

# Special Design Provision

Beam Hanger System - Installation Requirements



October 9, 2019

The Beam Hanger Systems supplied by MTC Solutions are among the most recent technological innovations in the field of mass timber engineering. These pre-engineered connections are premanufactured, provided with tabulated design values and precise installation instructions, reducing the engineering, detailing and assembly time needed to successfully complete a project.

This letter, intended for the engineers and detailers, will teach you more about the different concepts integrated within the geometry requirements of the beam hanger connectors. The following sections are defined:

- **The concepts** used to derive the geometry requirements
- The connectors **placement calculation** in the beam depth
- How to read the **geometry requirements** tables from our design guide
- **Solutions** if the suggested geometry requirements cannot be followed

This document is to be read in conjunction with **MTC Solutions Beam Hanger Design Guide**.



All tables and renderings listed in the Beam Hanger Design Guide highlight geometric parameters, such as “ $a_{main}$ ” and “ $a_{sec}$ ” factors, which should always be followed during installation.

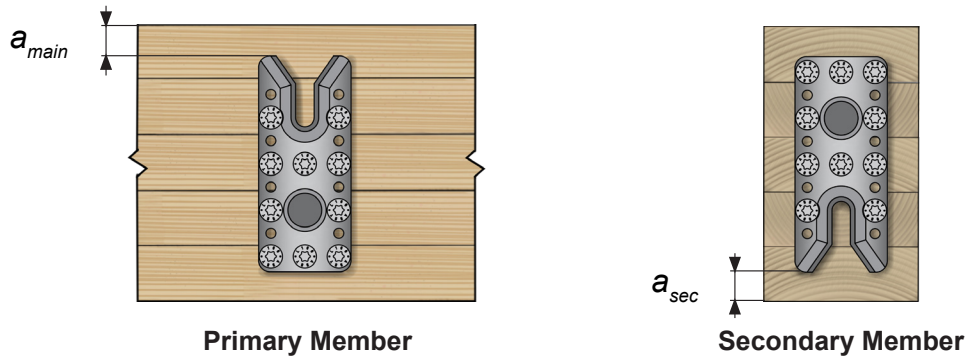
Sincerely,  
**MTC Solutions**

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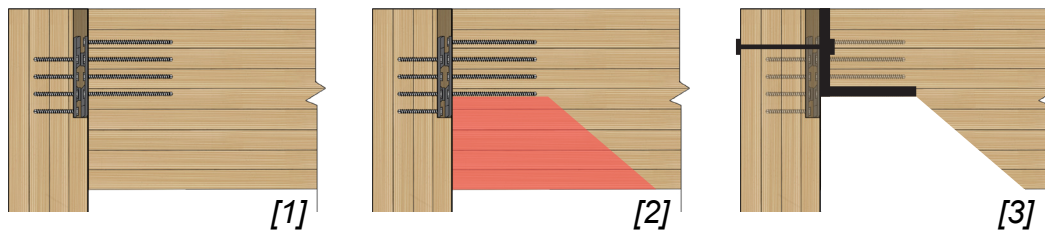
## The Concepts

### Height Placement

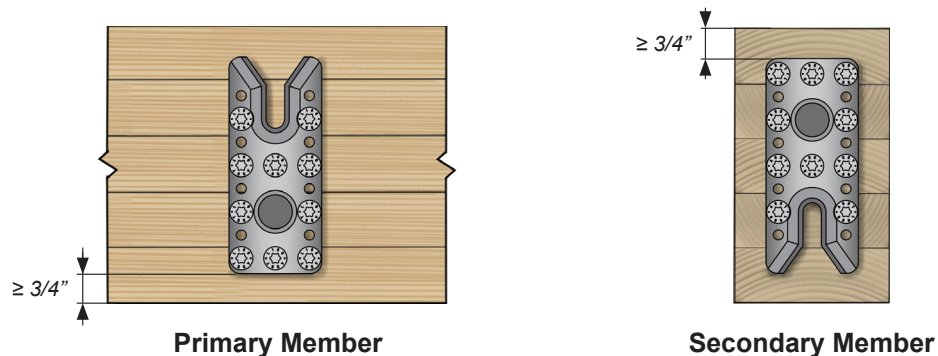
It is recommended to install the beam hanger system as high as possible into the primary member and as low as possible into the secondary member to ensure that wood members are entirely engaged in the connection.



**The maximum height** placement recommendation is required to reduce perpendicular to grain tension and the associated premature splitting. A high in section install is often viewed as introduction of a virtual notch in similar fashion as it would occur with a high mounted angle bracket. Notch depth is commonly limited by design codes.



**The minimum height** placement recommendation is based on the minimum edge distance requirements of the fasteners used with the connectors. It is recommended to have a minimum distance of  $3/4"$  [ $20mm$ ] at the top of the beam hanger system in the secondary member and at the bottom of the beam hanger system in the primary member.

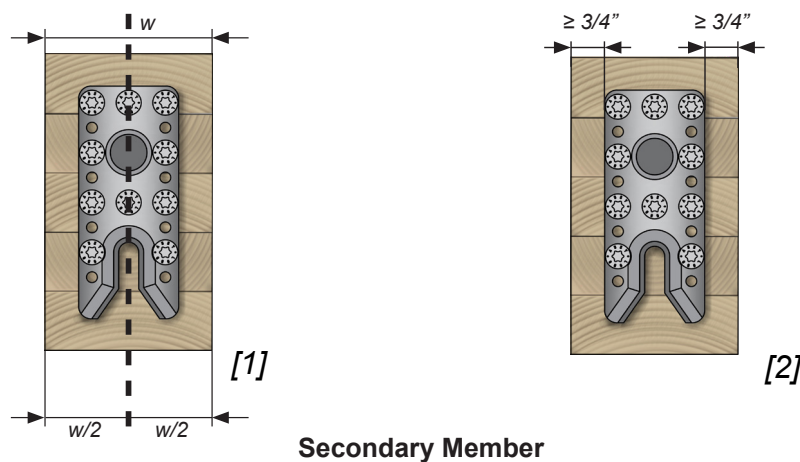


## The Concepts

### Lateral Placement

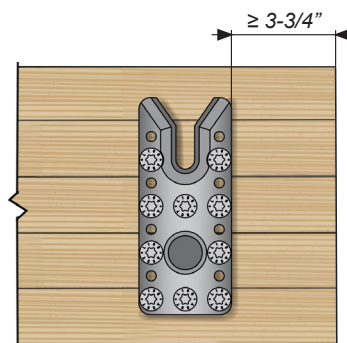
It is recommended to center the beam hanger system in the secondary member's width ( $w$ ) <sup>[1]</sup>. This placement is to ensure to engaged as much wood as possible in the in the connection. It is particularly important as installation in the secondary member is usually done in the end grain of the wood.

Additionally, a minimum edge distance of  $3/4"$  [ $20mm$ ] <sup>[2]</sup> on either side of the beam hanger plate is advised. This number reflects the edge distance requirements for a fully threaded self tapping screw in timber.



### End Distance

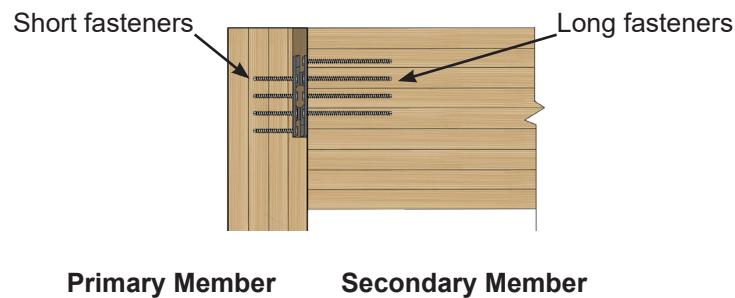
It is recommended to have a minimum end distance of  $3-3/4"$  [ $95mm$ ] on either side of the beam hanger plate installed either in the primary or secondary member. The end distances are specified in order to avoid any splitting issues that might arise, especially for installation in Douglas Fir.



## The Concepts

### Screw Installation

For a typical pre-engineered beam hanger installation, one side of the connector is installed into the end grain of the secondary member. Some beam hanger systems specify different fasteners length for side grain or end grain applications; since longer fasteners are generally required for installation in the end grain.

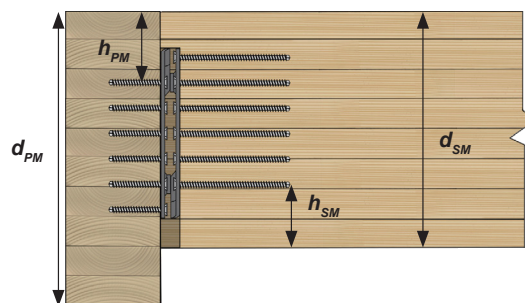


### Connector Height Placement Calculation

The maximum height of the connectors in the beam section without mandatory reinforcement may be calculated as followed:

$$h_i \leq 0.3 \cdot d_i$$

In the **secondary member**, the  $h_{SM}$  is measured from the bottom of the beam to the lowermost fastener. In the **primary member**, the  $h_{PM}$  is measured from the top of the beam to the uppermost fastener. The maximum height requirement does not apply to the primary post and column members, where the wood grain direction is parallel to the line of force.



Additionally, the designer must ensure the following:

1. All fasteners must be located at least 1-3/16" [30mm] to the edge of the beam.
2. The connector placement meets the fire rating requirement of the project.

## How to Use Our Geometry Requirement Tables

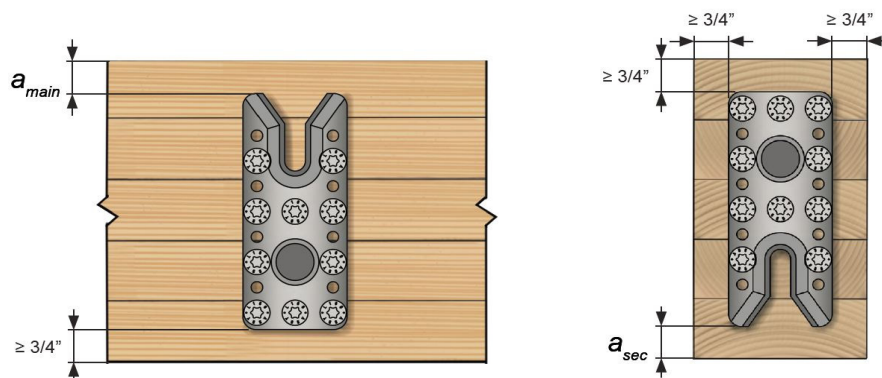
In order to simplify the design process, convenient and simple to use connector placement tables, based on the distance from the connector edge, may be found in the design guide. Hence, the following example from the US Beam Hanger Guide highlights the geometry requirements for the Ricon S VS 140 x 60.

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

Beam Depth	7-1/8"	9"	10-1/2"	12"	13-1/2"	15"	16-1/2"	18"	19-1/2"	21"	22-1/2"	24"	
$a_{main}$ & $a_{sec}$	min	3/4"											
	max	3/4"	1-1/4"	1-5/8"	2-1/8"	2-1/2"	3"	3-3/8"	3-7/8"	4-1/4"	4-3/4"	5-1/4"	5-5/8"

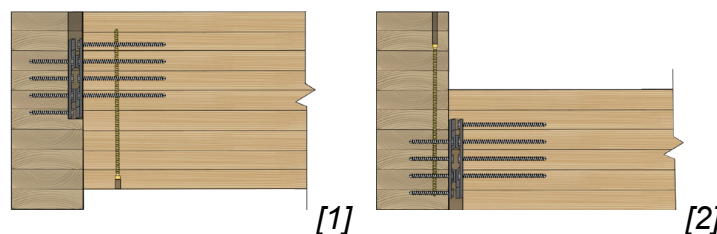
The geometry requirement tables list the minimum and maximum spacing from the bottom or the top of the connector:

- For the primary member, the " $a_{main}$ " is measured from the top of the beam to the top of the connector.
- For the secondary member, the " $a_{sec}$ " is measured from the bottom of the beam to the bottom of the connector.



## If Geometry Requirements Cannot Be Followed

Where detailing requirements dictate connector placements other than the ones specified in the Beam Hanger Design Guide, reinforcement of the assembly with fully threaded screws is required. Reinforcement can be achieved in the primary<sup>[1]</sup> or in the secondary<sup>[2]</sup> member, from above<sup>[2]</sup> or below<sup>[1]</sup>, depending on the configuration of the connection.



Proper reinforcement detailing must be done by the designer in order to ensure full connection strength. A simplified design procedure is included in the Beam Hanger Design Guide.