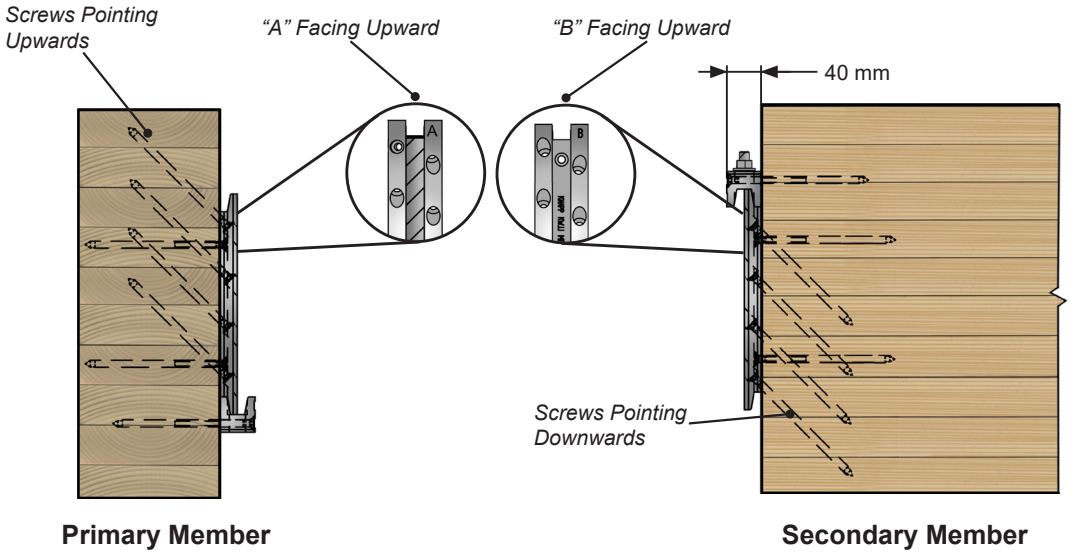
Beam Depth		[mm]	400	456	494	532	570	608
a_{main} & a_{sec}	min		33					
	max		60	113	125	136	148	159

Notes:
1. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
2. Please refer to the "Hardware" setion, page 10, to see MEGANT components in detail.
3. For the beam sizes not listed in table 10.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 10.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

* Geometry requirements in mm



Location Instructions - Connector Plates and Screws



MEGANT 430 X 60

*Connector Parameters and Dimensions**

Compatible Material

Load Rating

Fire Rating

1.5h — up to 3h

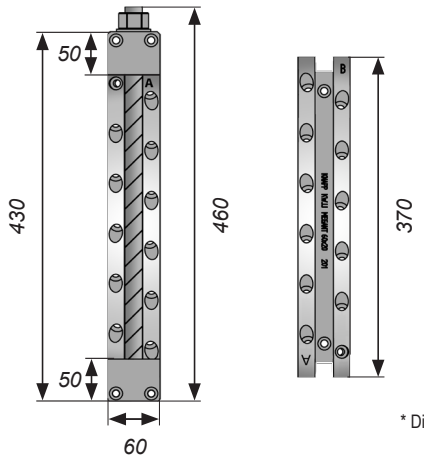
Installation Possibilities

Number of Fasteners to Install

5 — 60 — 120

Ratio Cost/Capacity

$/kN — $$/kN — $$$/kN



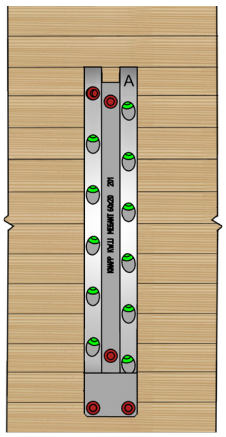
* Dimensions in mm

Table 11.1 Factored Resistances for MEGANT 430 x 60

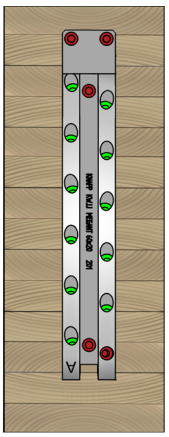
Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners		Threaded Rod	Factored Resistance, N_r		Uplift
			Type	Quantity		Down Load		
						kN	[lbs]	
MEGANT 430 x 60 17070430060200	100 x 520	0.42 (SPF)	VG CSK 8 x 160	32	1 pcs of M20 x 460 Grade 8.8	83	[18,650]	See uplift design p. 51
		0.49 (D.Fir)	VG CSK 8 x 160	32	1 pcs of M20 x 460 Grade 8.8	94	[21,130]	

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.33).
6. The minimum primary member width must be ≥ 160 mm.
7. The secondary member must be prevented from twisting.
8. All icons are described in section “How to use this guide” on page 9.
9. Screw installation must follow the patterns presented in the figures below.
10. All connection design must meet all relevant requirements of the Notes to the Designer section.

Fasteners	
Orientation	Quantity
90°, Horizontal	10
45°, Inclined	22



Primary Member



Secondary Member

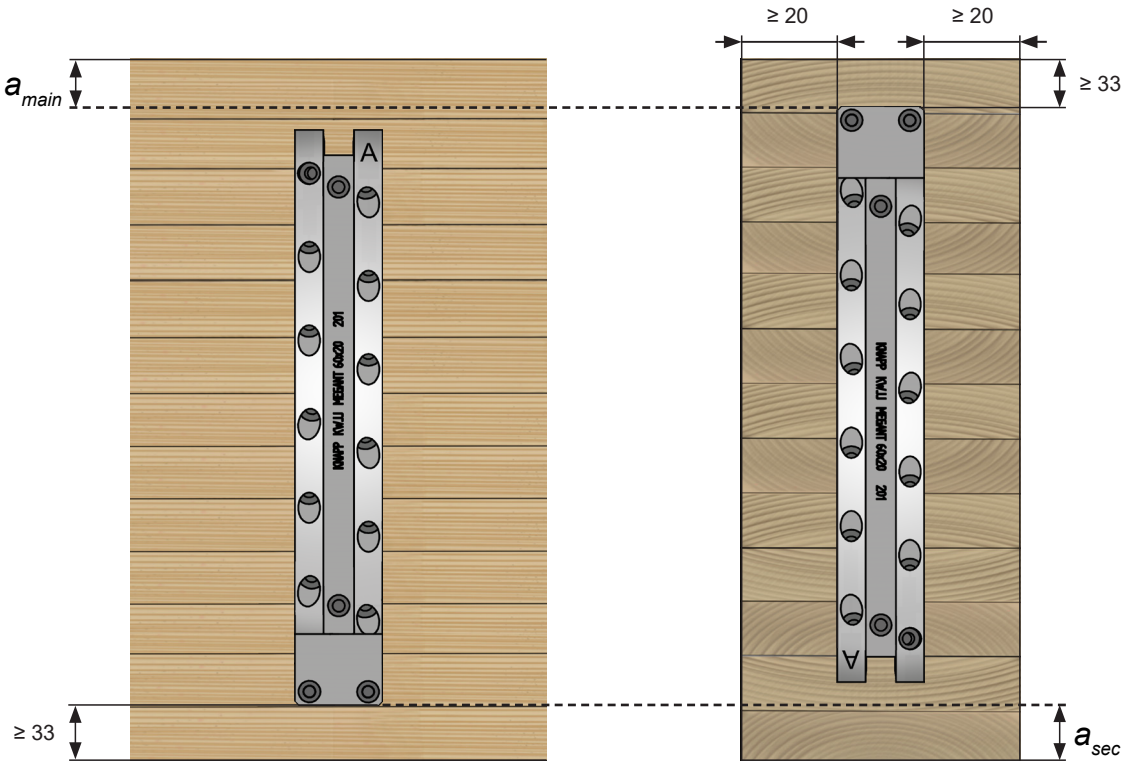
Connection Geometry Requirements*

Table 11.2 Minimum and Maximum Distances (a_{main} , a_{sec})

Beam Depth			520	570	608	646	684	722	760	798	836
a_{main} & a_{sec}	min	[mm]	33								
	max		60	110	148	170	182	193	205	216	227

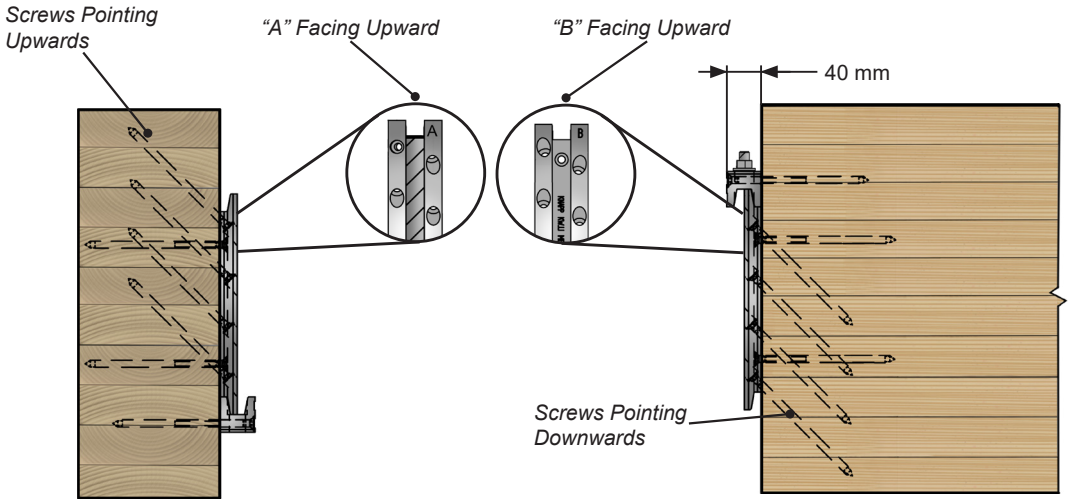
Notes:
1. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
2. Please refer to the "Hardware" setion, page 10, to see MEGANT components in detail.
3. For the beam sizes not listed in table 11.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 11.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

* Geometry requirements in mm



Primary Member **Secondary Member**

Location Instructions - Connector Plates and Screws



Primary Member **Secondary Member**

MEGANT 550 X 60

*Connector Parameters and Dimensions**

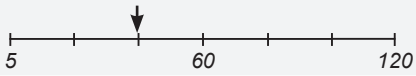
Compatible Material

Load Rating

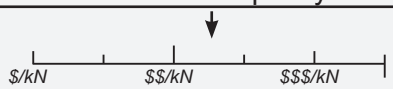
Fire Rating

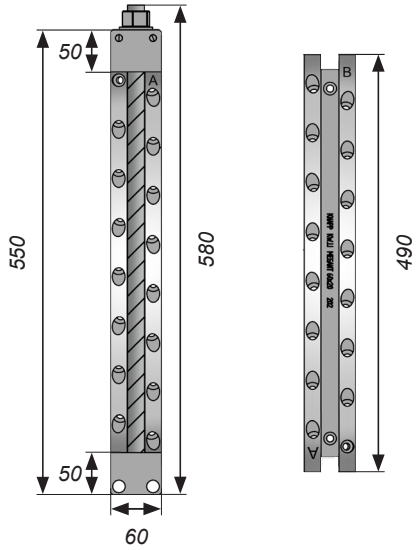
Installation Possibilities

Number of Fasteners to Install



Ratio Cost/Capacity





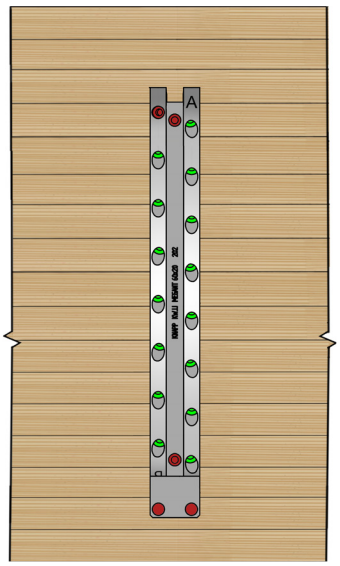
* Dimensions in mm

Table 12.1 Factored Resistances for MEGANT 550 x 60

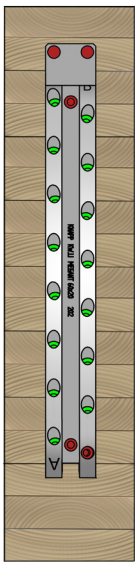
Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners		Threaded Rod	Factored Resistance, N_r		Uplift
			Type	Quantity		Down Load		
						kN	[lbs]	
MEGANT 550 x 60 170705500600200	100 x 640	0.42 (SPF)	VG CSK 8 x 160	40	1 pcs of M20 x 580 Grade 8.8	113	[25,400]	See uplift design p. 51
		0.49 (D.Fir)	VG CSK 8 x 160	40	1 pcs of M20 x 580 Grade 8.8	125	[28,100]	

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.35).
6. The minimum primary member width must be ≥ 160 mm.
7. The secondary member must be prevented from twisting.
8. All icons are described in section “How to use this guide” on page 9.
9. Screw installation must follow the patterns presented in the figures below.
10. All connection design must meet all relevant requirements of the Notes to the Designer section.

Fasteners	
Orientation	Quantity
90°, Horizontal	10
45°, Inclined	30



Primary Member



Secondary Member

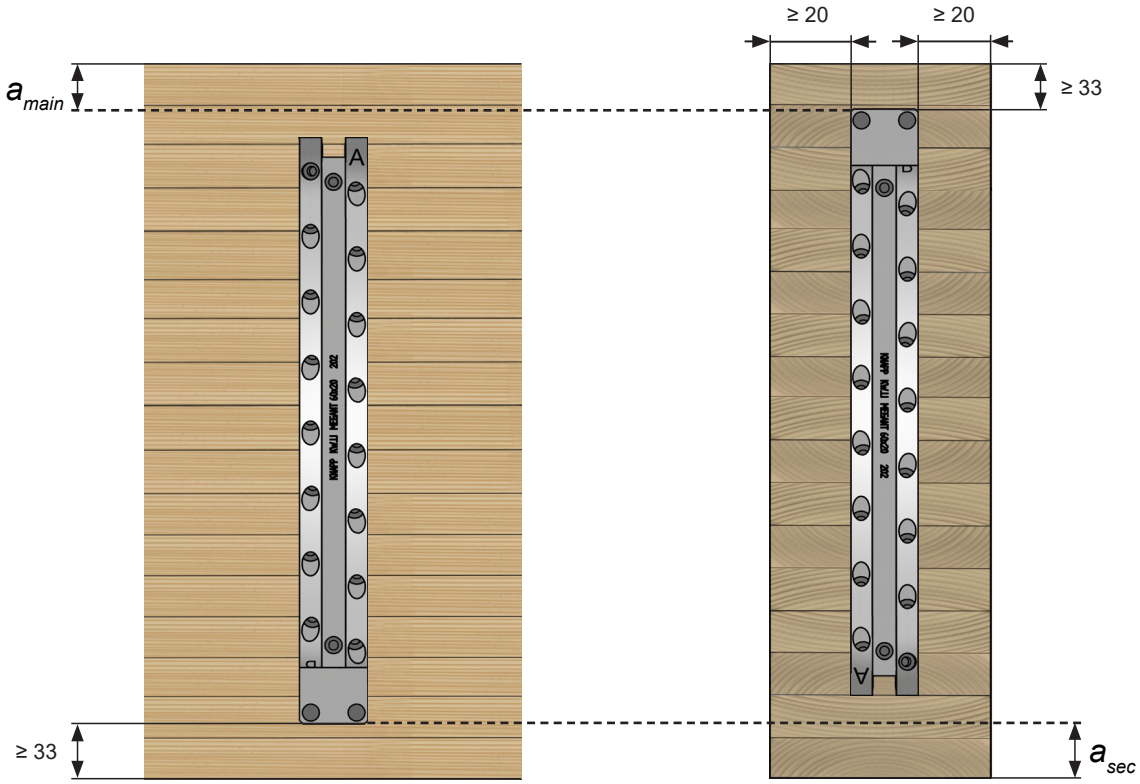
Connection Geometry Requirements*

Table 12.2 Minimum and Maximum Distances (a_{main}, a_{sec})

Beam Depth		[mm]	640	684	722	760	798	836	874	912	950	988	1026
a_{main} & a_{sec}	min		33										
	max		60	104	142	180	216	227	239	250	262	273	284

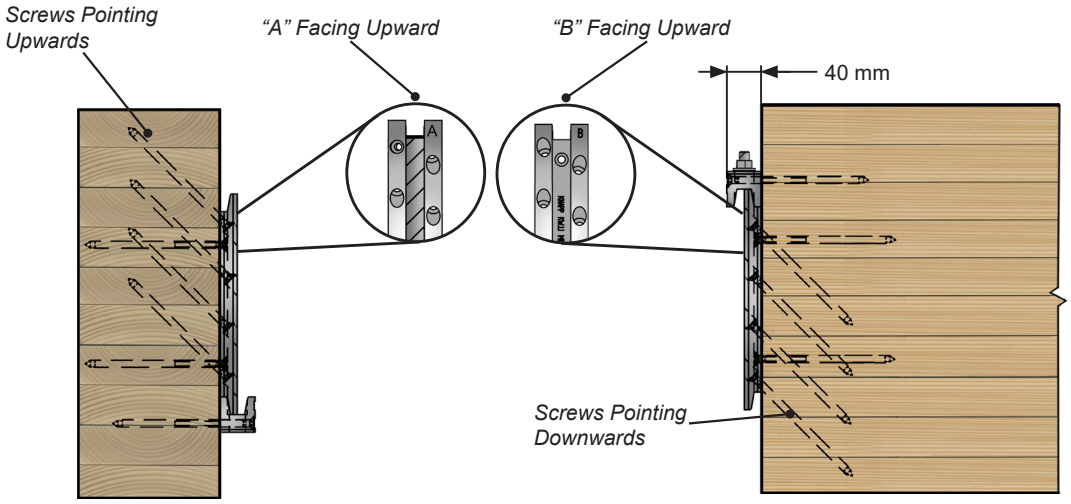
Notes:
1. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
2. Please refer to the "Hardware" setion, page 10, to see MEGANT components in detail.
3. For the beam sizes not listed in table 12.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 12.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

* Geometry requirements in mm



Primary Member **Secondary Member**

Location Instructions - Connector Plates and Screws



Primary Member **Secondary Member**

MEGANT 310 X 100

*Connector Parameters and Dimensions**

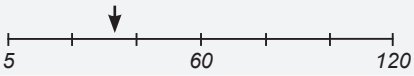
Compatible Material

Load Rating

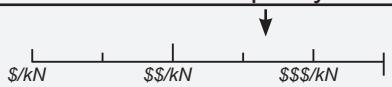
Fire Rating

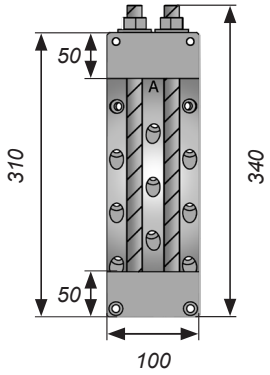
Installation Possibilities

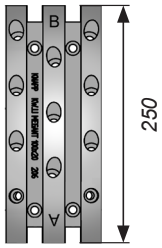
Number of Fasteners to Install



Ratio Cost/Capacity







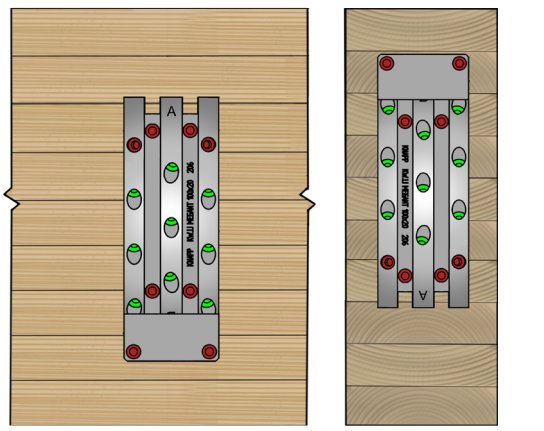
* Dimensions in mm

Table 13.1 Factored Resistances for MEGANT 310 x 100

Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners		Threaded Rod	Factored Resistance, N_r		Uplift
			Type	Quantity		Down Load		
						kN	[lbs]	
MEGANT 310 x 100 170703101000200	140 x 400	0.42 (SPF)	VG CSK 8 x 160	34	2 pcs of M16 x 340 Grade 8.8	68	[15,280]	See uplift design p. 51
		0.49 (D.Fir)	VG CSK 8 x 160	34	2 pcs of M16 x 340 Grade 8.8	77	[17,310]	

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.37).
6. The minimum primary member width must be ≥ 160 mm.
7. The secondary member must be prevented from twisting.
8. All icons are described in section “How to use this guide” on page 9.
9. Screw installation must follow the patterns presented in the figures below.
10. All connection design must meet all relevant requirements of the Notes to the Designer section.

Fasteners	
Orientation	Quantity
90°, Horizontal	16
45°, Inclined	18



Primary Member **Secondary Member**

Connection Geometry Requirements*

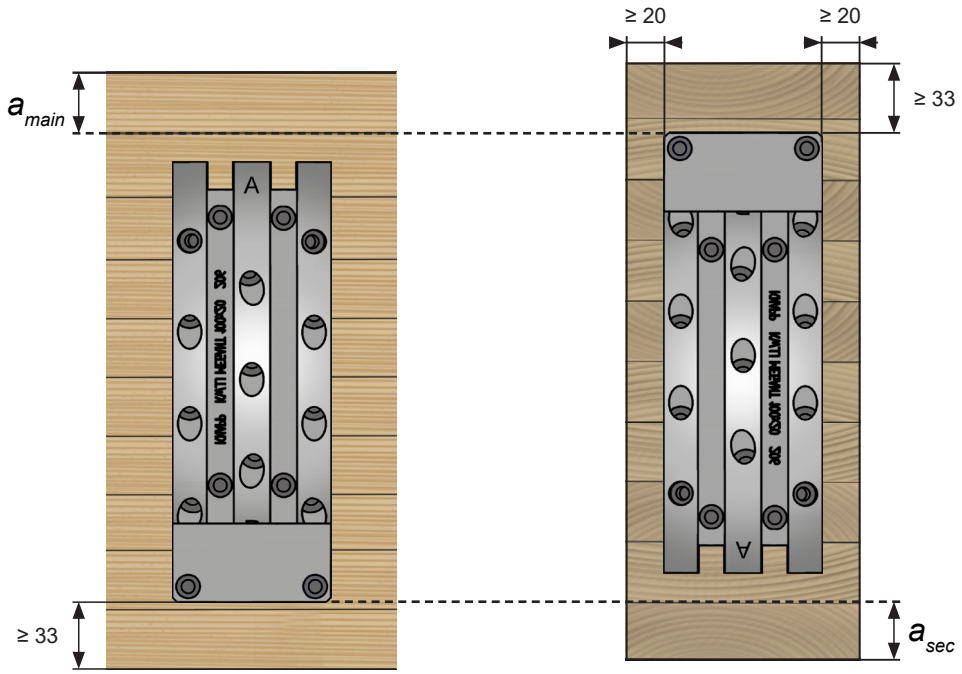
Table 13.2 Minimum and Maximum Distances (a_{main}, a_{sec})

Beam Depth		[mm]	400	456	494	532	570	608
a_{main} & a_{sec}	min		33					
	max		60	83	95	106	117	129

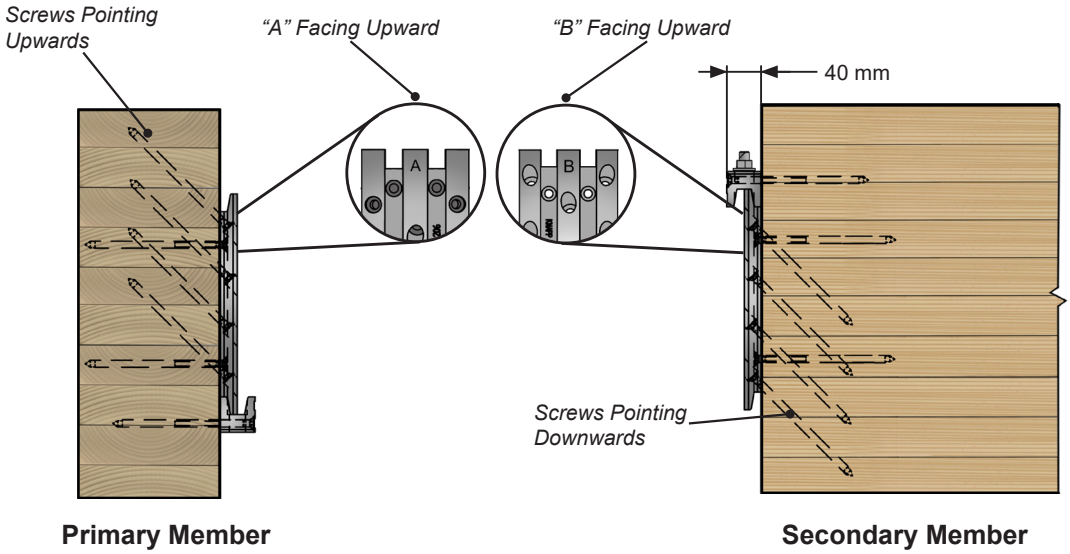
Notes:

1. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
2. Please refer to the "Hardware" setion, page 10, to see MEGANT components in detail.
3. For the beam sizes not listed in table 13.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 13.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

* Geometry requirements in mm

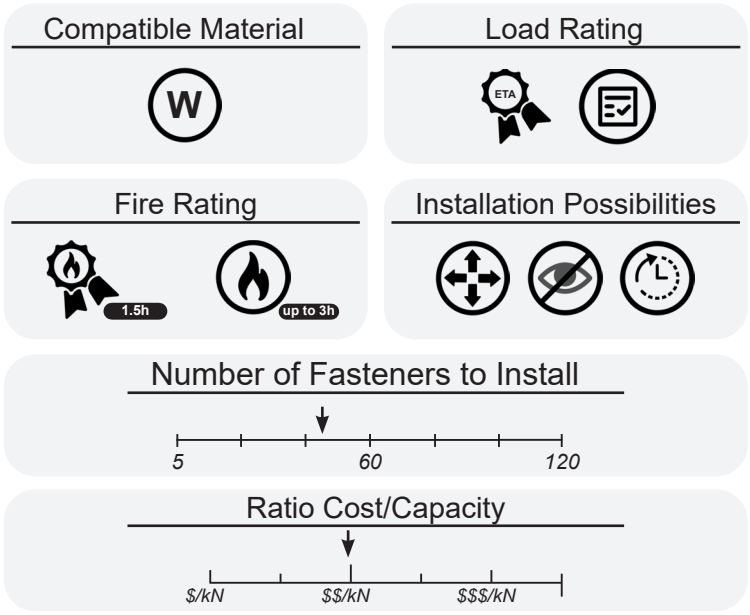


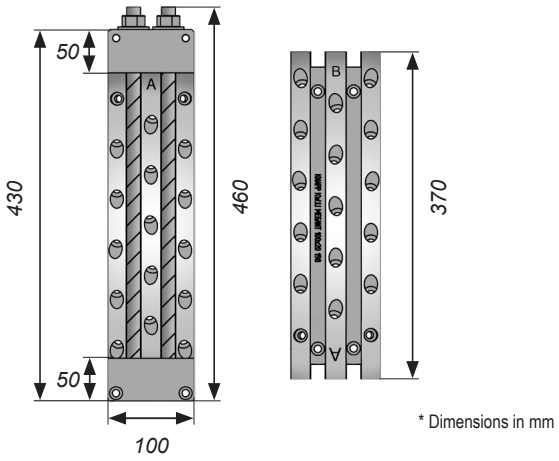
Location Instructions - Connector Plates and Screws



MEGANT 430 X 100

*Connector Parameters and Dimensions**





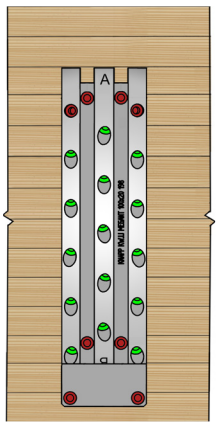
* Dimensions in mm

Table 14.1 Factored Resistances for MEGANT 430 x 100

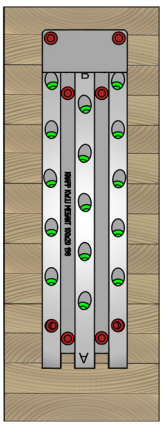
Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners		Threaded Rod	Factored Resistance, N_r		Uplift
			Type	Quantity		Down Load		
						kN	[lbs]	
MEGANT 430 x 100 170704301000200	140 x 530	0.42 (SPF)	VG CSK 8 x 160	46	2 pcs of M16 x 460 Grade 8.8	113	[25,400]	See uplift design p. 51
		0.49 (D.Fir)	VG CSK 8 x 160	46	2 pcs of M16 x 460 Grade 8.8	128	[28,770]	

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.39).
6. The minimum primary member width must be ≥ 160 mm.
7. The secondary member must be prevented from twisting.
8. All icons are described in section “How to use this guide” on page 9.
9. Screw installation must follow the patterns presented in the figures below.
10. All connection design must meet all relevant requirements of the Notes to the Designer section.

Fasteners	
Orientation	Quantity
90°, Horizontal	16
45°, Inclined	30



Primary Member



Secondary Member

Connection Geometry Requirements*

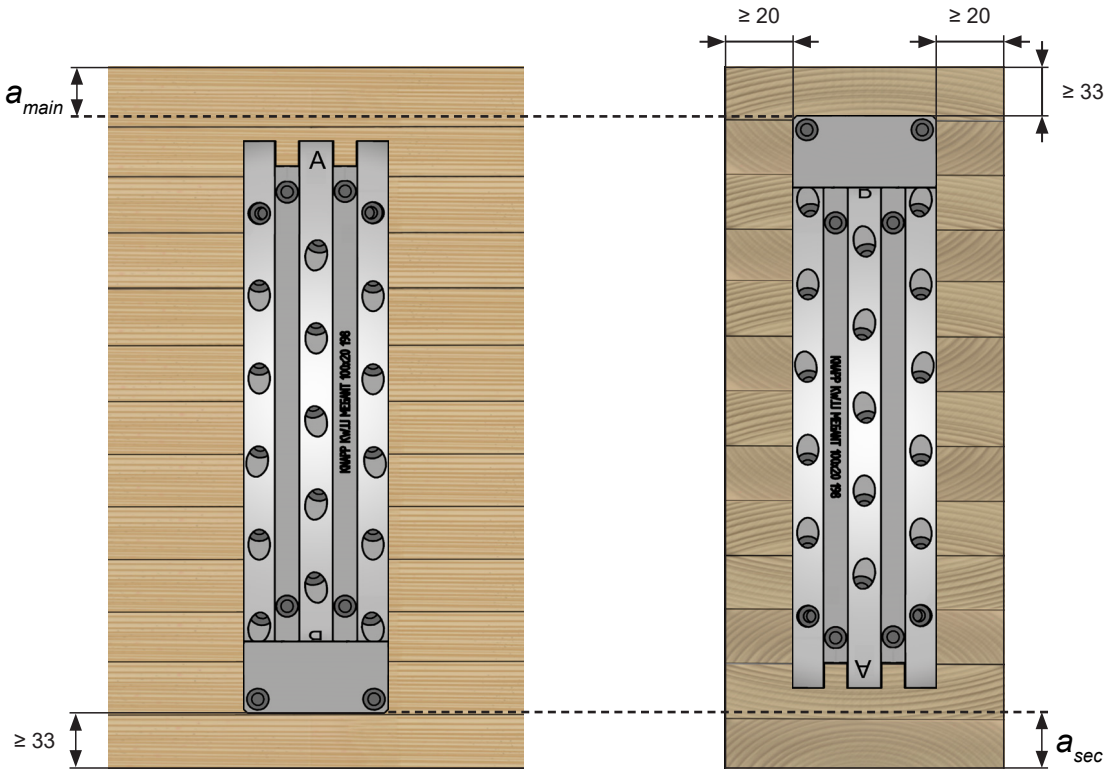
Table 14.2 Minimum and Maximum Distances (a_{main}, a_{sec})

Beam Depth		[mm]	530	570	608	646	684	722	760	798	836
a_{main} & a_{sec}	min	[mm]	33								
	max	[mm]	70	110	129	140	152	163	175	186	197

Notes:

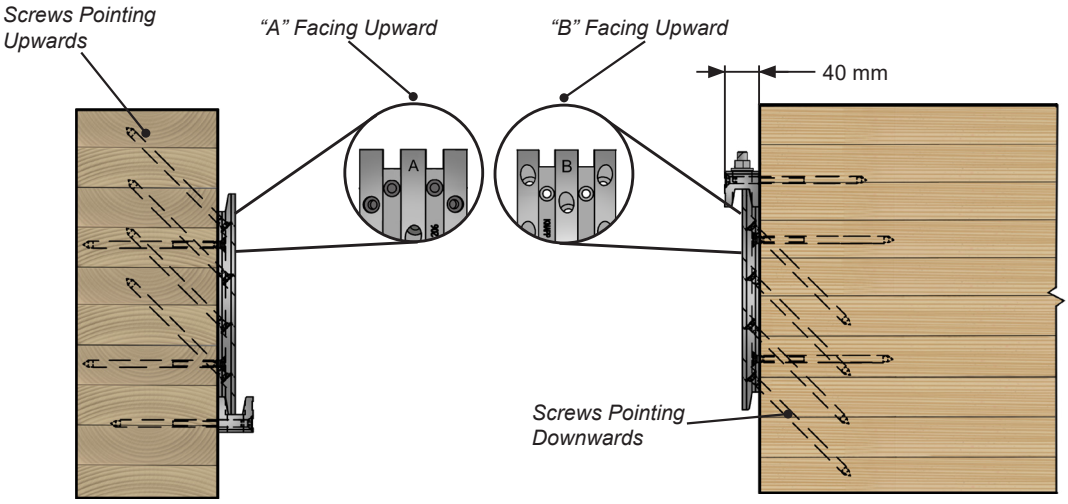
1. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
2. Please refer to the "Hardware" setion, page 10, to see MEGANT components in detail.
3. For the beam sizes not listed in table 14.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 14.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

* Geometry requirements in mm



Primary Member **Secondary Member**

Location Instructions - Connector Plates and Screws



Primary Member **Secondary Member**

MEGANT 550 X 100

*Connector Parameters and Dimensions**

Compatible Material

Load Rating

Fire Rating

1.5h — up to 3h

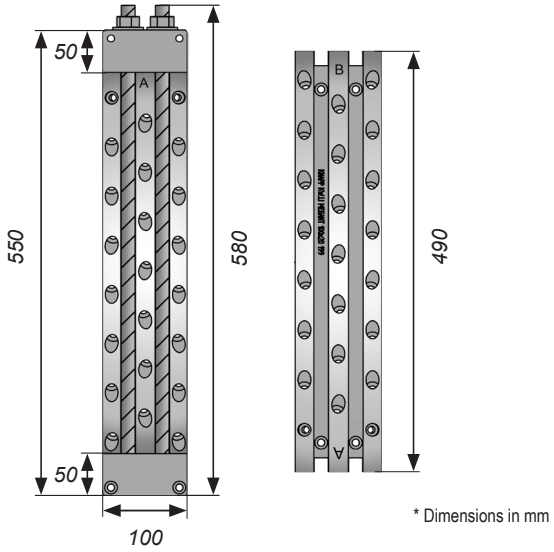
Installation Possibilities

Number of Fasteners to Install

5 — 60 — 120

Ratio Cost/Capacity

$/kN — $$/kN — $$$/kN



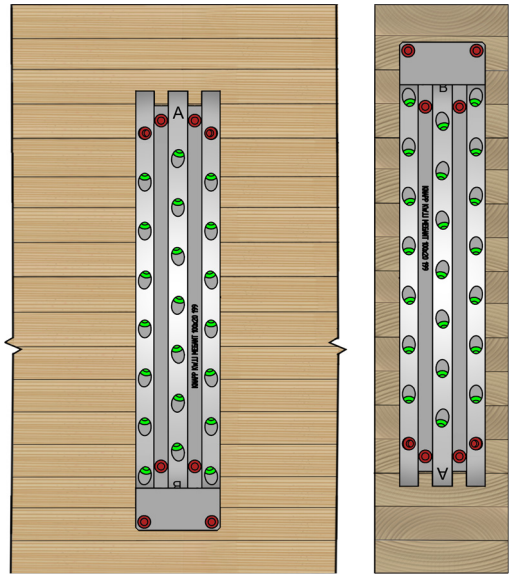
* Dimensions in mm

Table 15.1 Factored Resistances for MEGANT 550 x 100

Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners		Threaded Rod	Factored Resistance, N_r		Uplift
			Type	Quantity		Down Load		
						kN	[lbs]	
MEGANT 550 x 100 170705501000200	140 x 650	0.42 (SPF)	VG CSK 8 x 160	58	2 pcs of M16 x 580 Grade 8.8	157	[35,290]	See uplift design p. 51
		0.49 (D.Fir)	VG CSK 8 x 160	58	2 pcs of M16 x 580 Grade 8.8	166	[37,310]	

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.41).
6. The minimum primary member width must be ≥ 160 mm.
7. The secondary member must be prevented from twisting.
8. All icons are described in section “How to use this guide” on page 9.
9. Screw installation must follow the patterns presented in the figures below.
10. All connection design must meet all relevant requirements of the Notes to the Designer section.

Fasteners	
Orientation	Quantity
90°, Horizontal	16
45°, Inclined	42



Primary Member **Secondary Member**

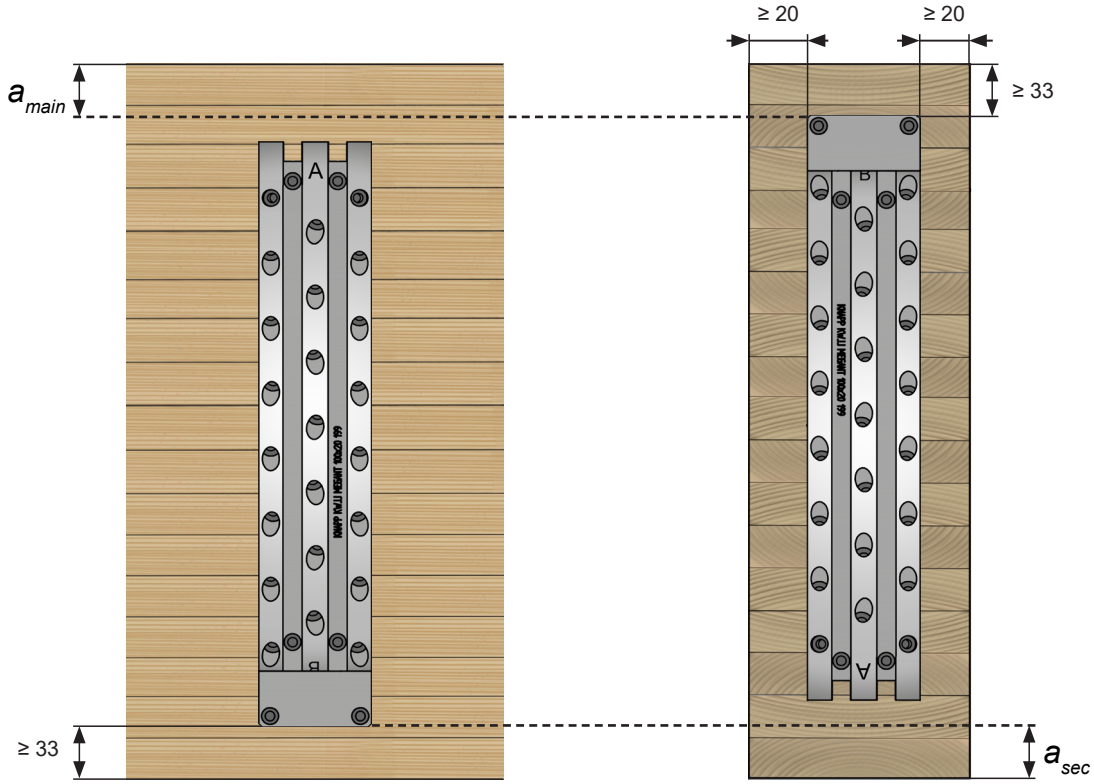
Connection Geometry Requirements*

Table 15.2 Minimum and Maximum Distances (a_{main}, a_{sec})

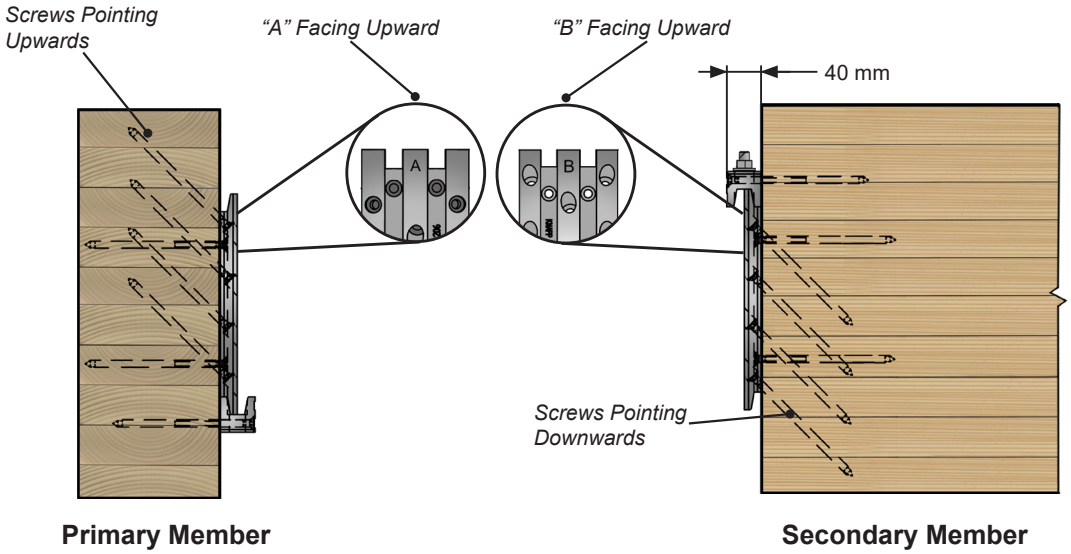
Beam Depth		[mm]	650	684	722	760	798	836	874	912	950	988	1026
a_{main} & a_{sec}	min	[mm]	33										
	max	[mm]	70	104	142	175	186	197	209	220	232	243	254

Notes:
1. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
2. Please refer to the "Hardware" setion, page 10, to see MEGANT components in detail.
3. For the beam sizes not listed in table 15.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 15.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

* Geometry requirements in mm



Location Instructions - Connector Plates and Screws



MEGANT 310 X 150

*Connector Parameters and Dimensions**

Compatible Material

Load Rating

Fire Rating

1.5h

up to 3h

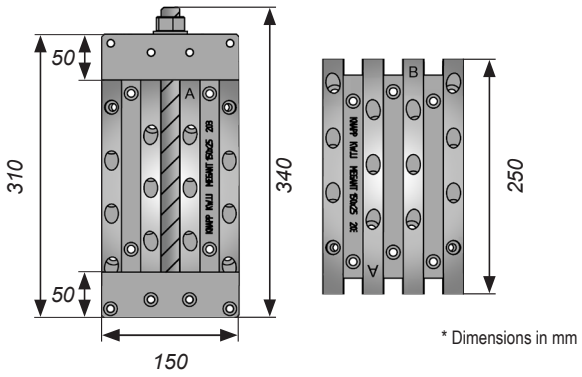
Installation Possibilities

Number of Fasteners to Install

5 — 60 — 120

Ratio Cost/Capacity

$/kN — $$/kN — $$$/kN



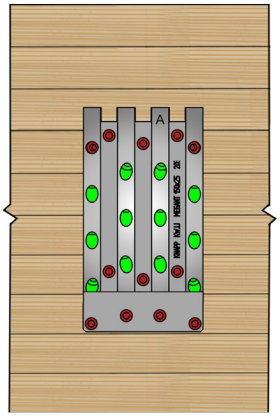
* Dimensions in mm

Table 16.1 Factored Resistances for MEGANT 310 x 150

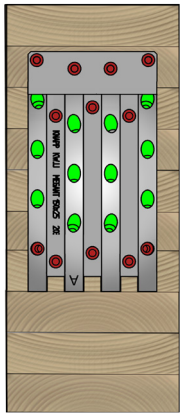
Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners		Threaded Rod	Factored Resistance, N_r		Uplift
			Type	Quantity		Down Load		
						kN	[lbs]	
MEGANT 310 x 150 170703101500200	190 x 400	0.42 (SPF)	VG CSK 8 x 160	48	1 pcs of M20 x 340 Grade 8.8	88	[19,780]	See uplift design p. 51
		0.49 (D.Fir)	VG CSK 8 x 160	48	1 pcs of M20 x 340 Grade 8.8	100	[22,480]	

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.43).
6. The secondary member must be prevented from twisting.
7. All icons are described in section “How to use this guide” on page 9.
8. Screw installation must follow the patterns presented in the figures below.
9. All connection design must meet all relevant requirements of the Notes to the Designer section.

Fasteners	
Orientation	Quantity
90°, Horizontal	24
45°, Inclined	24



Primary Member



Secondary Member

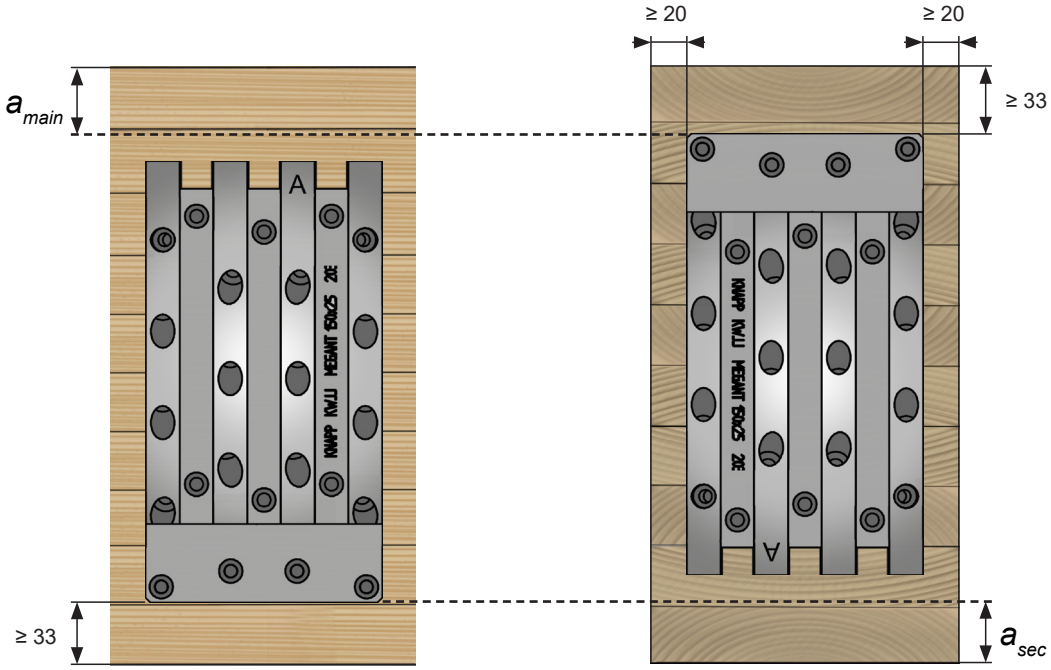
Connection Geometry Requirements*

Table 16.2 Minimum and Maximum Distances (a_{main}, a_{sec})

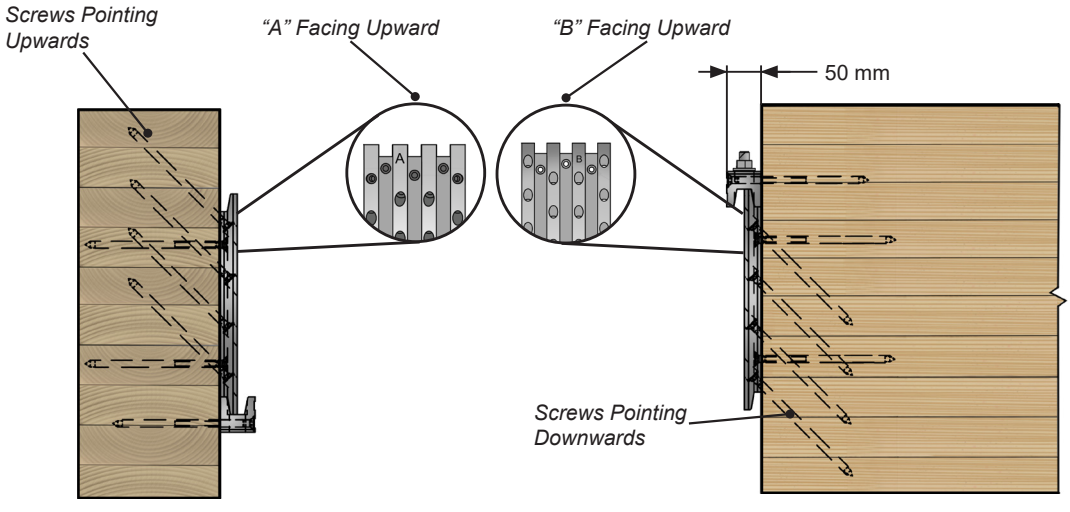
Beam Depth		[mm]	400	456	494	532	570	608
a_{main} & a_{sec}	min		33					
	max		60	83	95	106	118	129

Notes:
1. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
2. Please refer to the "Hardware" setion, page 10, to see MEGANT components in detail.
3. For the beam sizes not listed in table 16.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 16.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

* Geometry requirements in mm



Location Instructions - Connector Plates and Screws



MEGANT 430 X 150

*Connector Parameters and Dimensions**

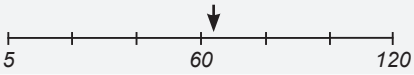
Compatible Material

Load Rating

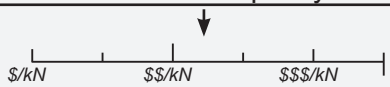
Fire Rating

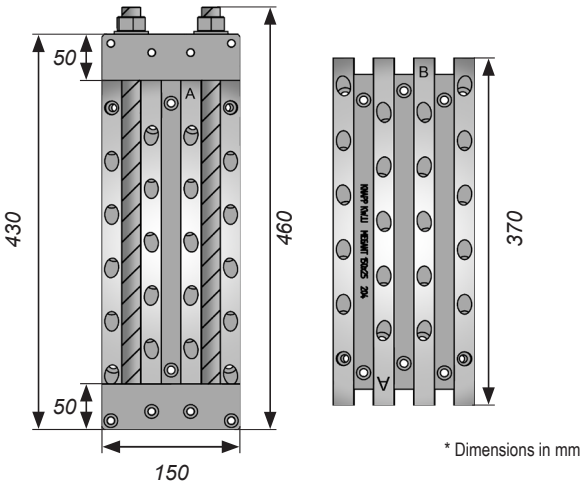
Installation Possibilities

Number of Fasteners to Install



Ratio Cost/Capacity





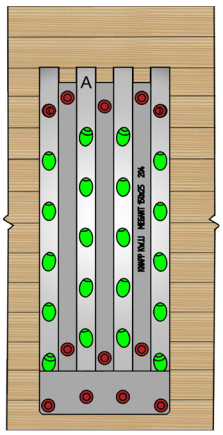
* Dimensions in mm

Table 17.1 Factored Resistances for MEGANT 430 x 150

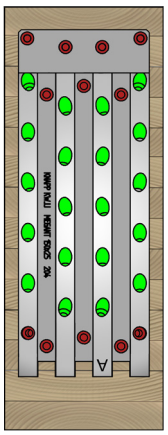
Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners		Threaded Rod	Factored Resistance, N_r		Uplift
			Type	Quantity		Down Load		
						kN	[lbs]	
MEGANT 430 x 150 170704301500200	190 x 520	0.42 (SPF)	VG CSK 8 x 160	64	2 pcs of M20 x 460 Grade 8.8	147	[32,040]	See uplift design p. 51
		0.49 (D.Fir)	VG CSK 8 x 160	64	2 pcs of M20 x 460 Grade 8.8	166	[37,310]	

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.45).
6. The secondary member must be prevented from twisting.
7. All icons are described in section “How to use this guide” on page 9.
8. Screw installation must follow the patterns presented in the figures below.
9. All connection design must meet all relevant requirements of the Notes to the Designer section.

Fasteners	
Orientation	Quantity
90°, Horizontal	24
45°, Inclined	40



Primary Member



Secondary Member

Connection Geometry Requirements*

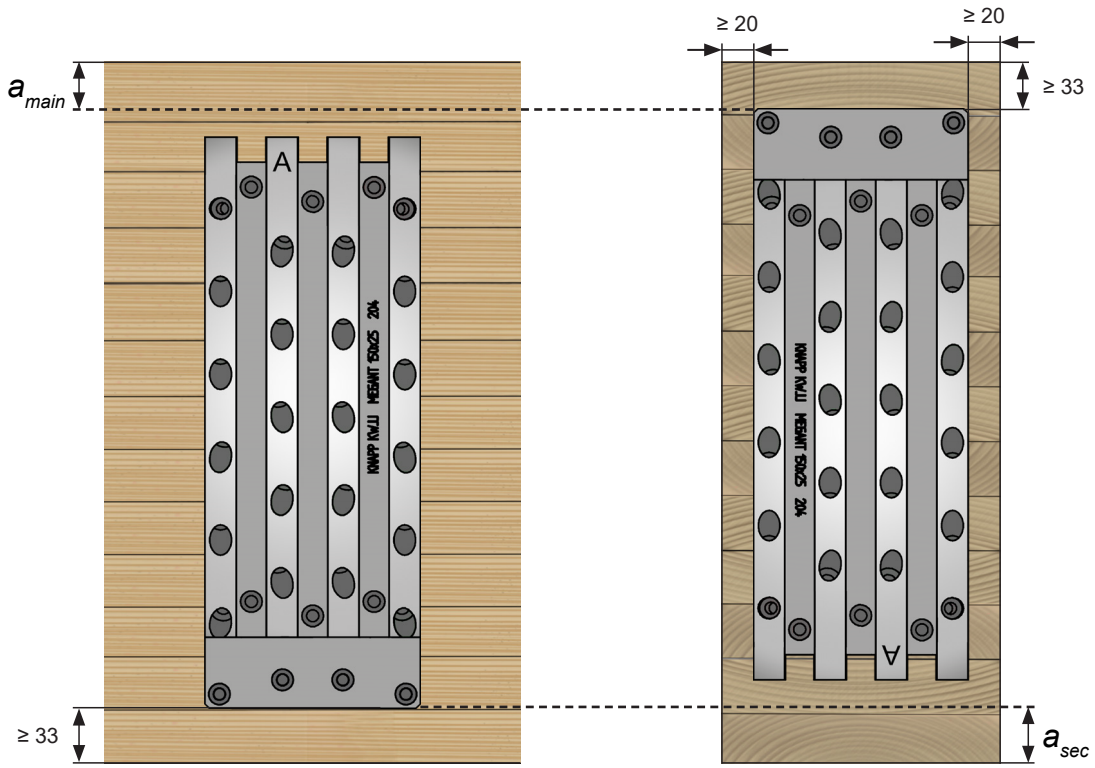
Table 17.2 Minimum and Maximum Distances (a_{main}, a_{sec})

Beam Depth			520	570	608	646	684	722	760	798	836	874	912	950	988
a_{main} & a_{sec}	min	[mm]	33												
	max		60	110	129	140	152	163	175	186	197	209	220	232	243

Notes:

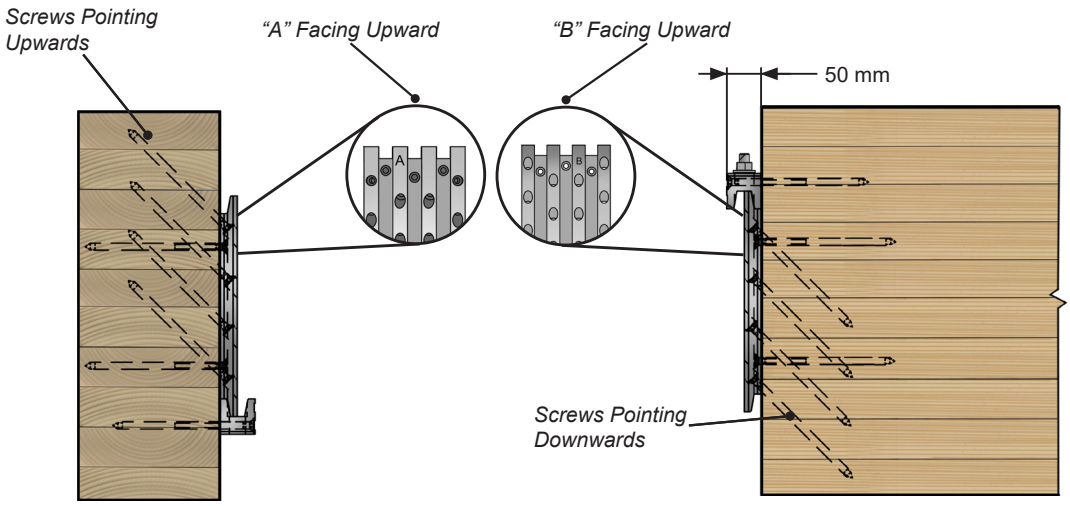
1. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
2. Please refer to the "Hardware" setion, page 10, to see MEGANT components in detail.
3. For the beam sizes not listed in table 17.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 17.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

* Geometry requirements in mm



Primary Member **Secondary Member**

Location Instructions - Connector Plates and Screws



Primary Member **Secondary Member**

MEGANT 550 X 150

*Connector Parameters and Dimensions**

Compatible Material

Load Rating

Fire Rating

1.5h

up to 3h

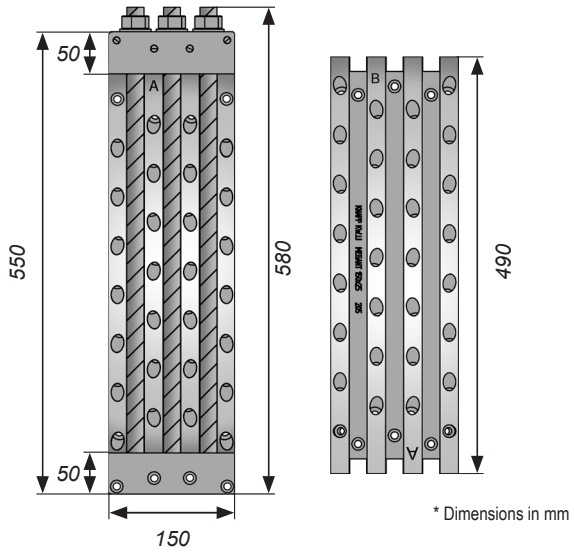
Installation Possibilities

Number of Fasteners to Install

5 60 120

Ratio Cost/Capacity

$/kN $$/kN $$$/kN



* Dimensions in mm

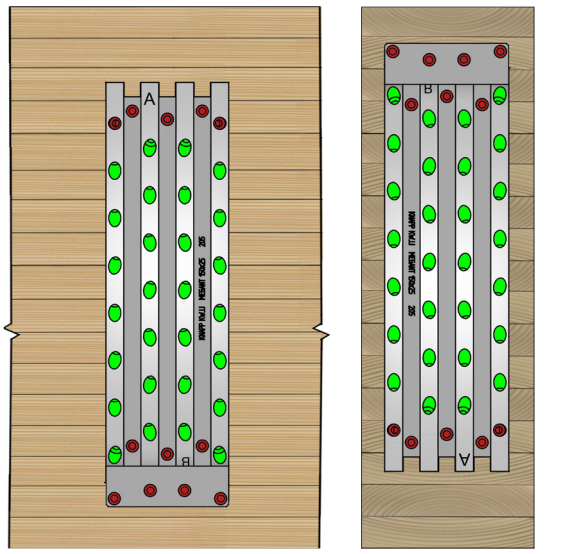
Table 18.1 Factored Resistances for MEGANT 550 x 150

Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners		Threaded Rod	Factored Resistance, N_r		Uplift
			Type	Quantity		Down Load		
						kN	[lbs]	
MEGANT 550 x 150 170705501500200	190 x 640	0.42 (SPF)	VG CSK 8 x 160	80	3 pcs of M20 x 580 Grade 8.8	205	[46,080]	See uplift design p. 51
		0.49 (D.Fir)	VG CSK 8 x 160	80	3 pcs of M20 x 580 Grade 8.8	232	[52,150]	

Notes:

1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.47).
6. The secondary member must be prevented from twisting.
7. All icons are described in section “How to use this guide” on page 9.
8. Screw installation must follow the patterns presented in the figures below.
9. All connection design must meet all relevant requirements of the Notes to the Designer section.

Fasteners	
Orientation	Quantity
90°, Horizontal	24
45°, Inclined	56



Primary Member **Secondary Member**

Connection Geometry Requirements*

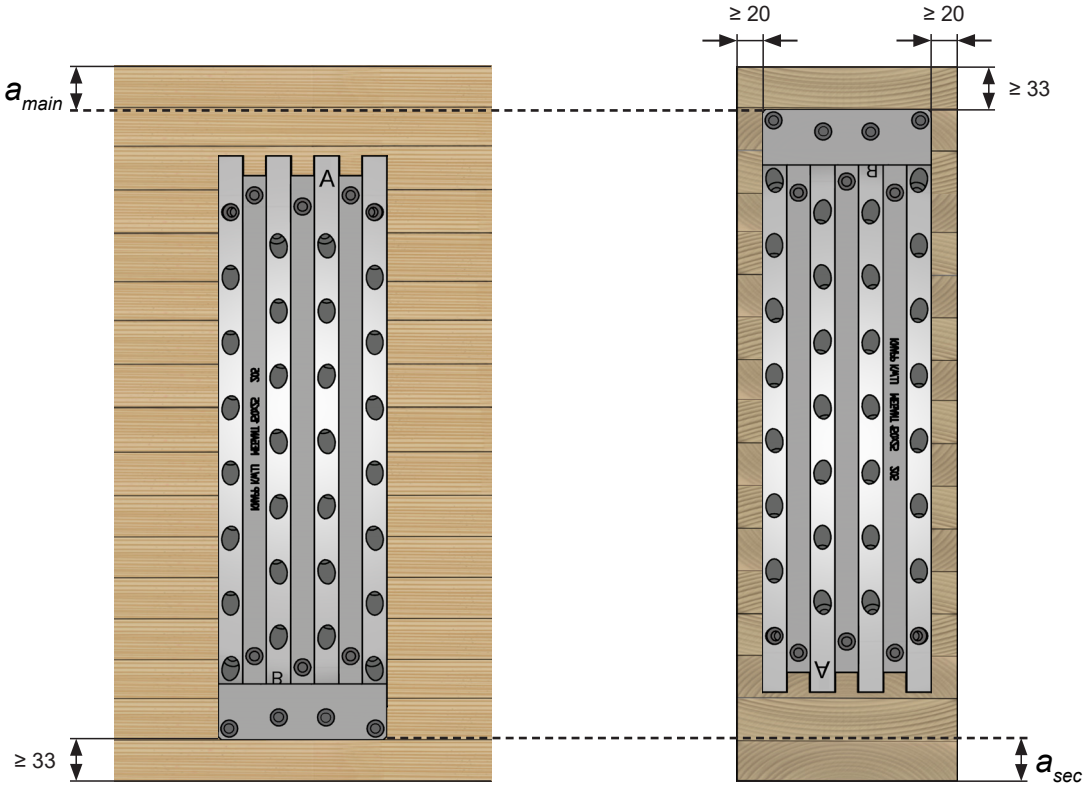
Table 18.2 Minimum and Maximum Distances (a_{main}, a_{sec})

Beam Depth			640	684	722	760	798	836	874	912	950	988
a_{main} & a_{sec}	min	[mm]	33									
	max		60	104	142	175	186	197	209	220	232	243

Notes:

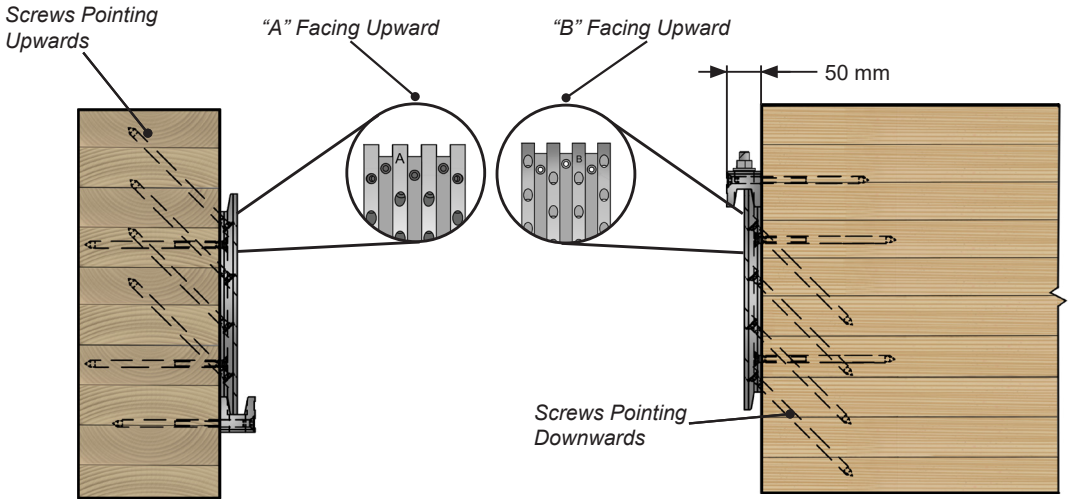
1. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
2. Please refer to the "Hardware" setion, page 10, to see MEGANT components in detail.
3. For the beam sizes not listed in table 18.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 18.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

* Geometry requirements in mm



Primary Member **Secondary Member**

Location Instructions - Connector Plates and Screws



Primary Member **Secondary Member**

MEGANT 730 X 150

*Connector Parameters and Dimensions**

Compatible Material

Load Rating

Fire Rating

1.5h

up to 3h

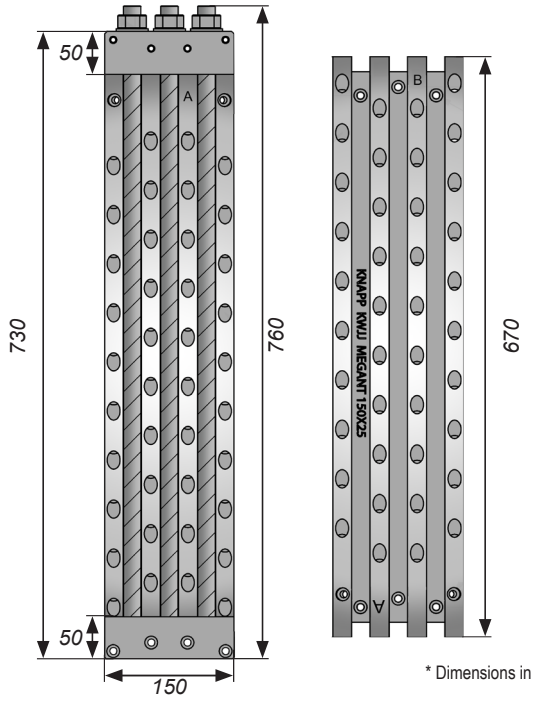
Installation Possibilities

Number of Fasteners to Install

5 60 120

Ratio Cost/Capacity

$/kN $$/kN $$$/kN



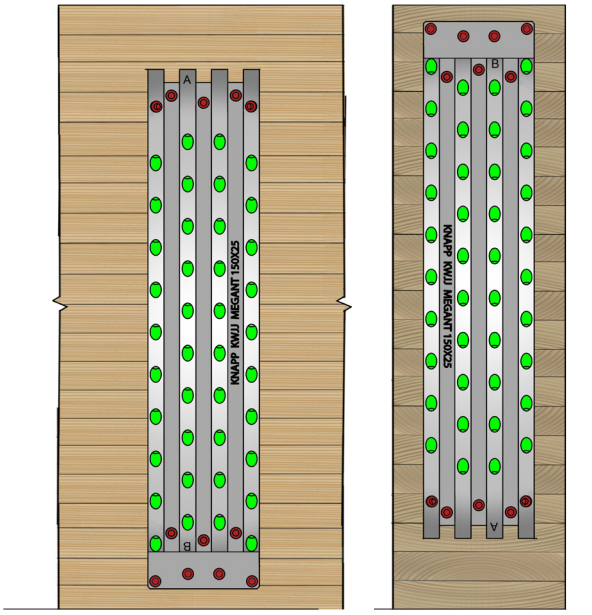
* Dimensions in mm

Table 19.1 Factored Resistances for MEGANT 730 x 150

Item #	Min. Beam Size [mm]	Relative Density [G]	Fasteners		Threaded Rod	Factored Resistance, N_r		Uplift
			Type	Quantity		Down Load kN	Down Load [lbs]	
MEGANT 730 x 150 170707301500200	190 x 840	0.42 (SPF)	VG CSK 8 x 160	104	3 pcs of M20 x 760 Grade 8.8	293	[65,860]	See uplift design p. 51
		0.49 (D.Fir)	VG CSK 8 x 160	104	3 pcs of M20 x 760 Grade 8.8	318	[71,480]	

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Connector placement must respect the requirements presented in the Connection Geometry Requirement Section (p.49).
6. The secondary member must be prevented from twisting.
7. All icons are described in section “How to use this guide” on page 9.
8. Screw installation must follow the patterns presented in the figures below.
9. All connection design must meet all relevant requirements of the Notes to the Designer section.

Fasteners	
Orientation	Quantity
90°, Horizontal	24
45°, Inclined	80



Primary Member **Secondary Member**

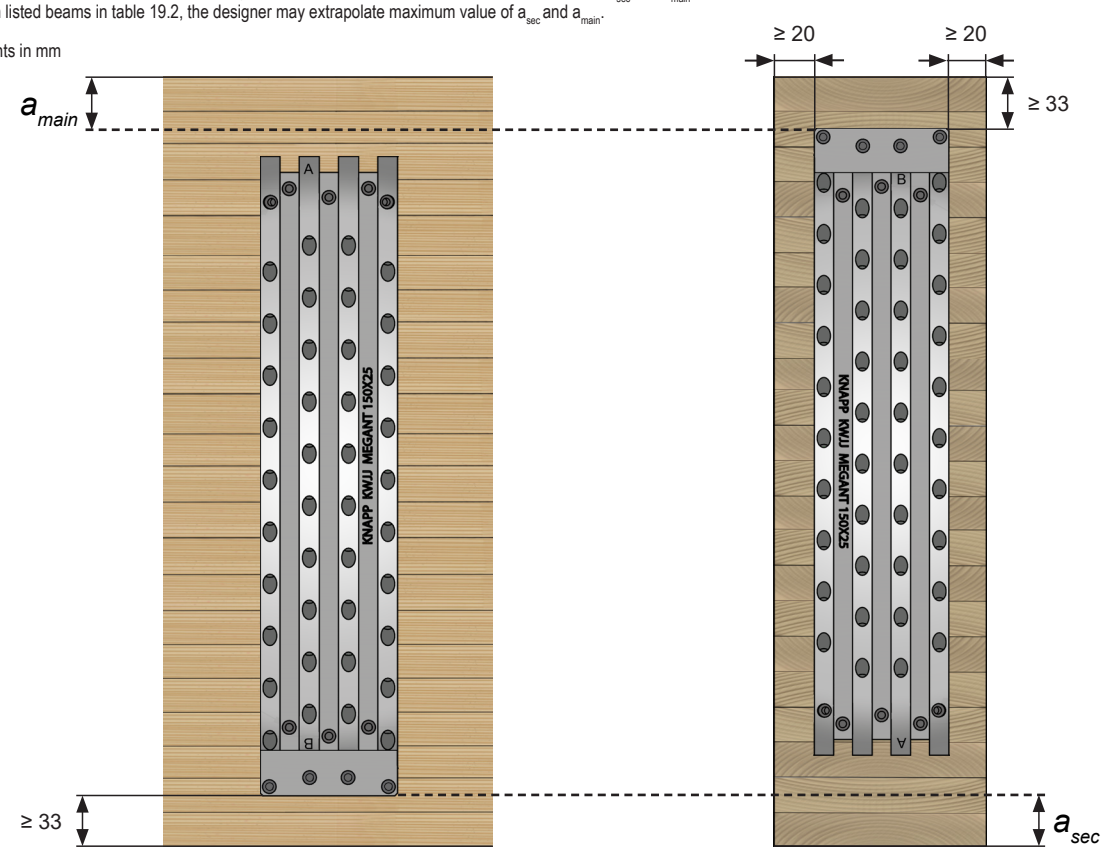
Connection Geometry Requirements*

Table 19.2 Minimum and Maximum Distances (a_{main}, a_{sec})

Beam Depth			840	874	912	950	988	1026	1064	1102	1140	1178	1216	1254	1292
a_{main} & a_{sec}	min	[mm]	33												
	max		80	114	152	190	228	254	266	277	289	300	311	323	334

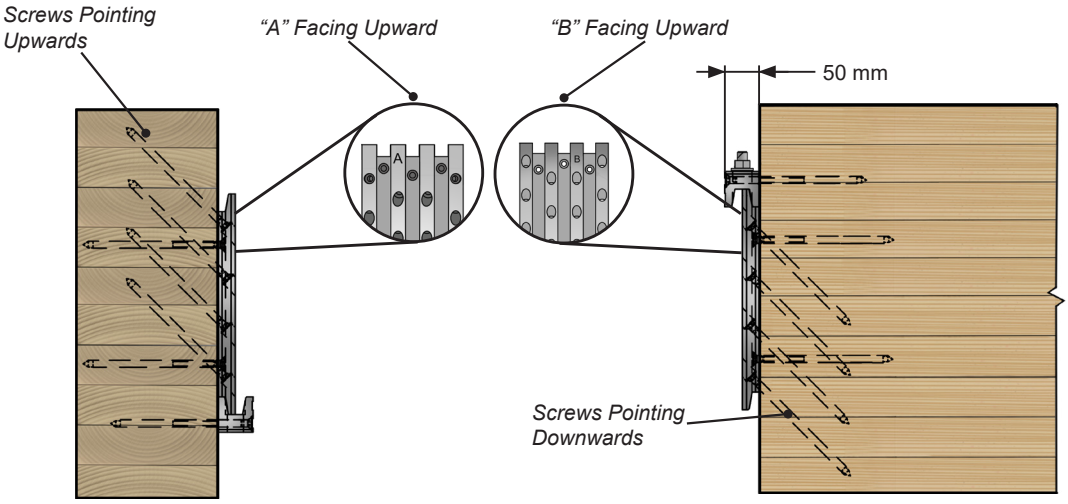
Notes:
1. Maximum distances do not apply to primary post/column members (a_{main}), where the wood grain direction is parallel to the line of the force.
2. Please refer to the "Hardware" setion, page 10, to see MEGANT components in detail.
3. For the beam sizes not listed in table 19.2, the designer is permitted to interpolate the maximum value for a_{sec} and a_{main}.
4. For deeper than listed beams in table 19.2, the designer may extrapolate maximum value of a_{sec} and a_{main}.

* Geometry requirements in mm



Primary Member **Secondary Member**

Location Instructions - Connector Plates and Screws



Primary Member **Secondary Member**

Carbon 12

Portland, Oregon 2017

Courtesy of: Andrew Poque

UPLIFT RESISTANCE DESIGN

When using a Beam Hanger System, additional hardware is required to resist possible uplift forces applied to the connection, for example wind suction.

- **Fully threaded toe screw**
- **Spring steel Clip Lock Brace**

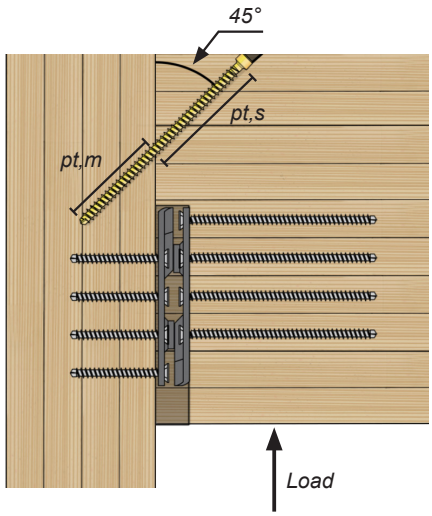
Beam Hanger Systems can resist uplift loading scenarios through two different hardware solutions:

Fully-Threaded Toe Screws

Fully threaded toe screws are installed after the connectors are dropped in place. The orientation of the screw relative to the sliding direction of the joint assures the screw resists primary in tension.

Fully-threaded toe screws can be used with all Beam Hanger Systems, the GIGANT, RICON S VS and the MEGANT.

The factored resistances are outlined in Table 20.



Example of a toe screw installation

Table 20. Factored Uplift Resistance [kN] per Fastener with Minimum Effective Thread Penetration Length of the Primary and the Secondary Member, Fastener Installed at 45 deg

Fastener	Relative Density [G]	Thread Penetration Length $p_{t,m}$ $p_{t,s}$ [mm]									
		80	100	120	140	160	180	200	220	240	260
8 mm VG Cyl	0.42 (SPF)	3.4	4.3	5.1	6.0	6.8	7.7	8.5	9.4	10.2	10.7
10 mm VG Cyl		4.2	5.3	6.4	7.4	8.5	9.5	10.6	11.7	12.7	13.6
8 mm VG Cyl	0.49 (D.Fir)	4.5	5.6	6.7	7.8	8.9	10.0	10.7	10.7	10.7	10.7
10 mm VG Cyl		5.6	7.0	8.4	9.8	11.2	12.5	13.6	13.6	13.6	13.6

Notes:
1. Capacities listed in this table incorporate short term loading with K_D = 1.15
2. A minimum of two toe screws is recommended.

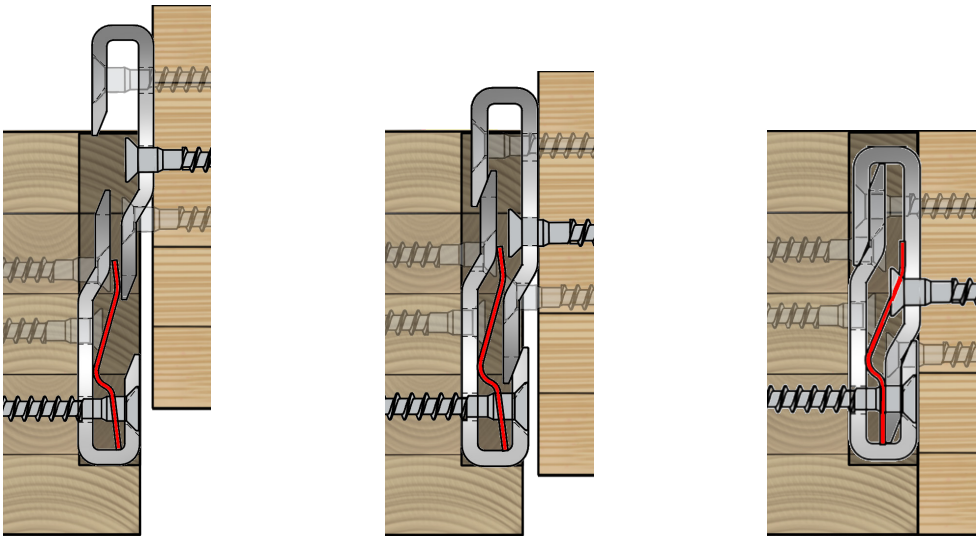
= Tensile Strength of fastener controls.

Clip Lock Brace System

GIGANT - Clip Lock System

The installation of the Clip Lock Brace system **must take place in the primary wood member**.

Step 1 *Step 2* *Step 3*

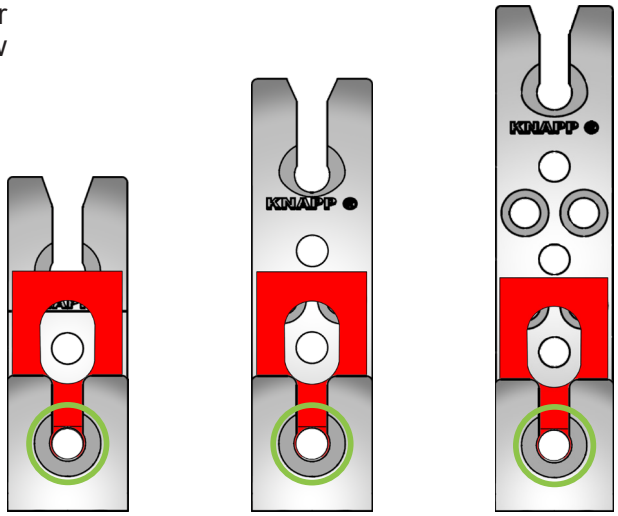


Screw Patterns With Clip Lock Brace System

The installation of the Clip Lock Brace system for the GIGANT connectors will not change the screw pattern.

Installation sequence:

In the primary member, installed as the final step before assembly of the members



GIGANT 120x40 **GIGANT 150x40** **GIGANT 180x40**

Table 21 Uplift Factored resistance with Clip Lock Brace

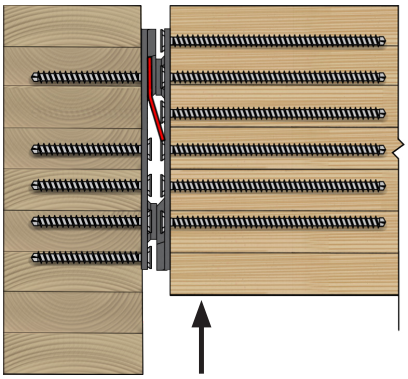
Connector width		Factored resistance
mm	[in]	[kN]
40	[1-5/8"]	8.6

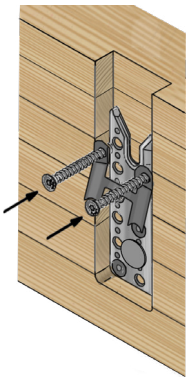
Note:
1. Capacities in this table incorporate short term loading with K_D = 1.15

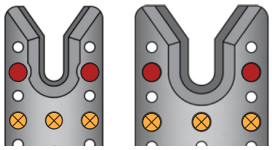
RICON S VS - Clip Lock System

The installation of the Clip Lock Brace system **must take place in the primary wood member**.

For the RICON S VS, a new screw pattern will apply, on the primary member only, to allow the Clip Lock Brace System to be installed properly.





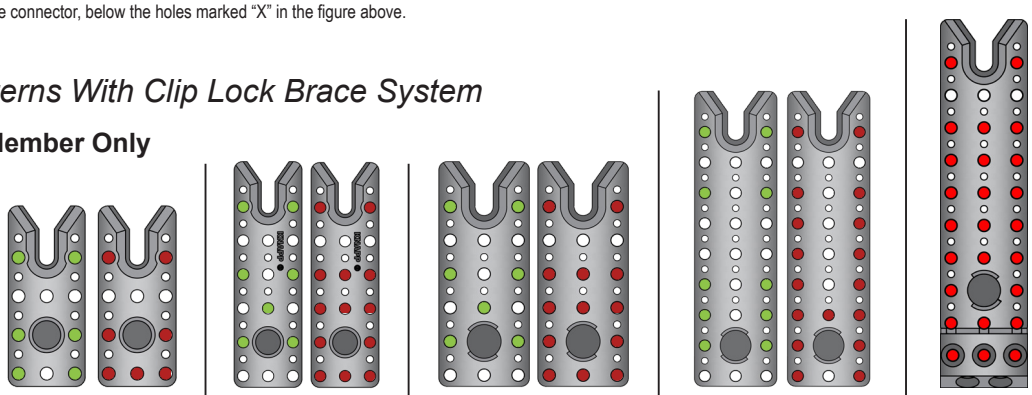


Clip-Lock Holes
No screws with Clip-Lock

Note:
1. Screws that would otherwise be installed under the clip lock can be placed in the center row of the connector, below the holes marked "X" in the figure above.

Screw Patterns With Clip Lock Brace System

In Primary Member Only



	RICON S VS 140x60	RICON S VS 200x60	RICON S VS 200x80	RICON S VS 290x80	RICON XL 390x80
	6 screws	7 screws	7 screws	10 screws	-
	7 screws	13 screws	13 screws	17 screws	25 [+2] screws

Table 22.1 Uplift Factored resistance with Clip Lock Brace

Connector width		Factored resistance
mm	[in]	[kN]
60	[2-3/8"]	12.7
80	[3-1/8"]	12.7

Note:
1. Capacities in this table incorporate short term loading with K_D = 1.15

Table 22.2 Reduction Factor to apply to Download Factored Resistance, N_r

Connector	Relative Density [G]	R_{clip} Factor
RICON S VS 140x60	0.42 (SPF) - 0.49 (D.Fir)	0.7
RICON S VS 200x60		0.8
RICON S VS 200x80		0.8
RICON S VS 290x80		0.9
RICON XL 390x80		0.9

Carbon 12

Portland, Oregon 2017

Courtesy of: Andrew Poque

FIRE DESIGN

Full Scale Loaded Fire Test

The CSA and the NDS recognize wood as a combustible material and a poor conductor of heat and refer to the property of wood in developing an insulating char layer in fire.

Wood can protect non-combustible elements such as a Beam Hanger System through an appropriately designed wood cover. The American Wood Council Technical Report 10 provides guidelines on char layer design for Beam Hangers in fire scenarios.

Full scale fire resistance rating testing with fully loaded specimens at the **Southwest Research Institute in San Antonio Texas** confirmed the char layer calculations and awarded the Beam Hanger System with a 1.5h fire rating.

SOUTHWEST RESEARCH INSTITUTE

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION

FIRE PERFORMANCE EVALUATION OF A LOAD BEARING GLULAM BEAM TO COLUMN CONNECTION, INCLUDING A CLT PANEL, TESTED IN GENERAL ACCORDANCE WITH ASTM E119-16a, *STANDARD TEST METHODS FOR FIRE TESTS OF BUILDING CONSTRUCTION AND MATERIALS*

FINAL REPORT
Consisting of 32 Pages

SwRI® Project No. 01.22532.01.001
Test Date: March 6, 2017
Report Issue: May 26, 2017

Prepared for:

Softwood Lumber Board
1101 K Street N.W., Suite 700
Washington, DC 20005

Submitted by:

Bill B. Hendrix
Principal Engineering Technologist
Fire Resistance Section

Approved by:

Kaleen C. Carpenter, M.S., P.E.
Manager
Fire Resistance Section

Benefiting government, industry and the public through innovative science and technology

Glulam Connection
Fire Resistance Rating

Char Layer Design

The wood cover must be thicker than the effective char thickness. As per the American Wood Council Technical Report 10, 2018 update, this wood cover refers to the a_{char}.

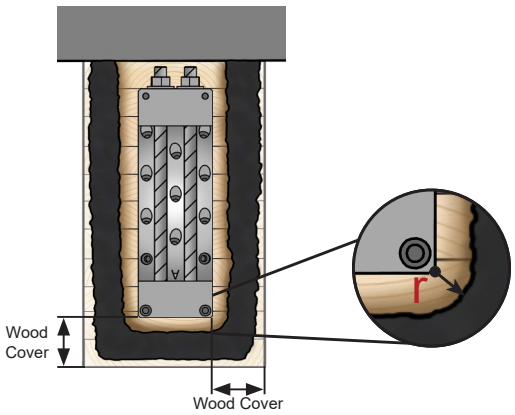
Table 23 Estimated Char Layer Thickness and Charring Rate Results

Fire Resistance Rating	Wood cover a_{char}
[hours]	[mm]
1	37
1.5	53
2	68

The Corner Effect

A multi directional exposure of columns and beams to the fire will result in faster charring at the corners. To account for this effect, corner rounding needs to be considered in fire design.

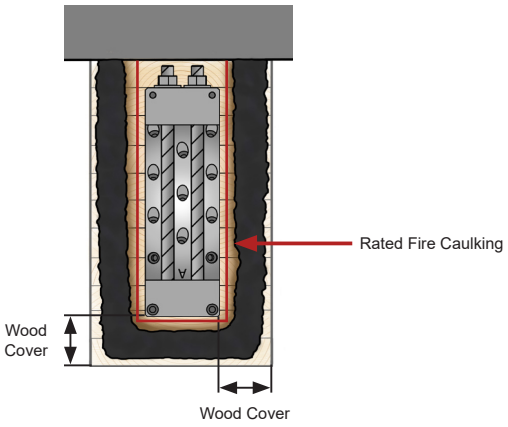
" r ", radius of the corner, is equal to the estimated char layer thickness.



Char Layer Fire Design

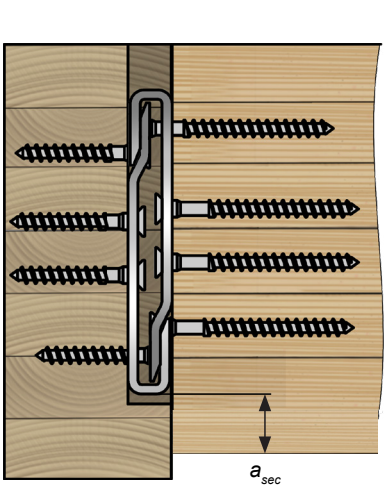
Installation Requirements - Fire Caulking

To reach the 1.5 hour fire rating approval, the Beam Hanger Systems must be installed with a fire rated caulking within the non charring area of the cross section.

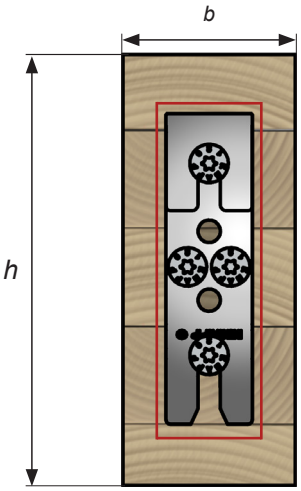


Char Layer - Suggested Cross Sections

GIGANT



Side View



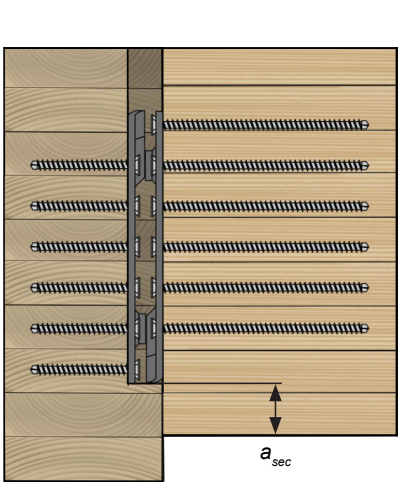
Front View
Secondary Member

Table 24.1 Suggested Cross Sections

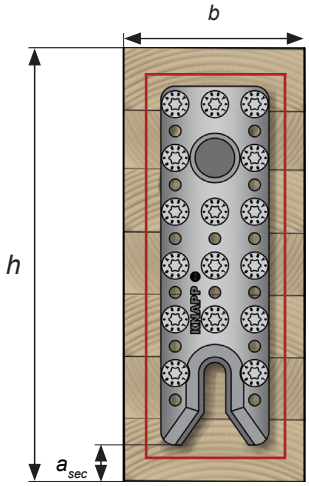
Connector	Fire Resistance Rating					
	1 hour			2 hours		
	Min. Beam Width (b) [mm]	Min. Beam Height (h) [mm]	a_{sec} [mm]	Min. Beam Width (b) [mm]	Min. Beam Height (h) [mm]	a_{sec} [mm]
GIGANT 120x40	114	290	50	-	-	-
	139	247	37			
GIGANT 150x40	114	293	50	223	353	68
	139	250	37			
GIGANT 180x40	114	295	50	223	355	68
	139	252	37			

Notes:
1. All minimum beam requirements account for the corner effect rounding when beams are designed for three-sided fire exposure.
2. Beam Hanger Systems must be installed with fire rated caulking within the non charring area.

RICON S VS



Side View



Front View
Secondary Member

Table 24.2 Suggested Cross Sections

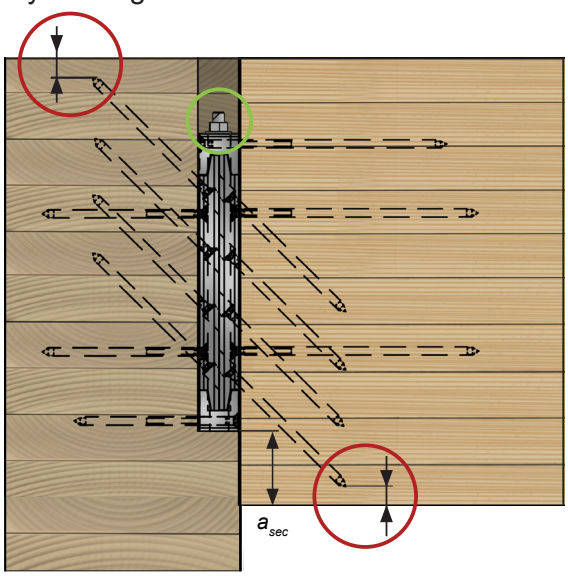
Connector		Fire Resistance Rating					
		1 hour			2 hours		
		Min. Beam Width (b) [mm]	Min. Beam Height (h) [mm]	a_{sec} [mm]	Min. Beam Width (b) [mm]	Min. Beam Height (h) [mm]	a_{sec} [mm]
RICON S VS 140x60	**Single**	159	257	37	242	360	68
	Double	204	300	50	266	438	91
RICON S VS 200x60	**Single**	134	300	50	242	360	68
	Double	204	300	50	266	438	91
RICON S VS 200x80	**Single**	154	300	50	216	437	91
	Double	244	300	50	306	437	91
RICON S VS 290x80	**Single**	154	360	50	216	437	91
	Double	244	360	50	306	437	91
RICON XL 390x80	**Single**	154	467	50	216	603	91
	Double	244	467	50	306	603	91

Notes:
1. All minimum beam requirements account for the corner effect rounding when beams are designed for three-sided fire exposure.
2. Beam Hanger Systems must be installed with fire rated caulking within the non charring area.

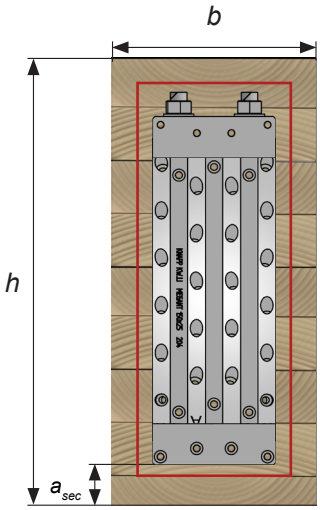
MEGANT

Note to consider inclined screw embedment at top and bottom for char layer design

Note to consider threaded rod height for char layer design



Side View



Front View
Secondary Member

Table 24.3 Suggested Cross Sections

Connector	Fire Resistance Rating					
	1 hour			2 hours		
	Min. Beam Width (b) [mm]	Min. Beam Height (h) [mm]	a_{sec} [mm]	Min. Beam Width (b) [mm]	Min. Beam Height (h) [mm]	a_{sec} [mm]
MEGANT 310x60	134	409	69	196	439	99
MEGANT 430x60	134	529	69	196	559	99
MEGANT 550x60	134	649	69	196	679	99
MEGANT 310x100	174	390	50	236	488	91
MEGANT 430x100	174	510	50	236	551	91
MEGANT 550x100	174	630	50	236	671	91
MEGANT 310x150	224	390	50	286	488	91
MEGANT 430x150	224	510	50	286	551	91
MEGANT 550x150	224	630	50	286	671	91
MEGANT 730x150	224	810	50	286	851	91

Notes:
1. All minimum beam requirements account for the corner effect rounding when beams are designed for three-sided fire exposure.
2. Beam Hanger Systems must be installed with fire rated caulking within the non charring area.

First Tech Credit Union

Portland, Oregon 2017

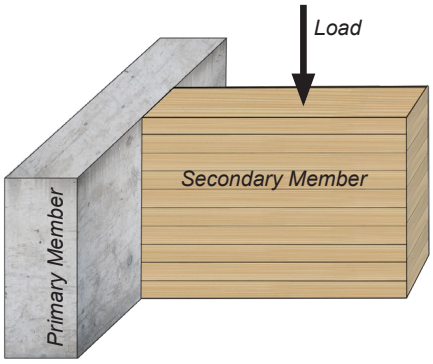
Courtesy of: Oregon Forest Resources Institute

RICON S VS - SPECIAL CONNECTIONS

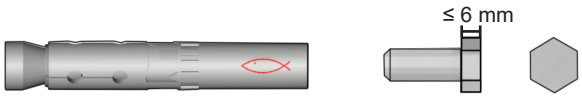
Concrete to Wood Connections (C)

The RICON S VS can also be anchored to concrete elements to create wood to concrete connections.

Provided that concrete work is not as precise as timber work, tolerance requirements should be carefully considered.



Fischer High performance Anchor FH II 12/M8 with Hexagon Screw M8x20 8.8



Fischer High Performance Anchor FH II 15/ M10 with Hexagon Screw M10x20 8.8

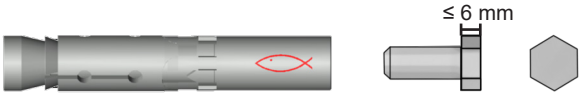
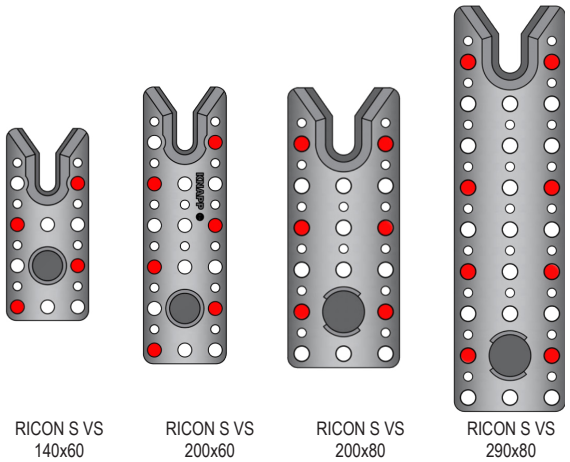


Table 25.1 Factored Resistances for Concrete to Wood Connections

Connector	Concrete Strength Class	Fasteners				Factored Resistance, N_r		Uplift
		Primary (Concrete) Member		Secondary (Wood) Member		Down Load		
		Type	Quantity	Type	Quantity	kN	[lbs]	
RICON S VS 140 x 60	C20/25 - C50/60	FH II 12/M8 I + M8 x 20 8.8	4	VG CSK 8 x 160	10	24	[5,300]	See uplift design p. 51 - 53
RICON S VS 200 x 60			6		16	32	[7,100]	
RICON S VS 200 x 80		FH II 15/M10 I + M10 x 20 8.8	6	VG CSK 10 x 200	16	48	[10,700]	
RICON S VS 290 x 80			8		20	59	[13,200]	

Notes:
1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. All installation and design of the concrete bolts needs to be in accordance with the manufacturer recommendations.
5. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
6. Factored resistances listed are applicable for Specific Gravities 0.42 & 0.49.
7. Connector placement must respect the minimum and maximum edge distance requirements for each connector size in concrete and wood.
8. Screw installation must follow the patterns presented under the design table.
9. Maximum bolt head thickness 6 mm.



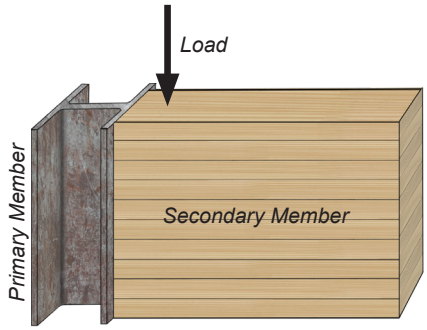
Concrete Fastener Positioning
(concrete to wood)

Steel to Wood Connections

The RICON S VS can be **bolted** or **welded** to steel elements to create wood to steel connections.

Bolts and welds need to be designed to transmit the respective loading requirements.

Option 1 - **Bolted**



Option 2 - **Welded**

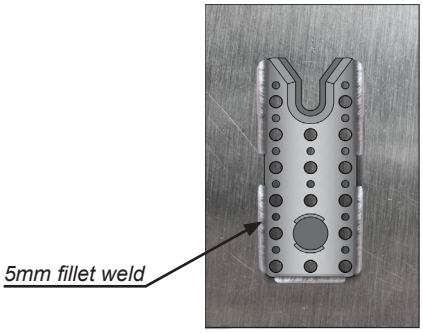
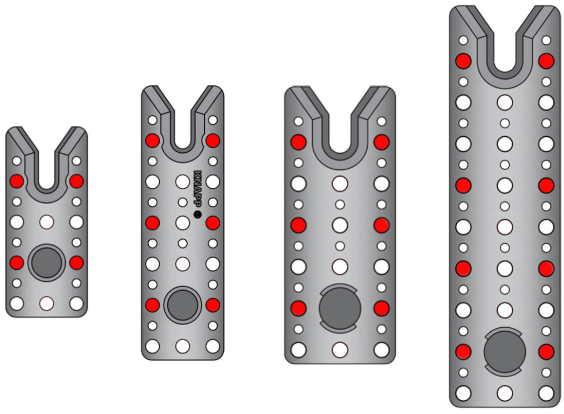


Table 25.2 Factored Resistances for Bolted Steel to Wood Connections

Connector	Steel Strength Class	Fasteners				Factored Resistance, N_r		Uplift
		Primary (Steel) Member		Secondary (Wood) Member		Down Load		
		Type	Quantity	Type	Quantity	kN	[lbs]	
RICON S VS 140 x 60	ASTM A36 or higher	M8 8.8 bolt + nut	4	VG CSK 8 x 160	10	26	[5,800]	See uplift design p. 51 - 53
RICON S VS 200 x 60			6		16	35	[7,800]	
RICON S VS 200 x 80		M10 8.8 bolt + nut	6	VG CSK 10 x 200	16	52	[11,600]	
RICON S VS 290 x 80			8		20	63	[14,100]	

Notes:
1. Factored resistance listed are only valid for Limit State Design in Canada.
2. Factored resistance listed are only valid using listed ASSY screws.
3. Factored resistance listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed symmetrically about the vertical axis to avoid eccentricity.
5. Bolts with a minimum grade of 8.8 shall be used.
6. Factored resistances listed are applicable for Specific Gravities 0.42 & 0.49.
7. The steel plate thickness shall be at least 6 mm.
8. Bolt installation must follow the patterns presented under the design table.
9. Maximum bolt head thickness 6 mm.
10. All bolt and steel design criteria must be designed by a licensed design professional.

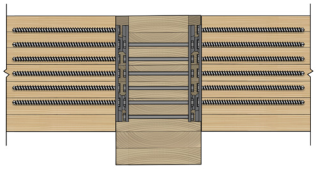


Bolt Positioning
(steel to wood)

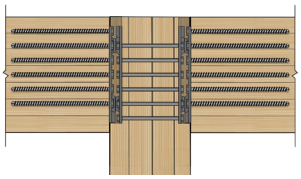
Through Connections

The RICON S VS is also suitable for double connections where secondary members connect into multiple faces of the primary member, a post member or a CLT wall element.

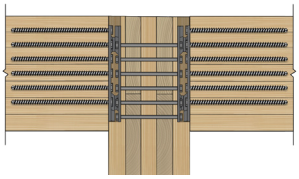
The Beam Hanger System is connected using through bolts or threaded rods suitable for structural applications.



Through Connection with a Beam



Through Connection with a Column



Through Connection with a CLT Wall

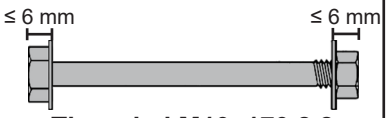
Table 25.3 Factored Resistances for Through Connections

Connector	Relative Density [G]	Fasteners (per connection)				Factored Resistance, N_r		Uplift
		Primary Member		Secondary Members		Down Load		
		Type	Quantity	Type	Quantity	kN	[lbs]	
RICON S VS 140 x 60	0.42 (SPF)	M8 8.8 bolt + jam nut	6	VG CSK 8 x 160	20	16	[3,500]	See uplift design p. 51 - 53
RICON S VS 200 x 60			9		32	23	[5,100]	
RICON S VS 200 x 80		M10 8.8 bolt + jam nut	9	VG CSK 10 x 200	32	37	[8,300]	
RICON S VS 290 x 80			12		40	50	[11,200]	
RICON S VS 140 x 60	0.49 (D.Fir)	M8 8.8 bolt + jam nut	6	VG CSK 8 x 160	20	19	[4,200]	
RICON S VS 200 x 60			9		32	28	[6,200]	
RICON S VS 200 x 80		M10 8.8 bolt + jam nut	9	VG CSK 10 x 200	32	44	[9,800]	
RICON S VS 290 x 80			12		40	58	[13,000]	

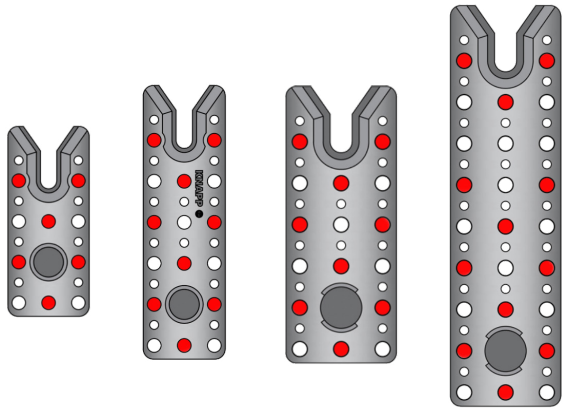
Notes:

1. Factored resistances listed are only valid for Limit State Design in Canada.
2. Factored resistances listed are only valid using listed ASSY screws.
3. Factored resistances listed are only valid for dry service condition (K_s=1.0).
4. Connector plates shall be installed centered around the vertical axis to avoid eccentricity.
5. Bolts with a minimum grade of 8.8 shall be used.
6. Minimum end and edge distances need to be kept following recommendations in the CSA.
7. The length of the through penetration shall be a minimum of 100 mm for M8 8.8 bolts and 125 mm for M10 8.8 bolts.
8. Bolts shall be installed with tight fit, jam nuts and washer to allow connector plates to engage properly.
9. Maximum bolt head and jam nut thickness 6 mm.
10. Connector placement must respect the minimum and maximum edge distance requirement for each connector size.
11. Bolt installation must follow the patterns presented under the design table.
12. Other limiting factors regarding the wood strength, group tear out etc. need to be considered.

Threaded Rod M8x150 8.8 Jam Nut and Washer



Threaded M10x170 8.8 with Jam Nut and Washer



RICON S VS 140x60 | RICON S VS 200x60 | RICON S VS 200x80 | RICON S VS 290x80

Bolt Positioning
(through connection)

Skewed Connections

The Beam Hanger System relies on different fastener lengths for load transfer in the primary and secondary member.

Primary Member
The connector plate installed into the primary member, for either a girder beam or a column, has fasteners driven in the side grain. This fiber orientation promotes higher withdrawal capacity, therefore the fasteners may be shorter and still sustain the same load.

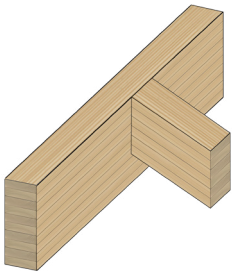
ASSY VG CSK 8x80 screws may be used with:
- RICON S VS 140x60
- RICON S VS 200x60

ASSY VG CSK 10x100 screws may be used with:
- RICON S VS 200x80
- RICON S VS 290x80
- RICON XL 390x80

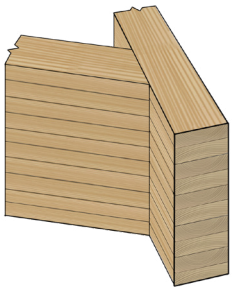
Secondary Member
The connector plate installed into the secondary member has fasteners driven into the end grain. Longer fully threaded screws are used in the secondary member in order to compensate for the withdrawal capacity reduction characteristic of this orientation of the wood fiber.

ASSY VG CSK 8x160 screws may be used with:
- RICON S VS 140x60
- RICON S VS 200x60

ASSY VG CSK 10x200 screws may be used with:
- RICON S VS 200x80
- RICON S VS 290x80
- RICON XL 390x80



Rafter to Ridge Beam Connection

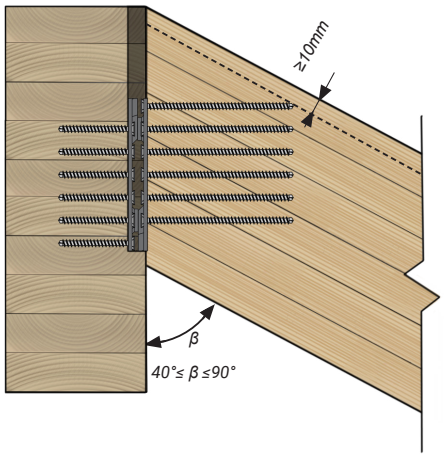


Joist to Beam Connection

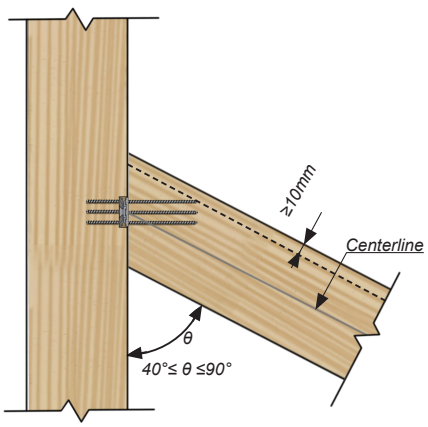
In skewed connections, the connector plate installed into the secondary member has fasteners driven into the grain at an angle relative to the connection angle.

The connection benefits from the changing the angle to grain relationship, and thus respective design values may be achieved with shorter screw length in the secondary member.

Skewed Connection Details



Side View: Rafter to Ridge Beam Connection



Top View: Joist to Beam or Column Connection

In skewed connections, the connector placement must respect the connection geometry requirements in order to be used without reinforcement. Where connection geometry imposes restrictions, fastener length may be reduced, and factored connection resistances shall be adjusted with the appropriate reduction factor (R_{SKEWED}).

For horizontal tilts (θ), the connector must be positioned within the centerline of the joist, otherwise eccentricities and resulting moments must be accounted for by the designer.

Table 26.1 Adjustment Factor (R_{SKEWED}) for RICON S VS 140x60 & 200x60

Screw Length [mm]	β or θ = 90°	β or θ = 80°	β or θ = 70°	β or θ = 60°	β or θ = 50°	β or θ = 40°
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

Table 26.2 Adjustment Factor (R_{SKEWED}) for RICON S VS 200x80, 290x80 & 390x80

Screw Length [mm]	β or θ = 90°	β or θ = 80°	β or θ = 70°	β or θ = 60°	β or θ = 50°	β or θ = 40°
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

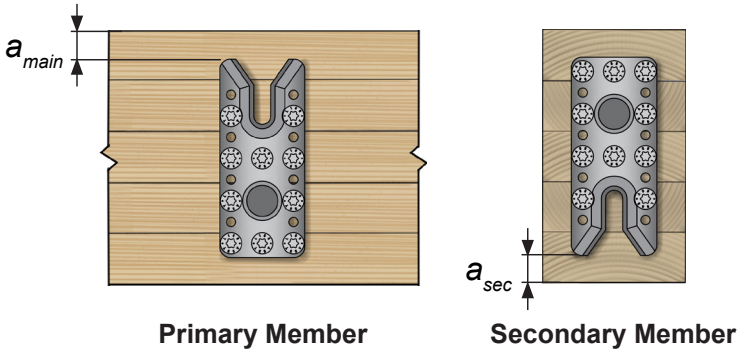
Notes:
1. Reduced fastener lengths only apply for installation in the secondary member.
2. Factored resistances of the connector must be adjusted with the reduction factor given in the table.

Rocky Ridge YMCA

Calgary, Alberta 2016

RICON S VS REINFORCEMENT

Where detailing requirements dictate connector placements other than the one specified in this document, connection strength may be limited, and reinforcement is required. Reinforcement may be achieved through the use of full thread screws in compliance with CCMC 13677-R.



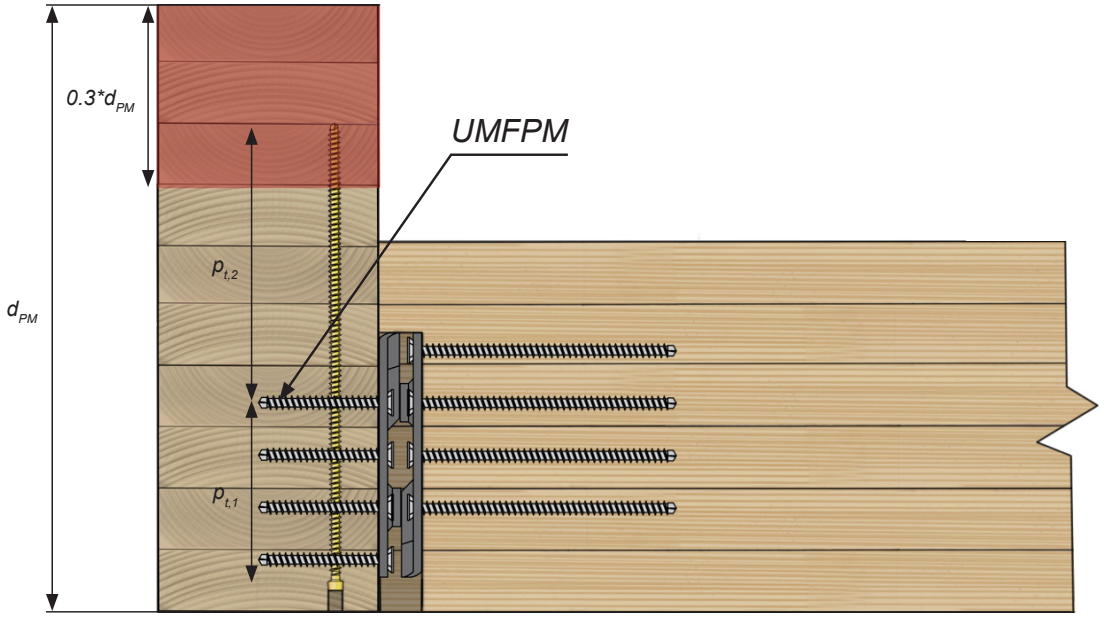
Primary Member Details

The effective thread penetration length $p_{t,1}$ and $p_{t,2}$ above and below the **upper most fastener in the primary member [UMFPM]** must exceed the value p_t provided in tables 27.1 through 27.5.

The fully threaded reinforcing screw must penetrate sufficiently (> 4*D) into the upper most section of the primary member ($0.3*d_{PM}$).

The effective thread penetration length may be adjusted to accommodate a wooden plug covering the screw head or to optimize screw selection to available screw lengths as per table 28.

The adjustment must fulfill min ($p_{t,1}$;$p_{t,2}$) >p_t. The reinforcing fully threaded wood screw in the primary member may be installed from the top down or the bottom up as required.



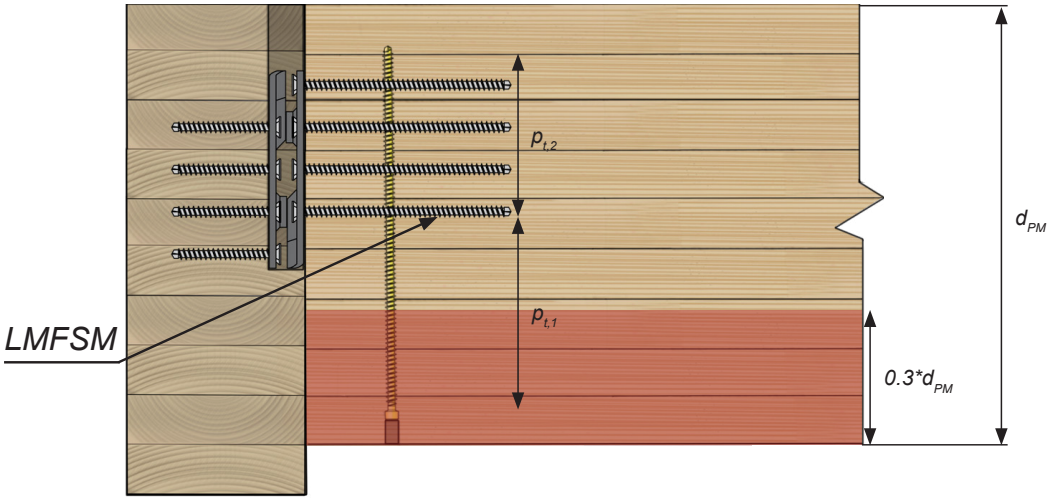
Secondary Member Details

The effective thread penetration length $p_{t,1}$ and $p_{t,2}$ above and below the **lower most fastener in the secondary member [LMFSM]** must exceed the value p_t provided in tables 27.1 through 27.5.

The fully threaded reinforcing screw must sufficiently penetrate (> 4*D) into the lower most section of the secondary member ($0.3*d_{SM}$).

The effective thread penetration length may be adjusted to accommodate a wooden plug covering the screw head or to optimize to available screw lengths as per table 28.

The adjustment must fulfill min ($p_{t,1}$;$p_{t,2}$) >p_t.The reinforcing fully threaded wood screw in the secondary member may be installed from the top down or the bottom up as required.



Reinforcement Tables

The appropriate thread penetration length (p_t) given in table 27.1 through 27.5 depends on the ratio h_i/d_i, where h_i is the distance between the **UMFPM** and the top of the primary member or the distance between the **LMFSM** and the bottom of the secondary member.

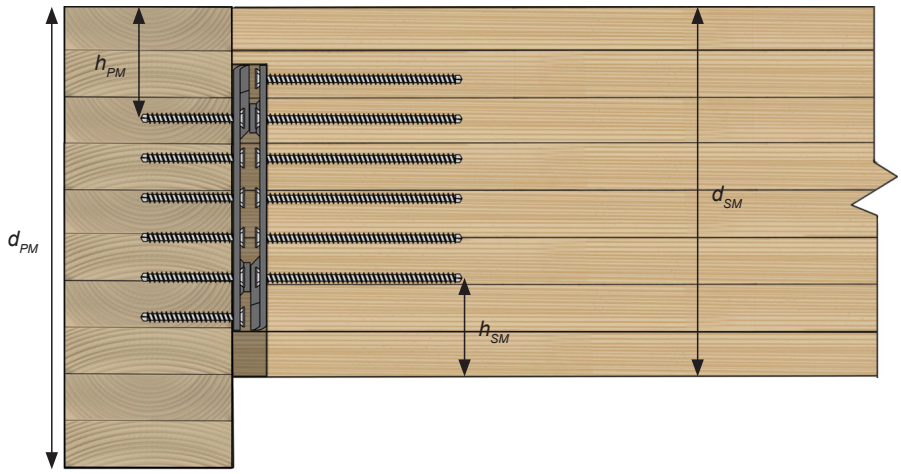


Table 27.1 Minimum Thread Penetration pt [mm] Needed for RICON S VS 140x60

h_i/d_i	0._0	0._1	0._2	0._3	0._4	0._5	0._6	0._7	0._8	0._9
0.3_	92	97	103	109	114	120	126	132	138	144
0.4_	150	156	162	169	175	181	188	194	200	207
0.5_	213	220	226	232	239	245	251	258	264	270

Table 27.2 Minimum Thread Penetration pt [mm] Needed for RICON S VS 200x60

h_i/d_i	0._0	0._1	0._2	0._3	0._4	0._5	0._6	0._7	0._8	0._9
0.3_	127	135	143	150	158	166	174	183	191	199
0.4_	208	216	225	234	242	251	260	269	277	286
0.5_	295	304	313	322	330	339	348	357	365	374

Table 27.3 Minimum Thread Penetration pt [mm] Needed for RICON S VS 200x80

h_i/d_i	0._0	0._1	0._2	0._3	0._4	0._5	0._6	0._7	0._8	0._9
0.3_	150	159	168	177	186	196	205	215	225	235
0.4_	245	255	265	275	285	296	306	316	327	337
0.5_	348	358	368	379	389	400	410	420	430	440

Table 27.4 Minimum Total Thread Penetration pt [mm] Needed for RICON S VS 290x80

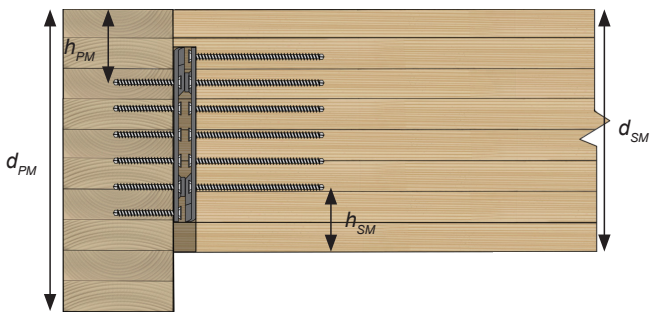
h_i/d_i	0._0	0._1	0._2	0._3	0._4	0._5	0._6	0._7	0._8	0._9
0.3_	184	194	205	217	228	239	251	263	275	287
0.4_	299	311	324	336	349	361	374	387	399	412
0.5_	425	438	450	463	476	488	501	514	526	538

Table 27.5 Minimum Thread Penetration pt [mm] Needed for RICON XL 390x80

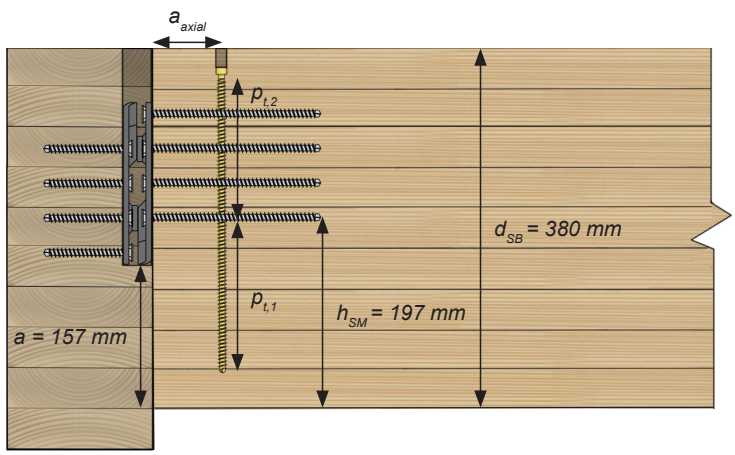
h_i/d_i	0._0	0._1	0._2	0._3	0._4	0._5	0._6	0._7	0._8	0._9
0.3_	339	359	380	400	421	433	464	486	508	531
0.4_	553	576	599	622	645	668	692	715	738	762
0.5_	786	809	833	856	880	903	926	949	973	995

Reinforcement notes:

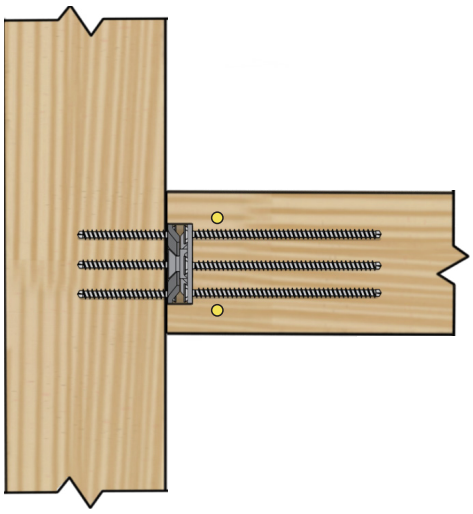
1. Ratios h_i/d_i are applicable to joist and header reinforcement.
2. Values in tables 27.1 and 27.2 are only applicable to 8 mm ASSY VG fasteners and values in tables 27.3, 27.4 and 27.5 are only applicable to 10 mm ASSY VG fasteners found in Table 28.
3. A minimum of two reinforcement fasteners shall be used.
4. For design purposes $p_{t,1}$ & $p_{t,2}$ may be considered a maximum of 200 mm. Beyond this value, the tensile resistance of the fastener is governing. Longer fasteners however, still may be used when the length is required for installation purposes.
5. Fasteners shall be placed in a symmetrical pattern respecting all governing spacing requirements.
6. Double connections may require additional reinforcement.
7. RICON XL 390x80 reinforcement with more than 2 screws must be designed by a licensed design professional.



Reinforcement Design Example



Side View



Top View

As an example, to connect a 120mm by 380mm Glulam beam to a girder with the 140x60 RICON S VS mounted high in the cross section, reinforcement would be necessary as a_{max} = 74mm for a 380mm beam and the actual measurement a=157mm, so $a>a_{max}$.

With given measurements of h_{SM} (197mm) the h_i/d_i ratio equals:

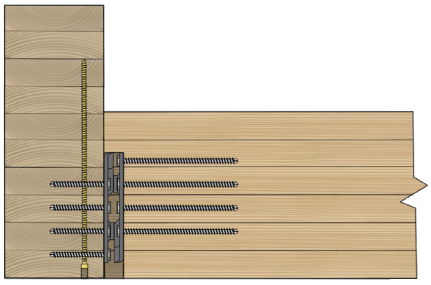
- 197 / 380 = 0.52

According to Table 27.1, for the h_i/d_i ratio of 0.52, pt = 226mm, therefore $p_{t,1}$ and $p_{t,2}$ have to be larger or equal to 226mm.

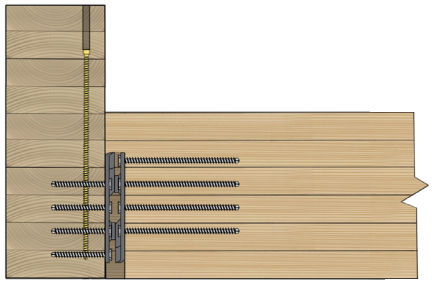
With 2 VG Cyl 8 x 280 fasteners countersunk 25mm installed from above, the effective embedding lengths result in:

- $p_{t,1}$ = 2* 122mm > 226mm
- $p_{t,2}$ = 2* 158mm > 226mm

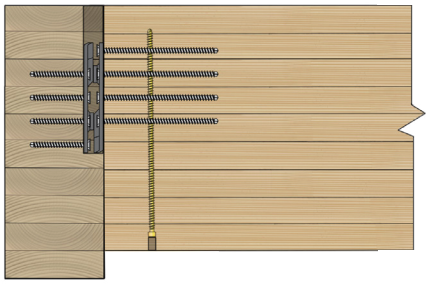
Reinforcement Possibilities



Header Reinforcement from Below



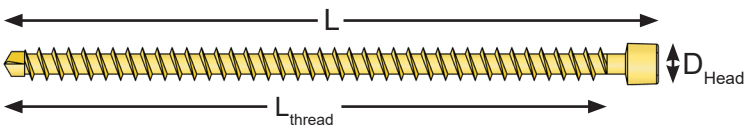
Header Reinforcement from Above



Joist Reinforcement from Below

Hardware Requirement - ASSY VG Cyl

Table 28 Screw Selection for ASSY VG Cylinder Head

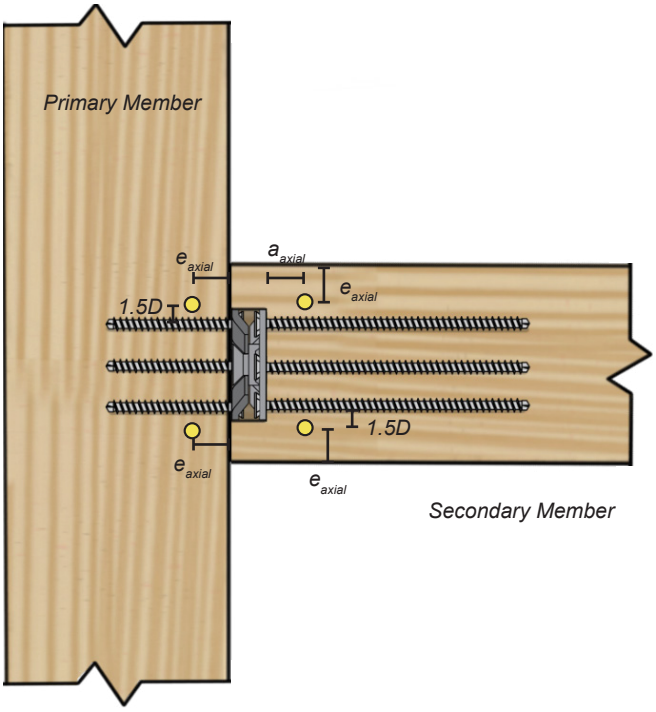


Item#	Box size pieces	D		L		L_{Thread}		D_{Head}		Bit
		mm	[in]	mm	[in]	mm	[in]	mm	[in]	
140080160000102	50	8	[5/16”]	160	[6-1/4”]	144	[5-5/8”]	10	[3/8”]	AW 40
140080180000102				180	[7-1/8”]	164	[6-1/2”]			
140080200000102	75			200	[7-7/8”]	184	[7-1/4”]			
140080220000102				240	[9-1/2”]	224	[8-7/8”]			
140080240000102				260	[10-1/4”]	244	[9-5/8”]			
140080260000102				280	[11”]	264	[10-3/8”]			
140080280000102				300	[11-7/8”]	284	[11-1/8”]			
140080300000102	50			330	[13”]	314	[12-3/8”]			
150080360000302				360	[14-1/4”]	344	[13-1/2”]			
150080380000302				380	[15”]	364	[14-3/8”]			
150080430000302	25			430	[17”]	414	[16-1/4”]			
150080480000302				480	[19”]	464	[18-1/4”]			
150080530000302				530	[20-7/8”]	514	[20-1/4”]			
150080580000302				580	[22-7/8”]	564	[22-1/4”]			
140100180000102	50	10	[3/8”]	180	[7-1/8”]	165	[6-1/2”]	13.4	[0.528”]	AW 50
140100200000102				200	[7-7/8”]	185	[7-1/4”]			
140100240000102				240	[9-1/2”]	225	[8-7/8”]			
140100260000102				260	[10-1/4”]	245	[9-5/8”]			
140100280000102				280	[11”]	265	[10-3/8”]			
140100300000102				300	[11-7/8”]	285	[11-1/4”]			
140100320000102				320	[12-5/8”]	305	[12”]			
140100340000102				340	[13-3/8”]	325	[12-3/4”]			
140100360000102				360	[14-1/4”]	345	[13-5/8”]			
140100380000102				380	[15”]	365	[14-3/8”]			
140100400000102				400	[15-3/4”]	385	[15-1/8”]			
140100430000102	25			430	[17”]	415	[16-3/8”]			
140100480000102				480	[19”]	456	[18”]			
140100530000102				530	[20-7/8”]	506	[19-7/8”]			
140100580000102				580	[22-7/8”]	556	[21-7/8”]			
140100650000102				650	[25-5/8”]	626	[24-5/8”]			
140100700000102				700	[27-5/8”]	676	[26-5/8”]			
140100750000102				750	[29-1/2”]	726	[28-5/8”]			
140100800000102				800	[31-1/2”]	776	[30-1/2”]			

Installation of Reinforcement

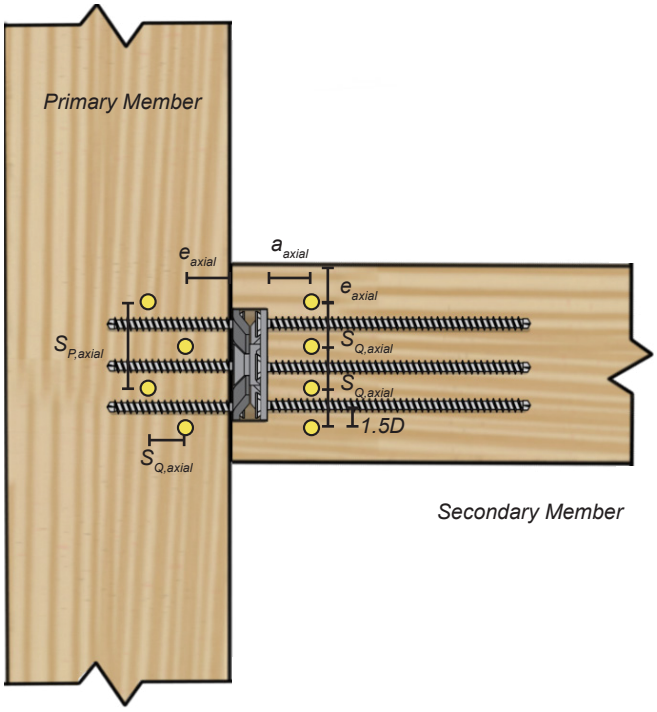
Reinforcing fasteners need to be installed as close as possible to the peak stress location they will experience while obeying the minimum geometry requirements.

It is not recommended to exceed a_{axial} or e_{axial} given in Table 29, and illustrated below. Reinforcement shall be assigned to one row of screws parallel to the line of the joint.



Top View

Geometry Requirements with 2 Reinforcement Screws in a Member



Top View

Geometry Requirements with > 2 Reinforcement Screws in a Member

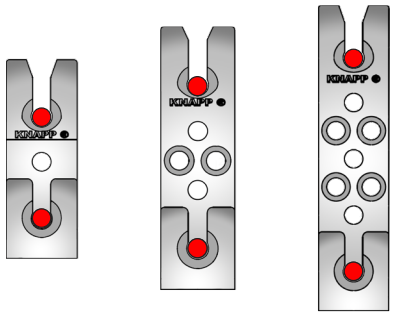
Table 29 Geometry Requirements without Pre-drilling

	End Distance a_{axial}	Edge Distance e_{axial}	Spacing Between Fasteners in a Row $S_{P,axial}$	Spacing Between Rows $S_{Q,axial}$
G ≤ 0.42	5 D	3 D	5 D	2.5 D
0.42 < G ≤ 0.55	5 D	3 D	5 D	2.5 D
D-Fir	7.5 D	3 D	7.5 D	2.5 D

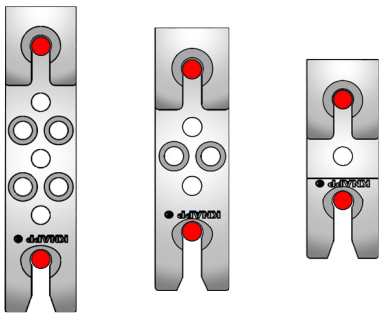
Notes:
1. For precise installation of long reinforcing screws, pre-drilling can be allowed.
2. Pre-drilling 8 mm diameter screws with a 5 mm drill bit and 10 mm diameter screws with a 6 mm drill bit.
3. Pre-drilling of full screw length is permitted if required.

INSTALLATION AND TOLERANCES

GIGANT - Concealed Installation Requirements



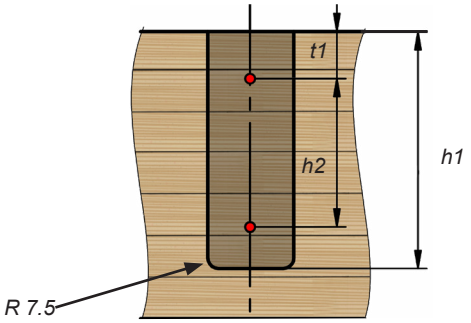
GIGANT 120x40 | GIGANT 140x40 | GIGANT 180x40



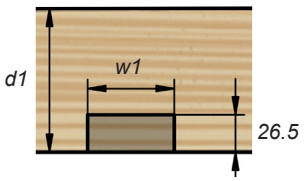
GIGANT 120x40 | GIGANT 140x40 | GIGANT 180x40

Notes:
1. The red dots indicate the positioning holes and should be aligned with the main holes on the members which are also marked red in the following figures.
2. All concealed installation is suggested to be field verified.

Routing in Primary Member Only

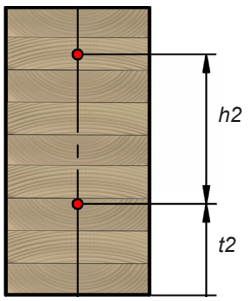


Side View



Top View

Primary Member



Secondary Member

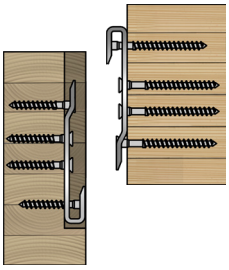
Table 30.1 Routing in Primary Member - Requirements

Connector	h1	h2	t1	t2	d1	w1
	[mm]					
GIGANT 120 x 40	a_{main} + 117	57.5	a_{main} + 37	a_{sec} + 37	≥ 106.5	≥ 40
GIGANT 150 x 40	a_{main} + 150	89.5	a_{main} + 38	a_{sec} + 38	≥ 106.5	≥ 40
GIGANT 180 x 40	a_{main} + 182	121	a_{main} + 38.5	a_{sec} + 38.5	≥ 106.5	≥ 40

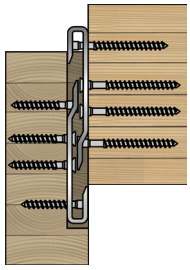
Note:
1. a_{main} refers to the top egde distance in the Primary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
2. a_{sec} refers to the bottom egde distance in the Secondary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.

Installation

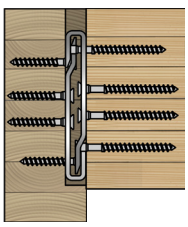
Step 1



Step 2



Step 3



Routing in Secondary Member Only

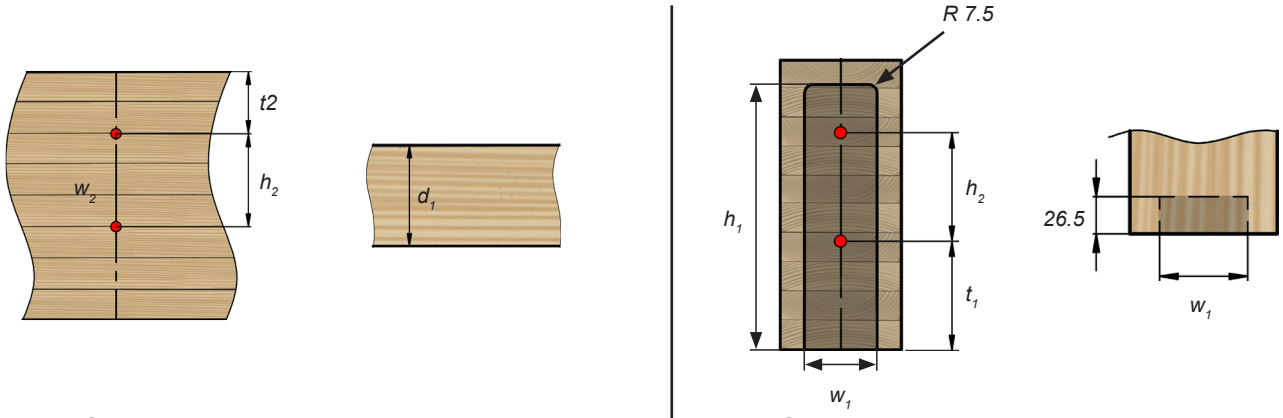


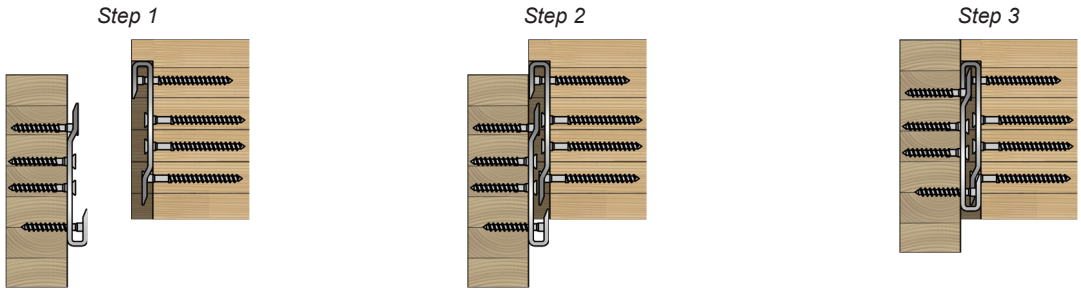
Table 30.2 Routing in Secondary Member - Requirements

Connector	h1	h2	t1	t2	d1	w1
	[mm]					
GIGANT 120 x 40	a_{sec} + 117	57.5	a_{sec} + 37	a_{main} + 37	≥ 80	≥ 40
GIGANT 150 x 40	a_{sec} + 150	89.5	a_{sec} + 38	a_{main} + 38	≥ 80	≥ 40
GIGANT 180 x 40	a_{sec} + 182	121	a_{sec} + 38.5	a_{main} + 38.5	≥ 80	≥ 40

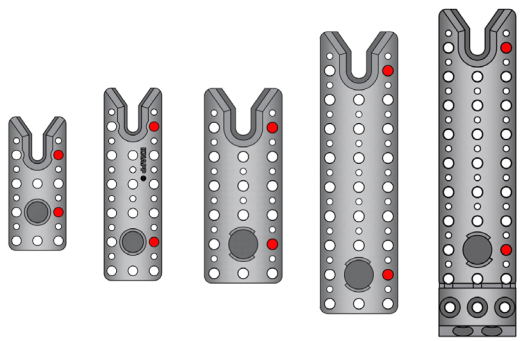
Note:

1. a_{main} refers to the top egde distance in the Primary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
2. a_{sec} refers to the bottom egde distance in the Secondary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.

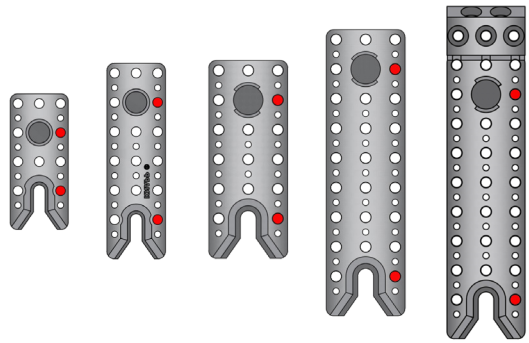
Installation



RICON S VS - Concealed Installation Requirements



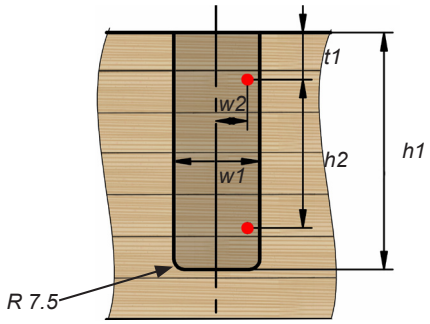
RICON S VS 140x60 | RICON S VS 200x60 | RICON S VS 200x80 | RICON S VS 290x80 | RICON XL 390x80



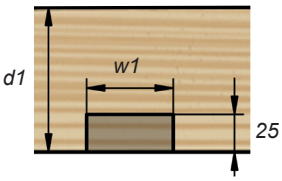
RICON S VS 140x60 | RICON S VS 200x60 | RICON S VS 200x80 | RICON S VS 290x80 | RICON XL 390x80

Notes:
1. The red dots indicate the positioning holes and should be aligned with the main holes on the members which are also marked red in the following figures.
2. All concealed installation is suggested to be field verified.

Routing in Primary Member Only

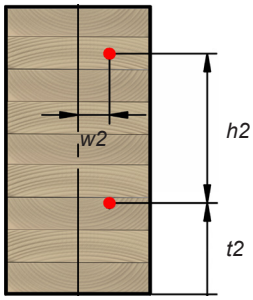


Side View



Top View

Primary Member



Secondary Member

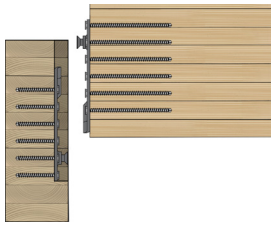
Table 31.1 Routing in Primary Member - Requirements

Connector	h1	h2	t1	t2	d1	w1	w2
	[mm]						
RICON S VS 140x60	a_{main} + 150	60	a_{main} + 40	a_{sec} + 40	≥ 105	≥ 60	22
RICON S VS 200x60	a_{main} + 210	120	a_{main} + 40	a_{sec} + 40	≥ 105	≥ 60	22
RICON S VS 200x80	a_{main} + 210	120	a_{main} + 40	a_{sec} + 40	≥ 125	≥ 80	30
RICON S VS 290x80	a_{main} + 300	210	a_{main} + 40	a_{sec} + 40	≥ 125	≥ 80	30
RICON XL 390x80	a_{main} + 400	210	a_{main} + 90	a_{sec} + 90	≥ 125	≥ 82	30

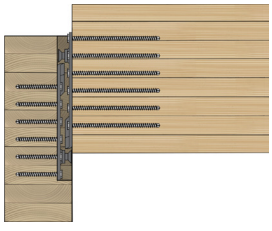
Note:
1. a_{main} refers to the top egde distance in the Primary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
2. a_{sec} refers to the bottom egde distance in the Secondary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.

Installation

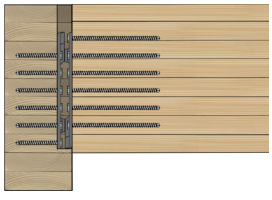
Step 1



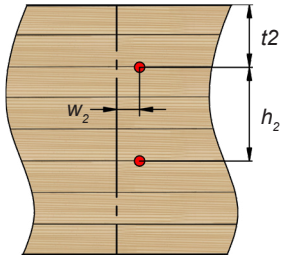
Step 2



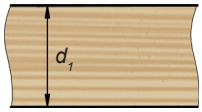
Step 3



Routing in Secondary Member Only

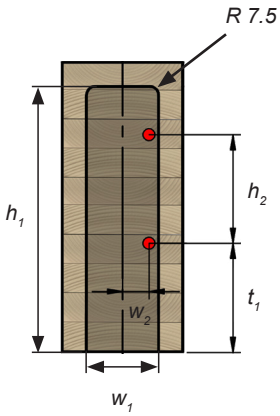


Side View

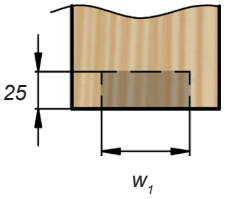


Top View

Primary Member



Side View



Bottom View

Secondary Member

Table 31.2 Routing in Secondary Member - Requirements

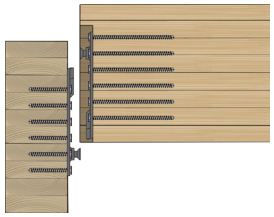
Connector	h1	h2	t1	t2	d1	w1	w2
	[mm]						
RICON S VS 140x60	a_{sec} + 150	60	a_{sec} + 40	a_{main} + 40	≥ 80	≥ 60	22
RICON S VS 200x60	a_{sec} + 210	120	a_{sec} + 40	a_{main} + 40	≥ 80	≥ 60	22
RICON S VS 200x80	a_{sec} + 210	120	a_{sec} + 40	a_{main} + 40	≥ 100	≥ 80	30
RICON S VS 290x80	a_{sec} + 300	210	a_{sec} + 40	a_{main} + 40	≥ 100	≥ 80	30
RICON XL 390x80	a_{sec} + 400	210	a_{sec} + 90	a_{main} + 90	≥ 100	≥ 82	30

Note:

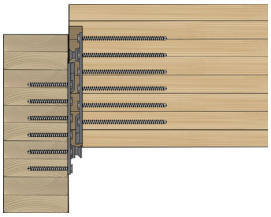
1. a_{main} refers to the top egde distance in the Primary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
2. a_{sec} refers to the bottom egde distance in the Secondary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.

Installation

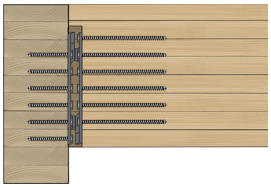
Step 1



Step 2



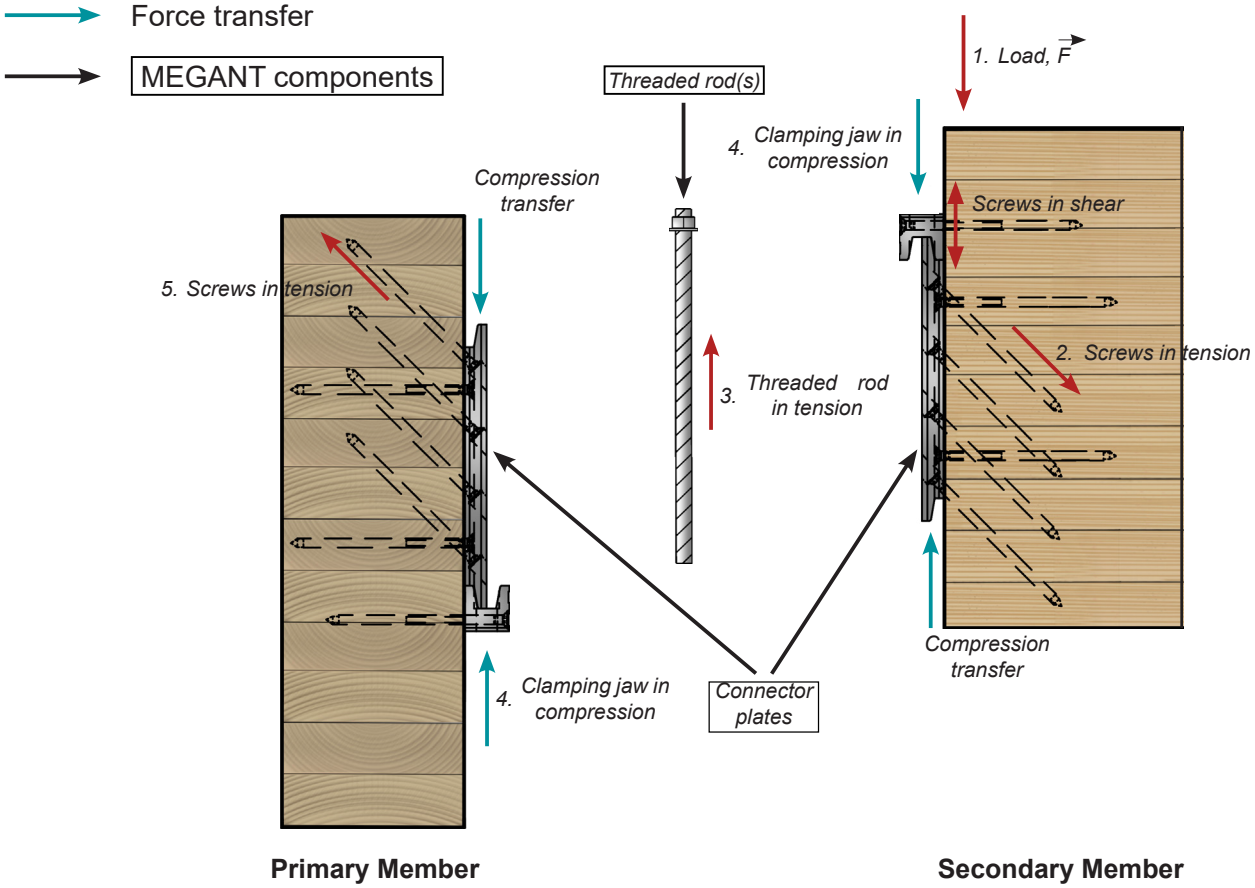
Step 3



MEGANT - Concealed Installation Requirements

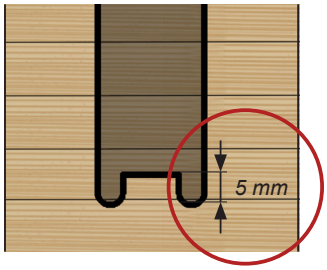
System Force Transfer

The following figure outlines the installation of the MEGANT connector and highlights the flow of forces through the different components. This is to aid in understanding why the fasteners and connector must be installed as specified.



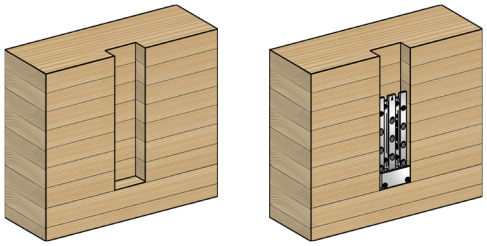
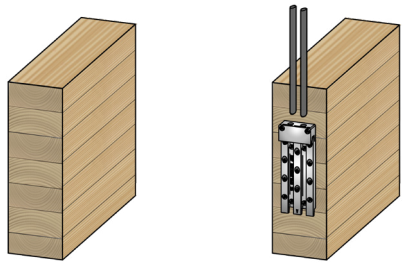
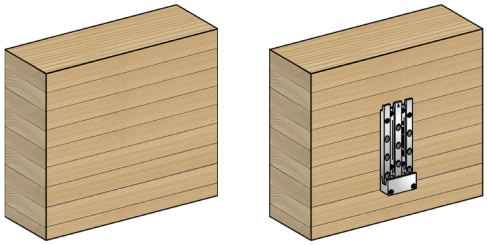
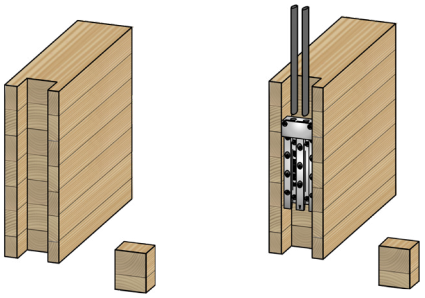
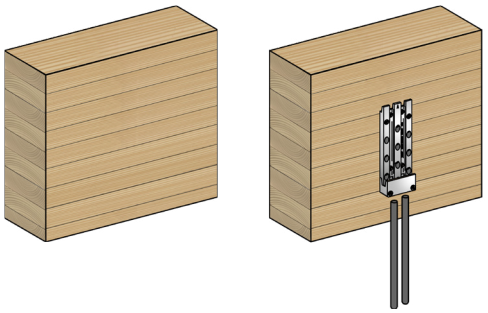
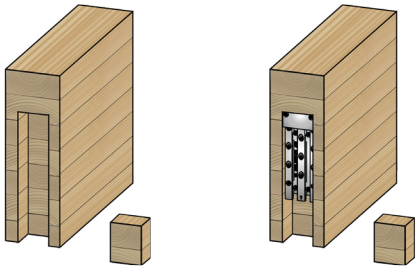
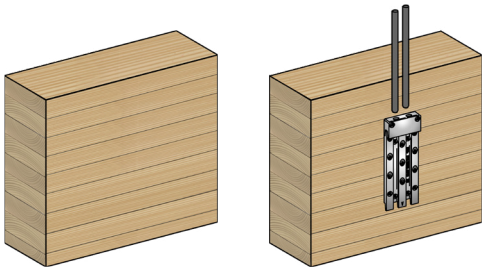
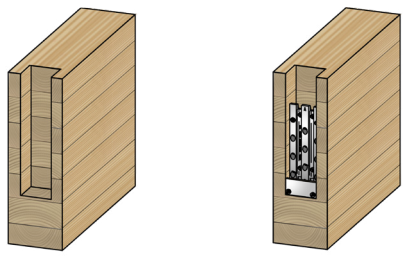
Housing Consideration

The housing for a fully concealed MEGANT connection is typically done using either a wood router or the finger mill tool of a CNC machine. In order to account for the round corner created by these rotating knife tools, it is recommended to allow for an extra 5mm in the inside corners.

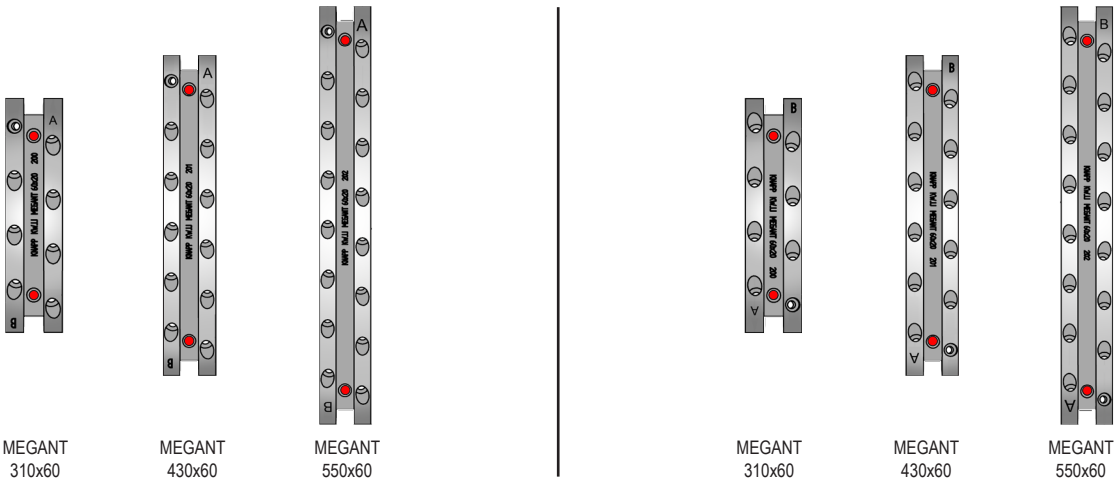


Top / Bottom View

Housing Possibilities

	Primary Member	Secondary Member
Girder Housing Most common housing for concealed install. Concealed from below, the rod can be installed from the top.		
Joist Through Housing Full depth housing in joist. Concealed from below with wood plug, the rod can still be installed from the top.		
Joist Bottom Housing Joist housing from bottom up. Concealed from below with wood plug, the rod needs to be installed from bottom up.		
Joist Top Housing Joist housing from top down. Concealed from below. No wood plug required. Advantageous when installing the beams to existing columns with floor above.		

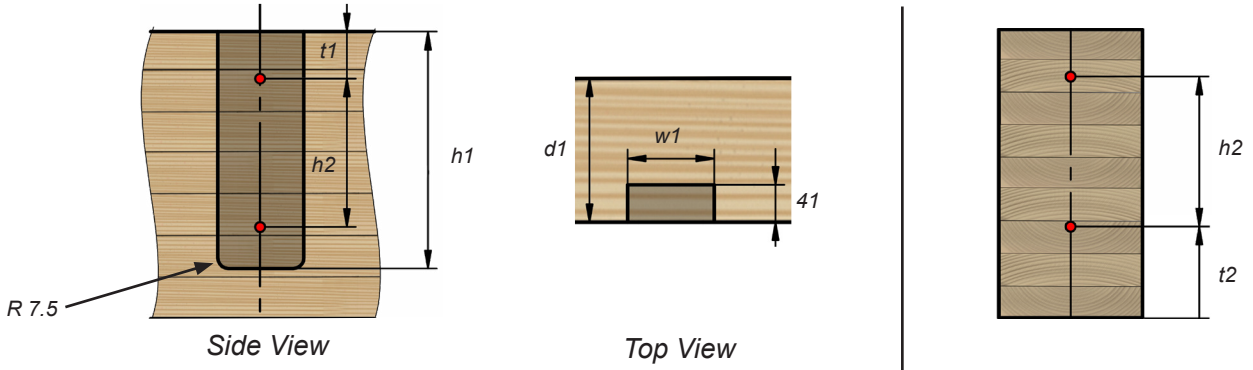
MEGANT 60 Series



MEGANT 310x60 | MEGANT 430x60 | MEGANT 550x60 | MEGANT 310x60 | MEGANT 430x60 | MEGANT 550x60

Notes:
1. The red dots indicate the positioning holes and should be aligned with the main holes on the members which are also marked red in the following figures.
2. All concealed installation is suggested to be field verified.

Routing in Primary Member Only



Side View | *Top View*

Primary Member | **Secondary Member**

Table 32.1 Routing in Primary Member - Requirements

Connector	h1	h2	t1	t2	d1	w1
	[mm]					
MEGANT 310x60	a_{main} + 310	170	a_{main} + 70	a_{sec} + 70	≥ 200	≥ 62
MEGANT 430x60	a_{main} + 430	290	a_{main} + 70	a_{sec} + 70	≥ 200	≥ 62
MEGANT 550x60	a_{main} + 550	410	a_{main} + 70	a_{sec} + 70	≥ 200	≥ 62

Note:
1. a_{main} refers to the top egde distance in the Primary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
2. a_{sec} refers to the bottom egde distance in the Secondary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
3. To ensure a proper routing for the Megant connector, please refer to the “housing consideration” on page 76.

Routing in Secondary Member Only

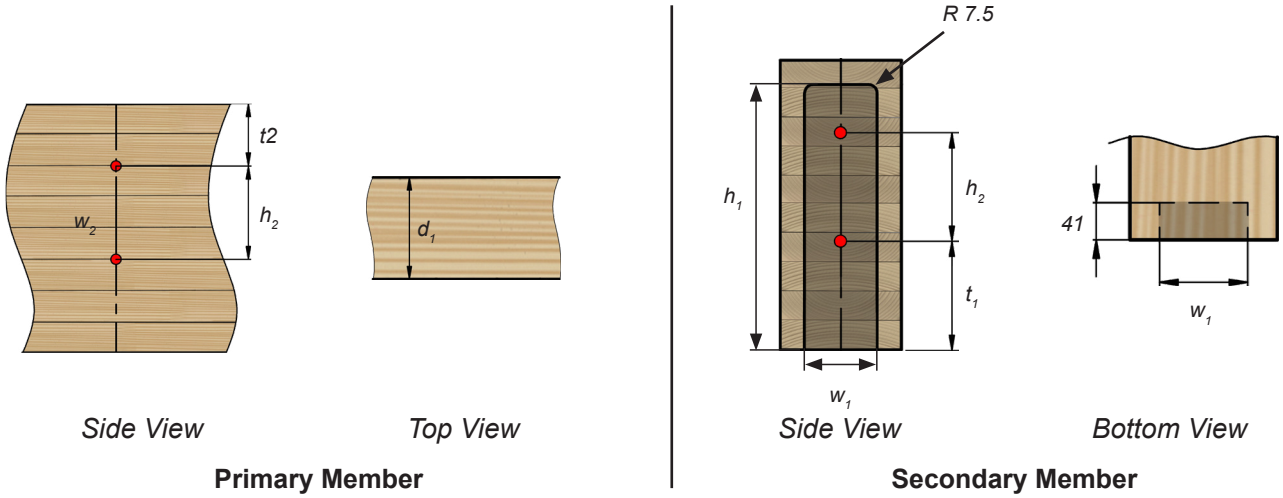


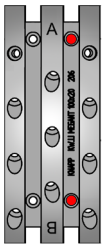
Table 32.2 Routing in Secondary Member - Requirements

Connector	h1	h2	t1	t2	d1	w1
	[mm]					
MEGANT 310x60	a_{sec} + 310	170	a_{sec} + 70	a_{main} + 70	≥ 160	≥ 62
MEGANT 430x60	a_{sec} + 430	290	a_{sec} + 70	a_{main} + 70	≥ 160	≥ 62
MEGANT 550x60	a_{sec} + 550	410	a_{sec} + 70	a_{main} + 70	≥ 160	≥ 62

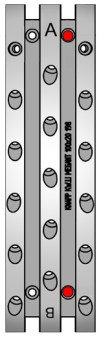
Note:

1. a_{main} refers to the top egde distance in the Primary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
2. a_{sec} refers to the bottom egde distance in the Secondary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
3. To ensure a proper routing for the Megant connector, please refer to the “housing consideration” on page 76.

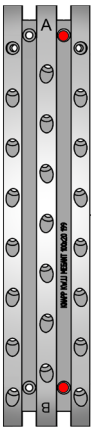
MEGANT 100 Series



MEGANT
310x100

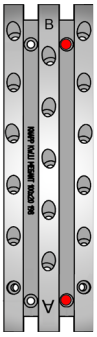


MEGANT
430x100

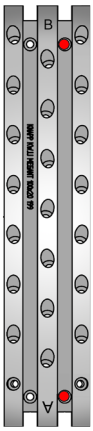


MEGANT
550x100

MEGANT
310x100



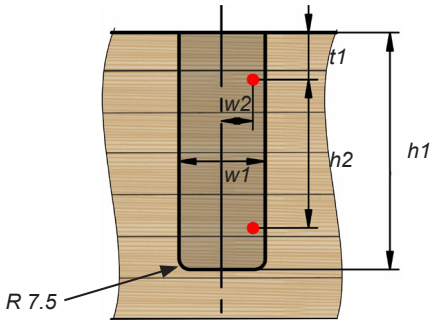
MEGANT
430x100



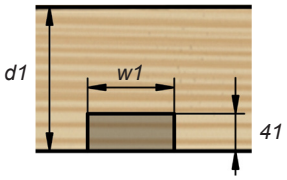
MEGANT
550x100

Notes:
1. The red dots indicate the positioning holes and should be aligned with the main holes on the members which are also marked red in the following figures.
2. All concealed installation is suggested to be field verified.

Routing in Primary Member Only

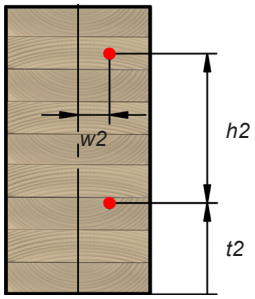


Side View



Top View

Primary Member



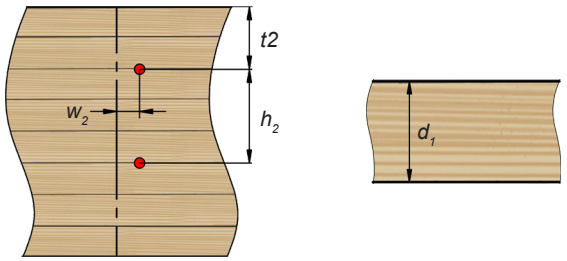
Secondary Member

Table 33.1 Routing in Primary Member - Requirements

Connector	h1	h2	t1	t2	d1	w1	w2
	[mm]						
MEGANT 310x100	a_{main} + 310	170	a_{main} + 65	a_{sec} + 65	≥ 200	≥ 102	20
MEGANT 430x100	a_{main} + 430	290	a_{main} + 65	a_{sec} + 65	≥ 200	≥ 102	20
MEGANT 550x100	a_{main} + 550	410	a_{main} + 65	a_{sec} + 65	≥ 200	≥ 102	20

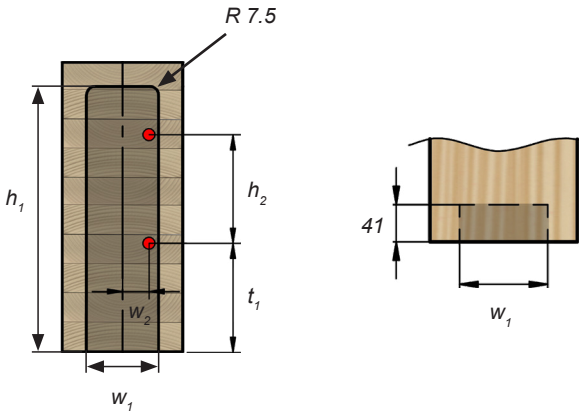
Note:
1. a_{main} refers to the top egde distance in the Primary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
2. a_{sec} refers to the bottom egde distance in the Secondary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
3. To ensure a proper routing for the Megant connector, please refer to the “housing consideration” on page 76.

Routing in Secondary Member Only



Side View *Top View*

Primary Member



Side View

Secondary Member

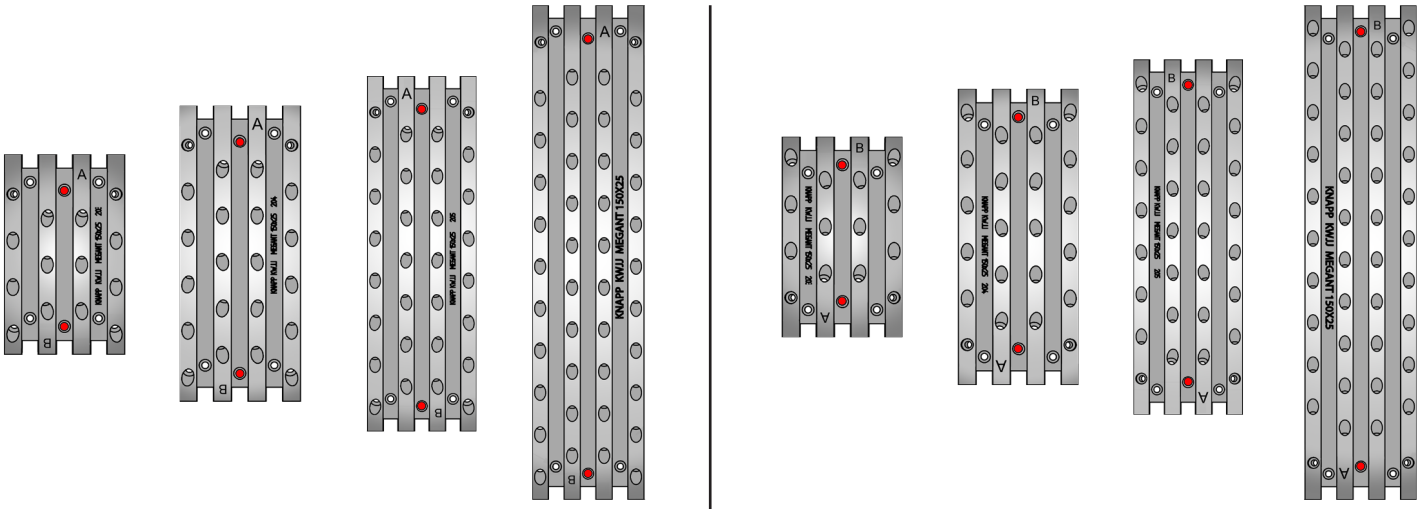
Table 33.2 Routing in Secondary Member - Requirements

Connector	h1	h2	t1	t2	d1	w1	w2
	[mm]						
MEGANT 310x100	a_{sec} + 310	170	a_{sec} + 65	a_{main} + 65	≥ 160	≥ 102	20
MEGANT 430x100	a_{sec} + 430	290	a_{sec} + 65	a_{main} + 65	≥ 160	≥ 102	20
MEGANT 550x100	a_{sec} + 550	410	a_{sec} + 65	a_{main} + 65	≥ 160	≥ 102	20

Note:

1. a_{main} refers to the top egde distance in the Primary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
2. a_{sec} refers to the bottom egde distance in the Secondary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
3. To ensure a proper routing for the Megant connector, please refer to the “housing consideration” on page 76.

MEGANT 150 Series



MEGANT 310x150 | MEGANT 430x150 | MEGANT 550x150 | MEGANT 730x150 | MEGANT 310x150 | MEGANT 430x150 | MEGANT 550x150 | MEGANT 730x150

Notes:
1. The red dots indicate the positioning holes and should be aligned with the main holes on the members which are also marked red in the following figures.
2. All concealed installation is suggested to be field verified.

Routing in Primary Member Only

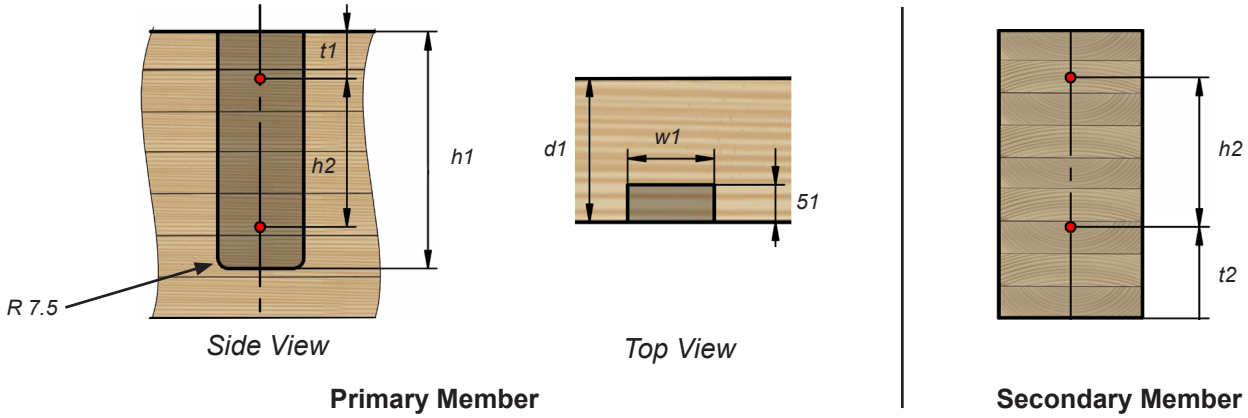


Table 34.1 Routing in Primary Member - Requirements

Connector	h1	h2	t1	t2	d1	w1
	[mm]					
MEGANT 310x150	a_{main} + 310	170	a_{main} + 65	a_{sec} + 65	≥ 211	≥ 152
MEGANT 430x150	a_{main} + 430	290	a_{main} + 65	a_{sec} + 65	≥ 211	≥ 152
MEGANT 550x150	a_{main} + 550	410	a_{main} + 65	a_{sec} + 65	≥ 211	≥ 152
MEGANT 730x150	a_{main} + 730	590	a_{main} + 65	a_{sec} + 65	≥ 211	≥ 152

Note:
1. a_{main} refers to the top egde distance in the Primary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
2. a_{sec} refers to the bottom egde distance in the Secondary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
3. To ensure a proper routing for the Megant connector, please refer to the “housing consideration” on page 76.

Routing in Secondary Member Only

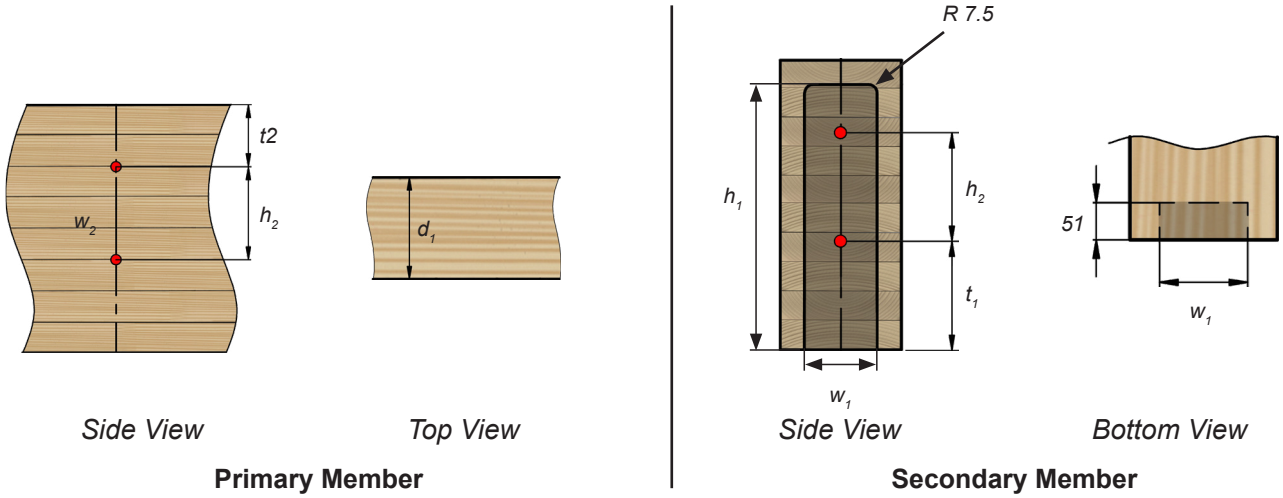


Table 34.2 Routing in Secondary Member - Requirements

Connector	h1	h2	t1	t2	d1	w1
	[mm]					
MEGANT 310x150	a_{sec} + 310	170	a_{sec} + 65	a_{main} + 65	≥ 160	≥ 152
MEGANT 430x150	a_{sec} + 430	290	a_{sec} + 65	a_{main} + 65	≥ 160	≥ 152
MEGANT 550x150	a_{sec} + 550	410	a_{sec} + 65	a_{main} + 65	≥ 160	≥ 152
MEGANT 730x150	a_{sec} + 730	590	a_{sec} + 65	a_{main} + 65	≥ 160	≥ 152

Note:

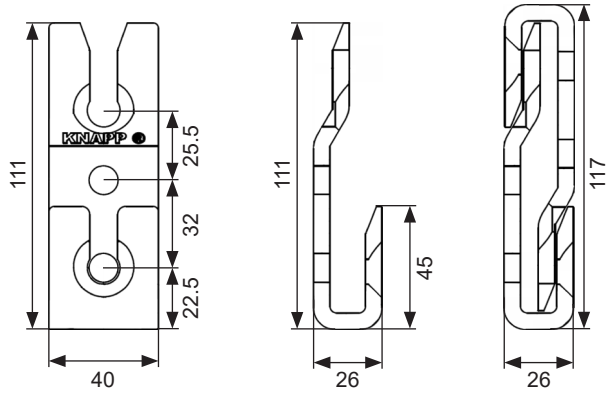
1. a_{main} refers to the top egde distance in the Primary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
2. a_{sec} refers to the bottom egde distance in the Secondary Member where reinforcement is not required. Please refer to the Geometry Requirement tables for each respective Beam Hanger System.
3. To ensure a proper routing for the Megant connector, please refer to the “housing consideration” on page 76.

ANNEX - DETAILING SECTION

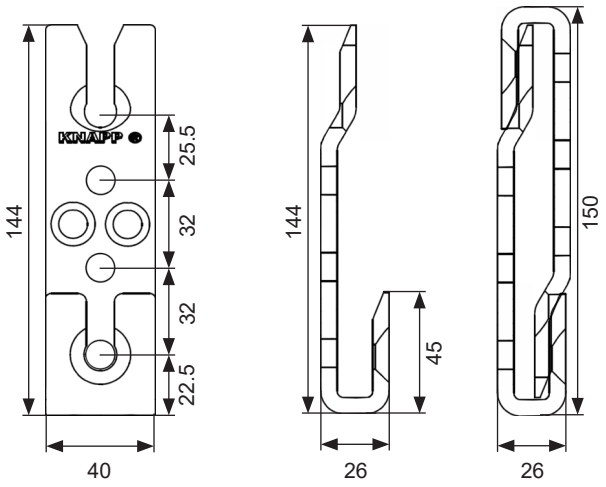
This annex presents detailed rendering and dimension of the different Beam Hangers Systems introduced in this design guide.

GIGANT

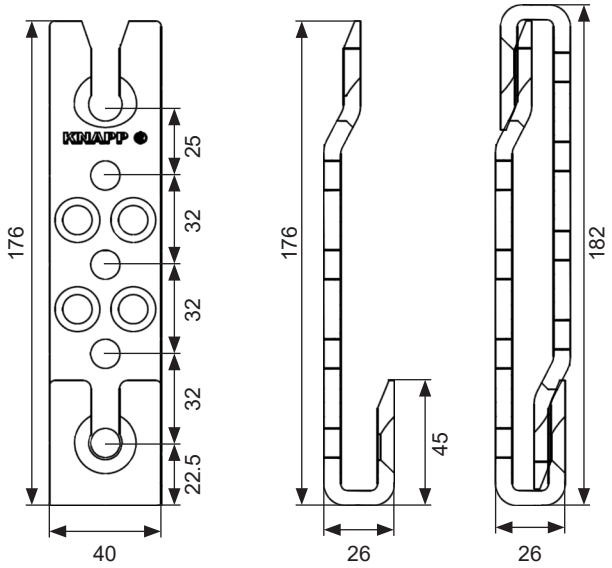
GIGANT 120 X 40



GIGANT 150 X 40

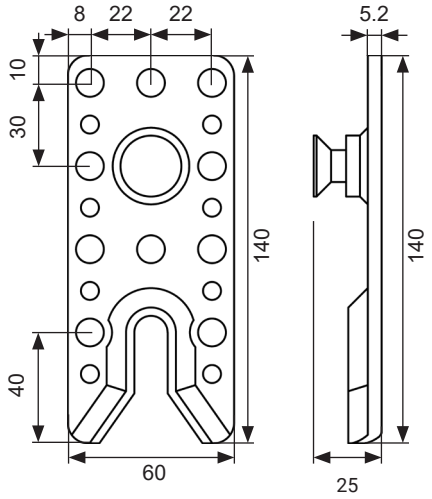


GIGANT 180 X 40

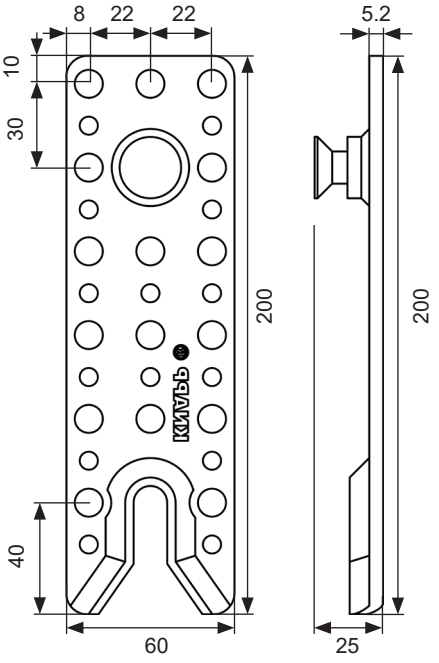


RICON S VS

RICON S VS 140 x 60

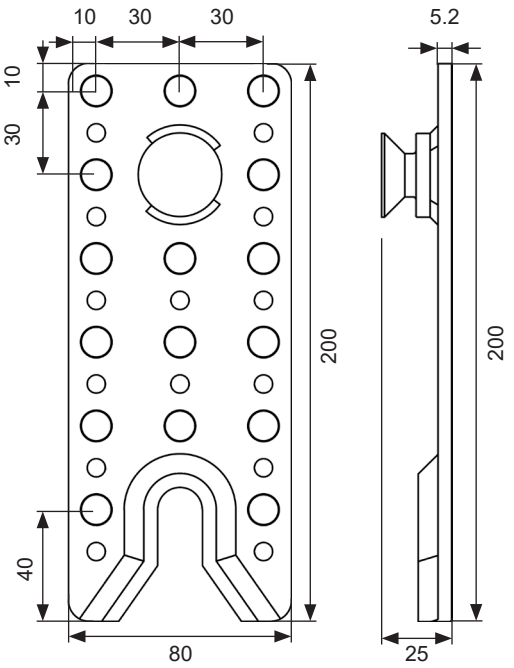


RICON S VS 200 x 60

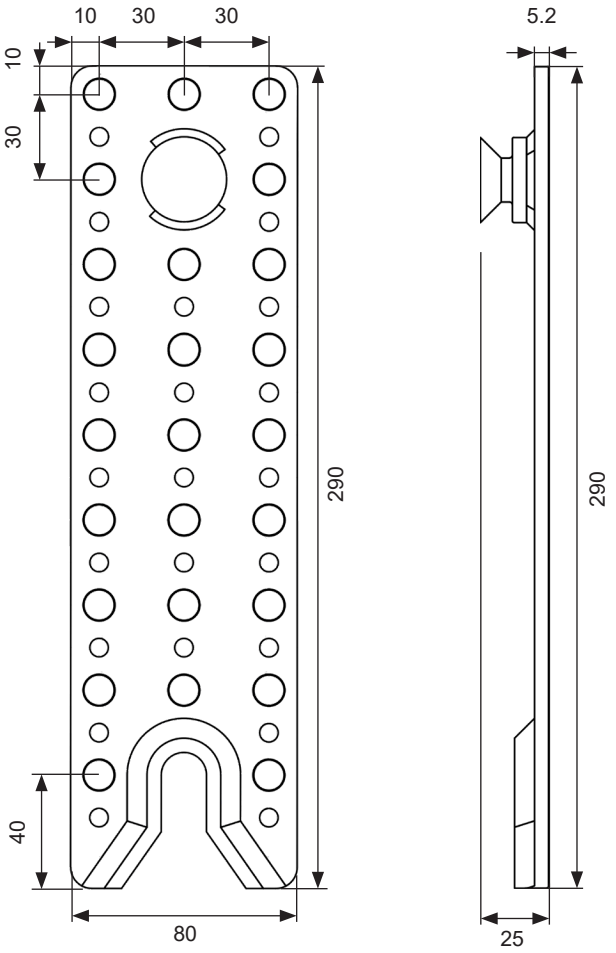


Notes:
1. All dimensions provided in this section are in mm

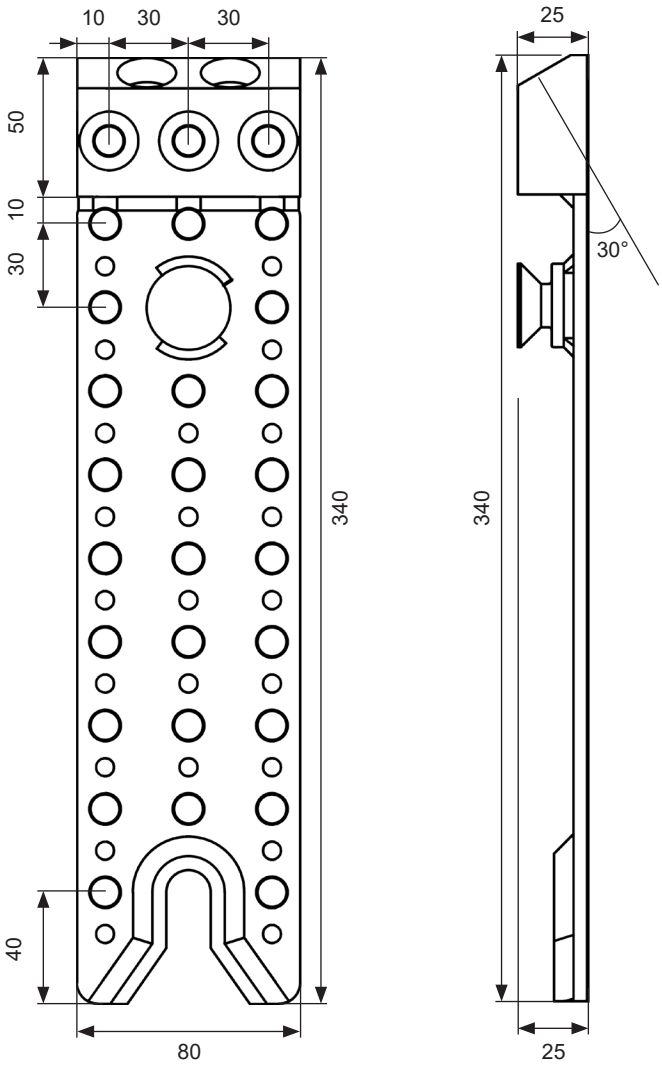
RICON S VS 200 x 80



RICON S VS 290 x 80



RICON S VS XL - 390 x 80

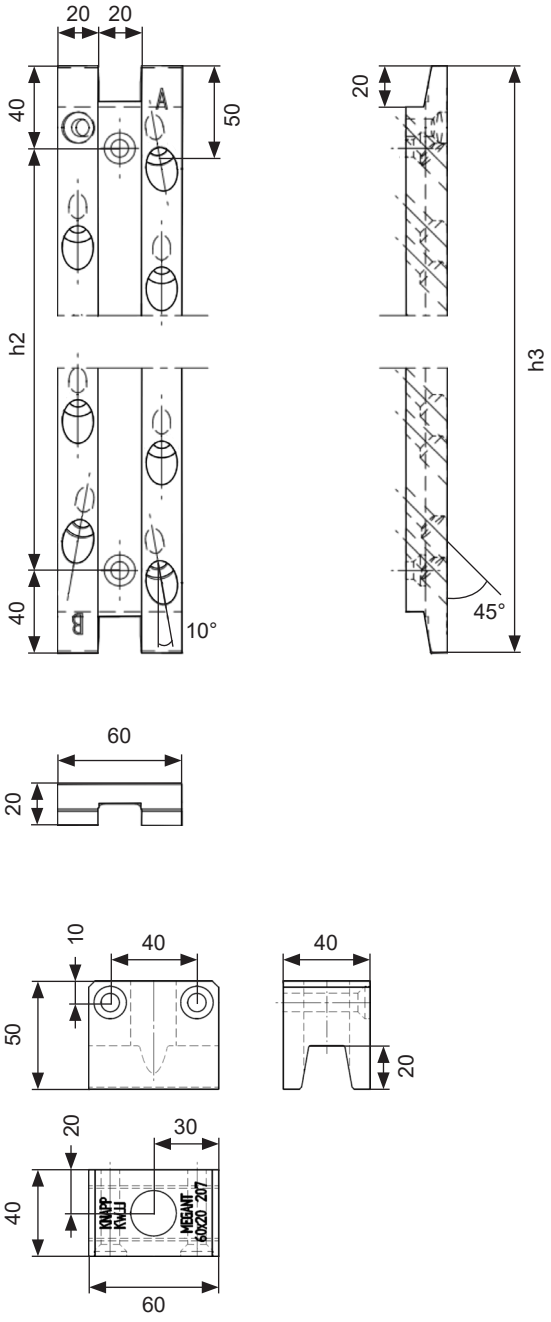


Notes:

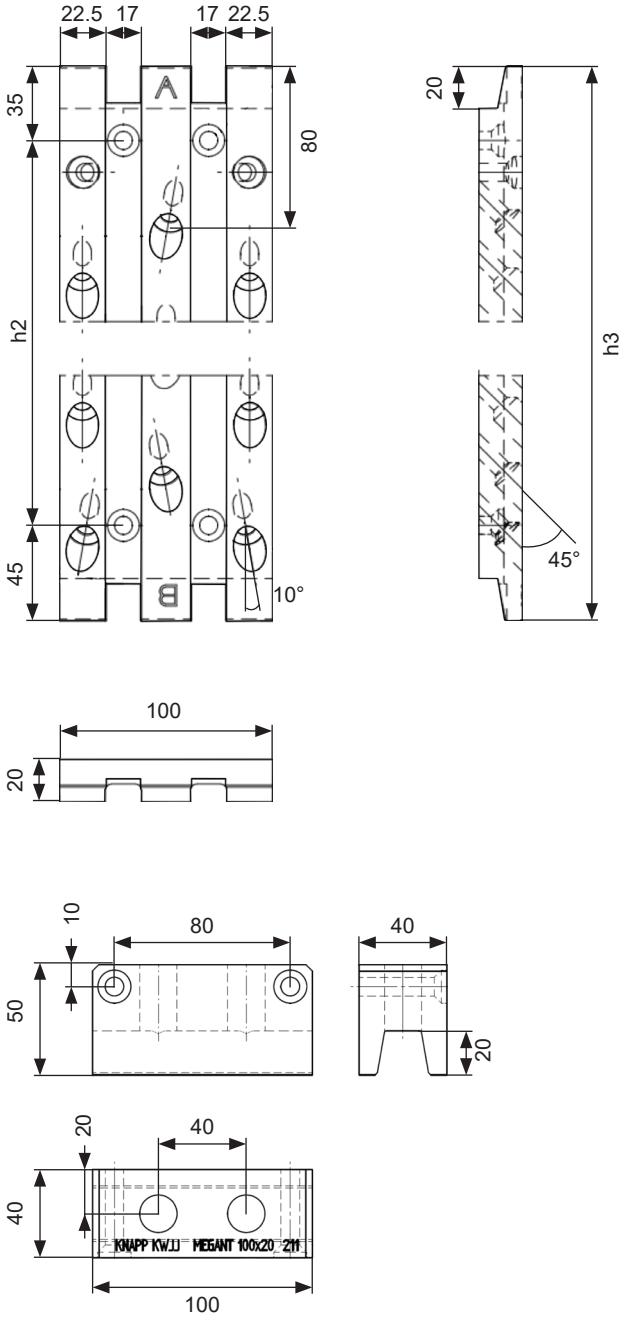
1. All dimensions provided in this section are in mm

MEGANT

MEGANT 60 SERIES



MEGANT 100 SERIES

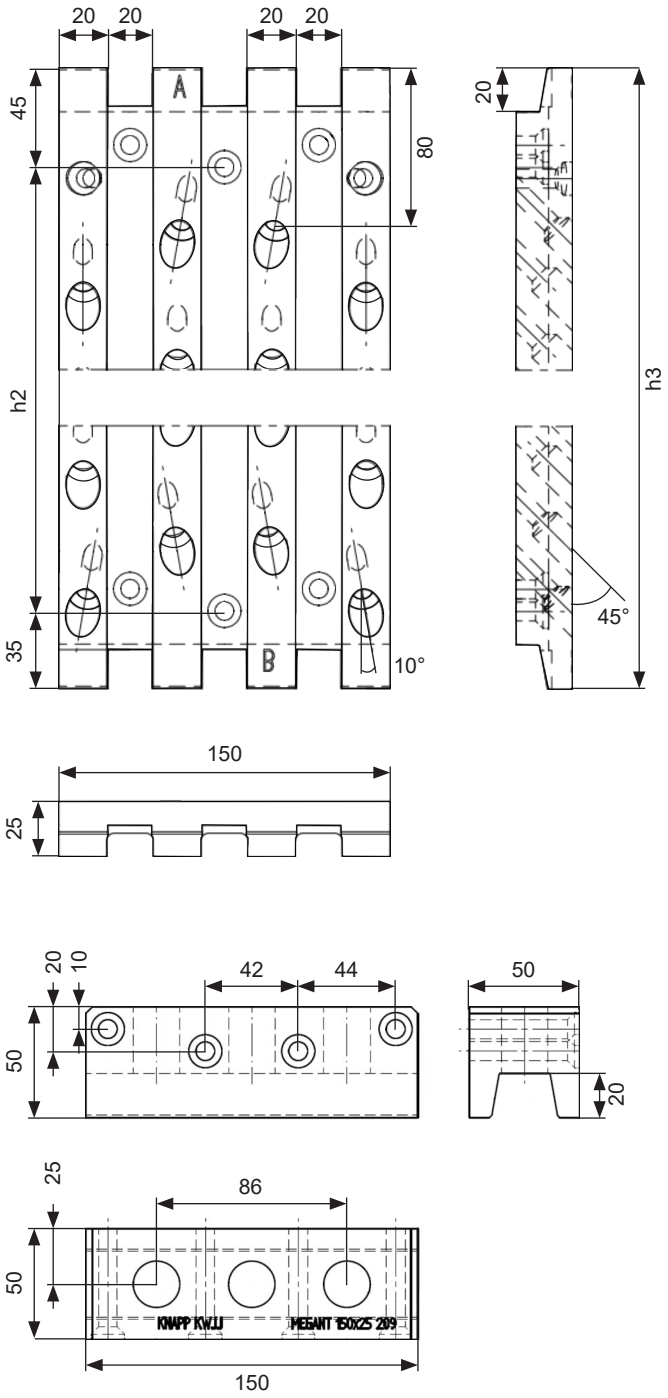


Connector	h2	h3
	[mm]	
MEGANT 310x60	170	250
MEGANT 430x60	290	370
MEGANT 550x60	410	490

Connector	h2	h3
	[mm]	
MEGANT 310x100	170	250
MEGANT 430x100	290	370
MEGANT 550x100	410	490

Notes:
1. All dimensions provided in this section are in mm

MEGANT 150 SERIES



Connector	h2	h3
	[mm]	
MEGANT 310x150	170	250
MEGANT 430x150	290	370
MEGANT 550x150	410	490
MEGANT 730x150	590	670

Notes:
1. All dimensions provided in this section are in mm

We strive to provide sustainable, high quality mass timber connection solutions to a rapidly evolving and thriving industry. We drive innovation through certified research and development and contribute our part to the education of young talent and experienced professionals.

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