MITEK GUIDE

Steel Framing

Connections & Bracing

Edition 4

MiTek®

creating the **advantage**

Introduction

This MiTek Guide gives the recommended design capacities of MiTek connectors for fixing to steel framing using 10 and 12 gauge Tek screws which have been calculated in accordance with AS/NZS 4600-2005 and comply with AS 3566 Class 3 corrosion resistance.

Steel framing components are to be designed and installed in accordance with the manufacturer's recommendations. They are to be certified by others to accommodate the uplift forces transferred through the connections.

When fixing to timber trusses use MiTek 30 x 2.8mm diameter, hot dipped galvanized, reinforced head nails or MiTek No. 14 x 30mm MSA1430, anti-split, self-drilling, hot dipped galvanized screws.

MiTek products are generally suitable for internal applications. Refer to the MiTek Durability Corrosion Flow Chart to determine the appropriate corrosion protection required for MiTek connectors.

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Installation Requirements

Tek screw specifications for fixing to steel trusses and framing

The screws are to conform to AS 3566 Class 3 and the screw head styles can be either hexagonal washer head or wafer head. The screw sizes are 10-16 x 16 or 12-14 x 20. The diameter and length of the screws are listed in Table 1.

Table 1 – Nominal diameter and length of screws

Screw Size	Gauge	Nominal diameter (mm)	Length (mm)
10-16 x 16	10	4.87	16
12-14 x 20	12	5.43	20

Minimum spacing, edge and end distance requirements

The table below gives minimum spacing, edge and end distance that is required for fixing Tek screws to MiTek connectors.

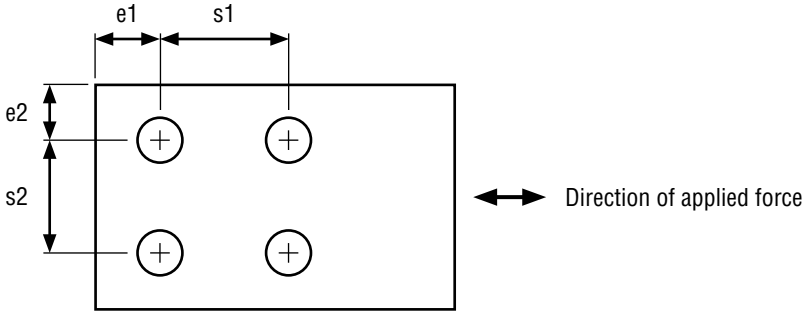


Table 2 – Minimum Spacing and Edge Distance Requirements for MiTek Connectors

Screw Size	Gauge	Min. spacing, s1 or s2 (mm)	Min. edge distance, e2 (mm)
10-16 x 16	10	15	8
12-14 x 20	12	17	9

Table 3 – Minimum End Distance Requirements for MiTek Connectors

Steel Grade of Framing Component	Steel Framing Thickness (mm)	Minimum End Distance, e1 (mm)					
		Screw Size					
		10			12		
		MiTek Connector Thickness (mm)					
		0.8	1.0	1.2	0.8	1.0	1.2
G300	0.80	8	8	8	8	9	9
G300	1.00	9	8	8	9	9	9
G300	1.20	10	9	8	10	10	9
G300	1.24	10	10	8	10	10	9
G300	1.64	10	10	10	10	11	11
G450	1.65	10	10	10	10	11	11
G550	0.60	8	8	8	9	9	9
G550	0.80	9	8	8	9	9	9
G550	0.85	9	8	8	10	9	9
G550	1.00	10	10	9	10	11	10

Notes:

a) All material thicknesses specified in this guide are the total coated thickness. It includes the zinc coating of 0.04mm for Z275 or 0.05mm for AZ150 steel.

b) The end distance is measured parallel to the direction of the applied force.

MiTek Nail and Screw specifications for fixing to timber trusses

The nail is MiTek 2.8mm diameter and 30mm long hot dipped galvanized reinforced head nail.

The screw is MSA1430 MiTek No. 14 x 30mm anti-split self-drilling hot dipped galvanized screws.

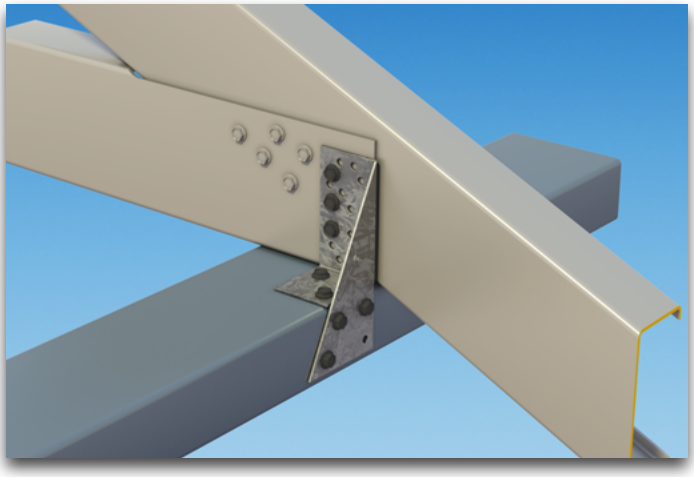
Minimum timber joint group is JD5.

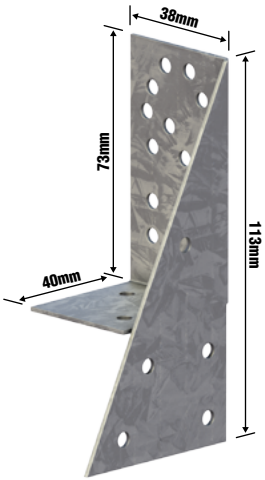
Design uplift capacities for nails and screws given in this guide incorporate the capacity factor (ø) for houses. For different building applications, multiply the design capacities by the following factors. Refer to AS 1720.1 for a full definition of each category of building application.

Table 4 – Adjustment Factor for Building Application

Category	Building Application	Adjustment Factor
1	House	1.00
2	Commercial/Industrial	0.94
3	Post Disaster	0.88

Trip-L-Grip





Trip-L-Grips are the most economical anchors used to simplify tie-down rafters or roof trusses.

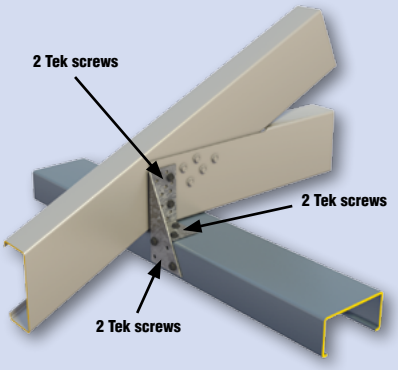
Specifications

Product Code	Steel Grade	Galvanized Coating	Total Coated Thickness
TGL or TGR	G300	Z275	1.0mm

Fixing into steel roof trusses

Table 5 - Design Capacities using 6 Tek screws per connection

Steel Grade of Framing Component	Steel Framing Thickness (mm)	Limit State Design Capacity in Wind Uplift (kN)	
		Screw Size	
		10	12
G300	0.80	2.0	2.2
G300	1.00	2.9	3.1
G300	1.20	3.9	4.2
G300	1.24	4.1	4.4
G300	1.64	4.3	4.8
G450	1.65	4.3	4.8
G550	0.60	1.5	1.6
G550	0.80	3.0	3.1
G550	0.85	3.3	3.5
G550	1.00	4.3	4.8

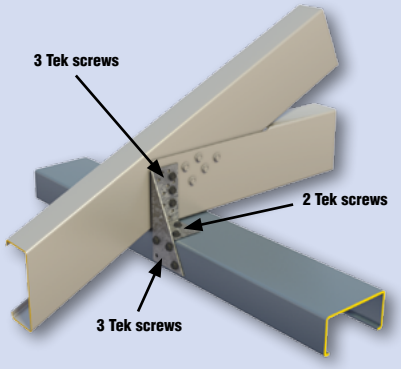


6 Tek screws Connection Detail

Notes apply, see page 7.

Table 6 - Design Capacities using 8 Tek screws per connection

Steel Grade of Framing Component	Steel Framing Thickness (mm)	Limit State Design Capacity in Wind Uplift (kN)	
		Screw Size	
		10	12
G300	0.80	3.1	3.2
G300	1.00	4.4	4.6
G300	1.20	5.9	6.0
G300	1.24	6.0	6.0
G300	1.64	6.0	6.0
G450	1.65	6.0	6.0
G550	0.60	2.3	2.5
G550	0.80	4.5	4.7
G550	0.85	4.9	5.2
G550	1.00	6.0	6.0

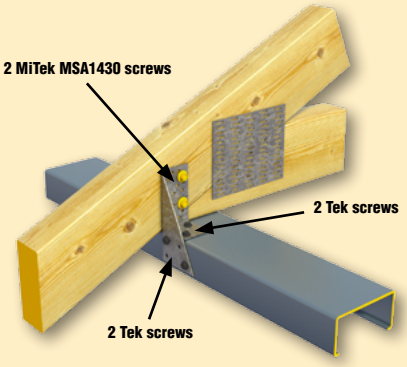


8 Tek screws Connection Detail

Fixing into timber roof trusses

Table 7 - Design Capacities using 2 MiTek MSA1430 and 4 Tek screws per connection

Steel Grade of Framing Component	Steel Framing Thickness (mm)	Limit State Design Capacity in Wind Uplift (kN)	
		Screw Size	
		10	12
G300	0.80	2.0*	2.2*
G300	1.00	2.9*	3.1*
G300	1.20	3.3	3.3
G300	1.24	3.3	3.3
G300	1.64	3.3	3.3
G450	1.65	3.3	3.3
G550	0.60	1.5*	1.6*
G550	0.80	3.0*	3.1*
G550	0.85	3.3	3.3
G550	1.00	3.3	3.3



2 MiTek MSA1430 and 4 Tek screws Connection Detail

Notes:

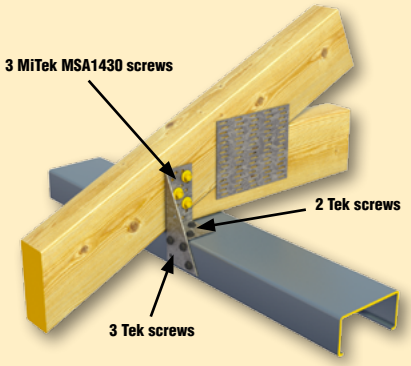
a) * Adjustment factors do not apply to this value, refer to MiTek nail and screw specifications on page 5 for details.

b) Adopt the minimum design capacity determined from the tables when different material type, material thickness and grade are used for rafter/truss and the wall plate.

c) The capacity is doubled when a pair of Trip-L-Grips are used in the connection.

Table 8 - Design Capacities using 3 MiTek MSA1430 and 5 Tek screws per connection

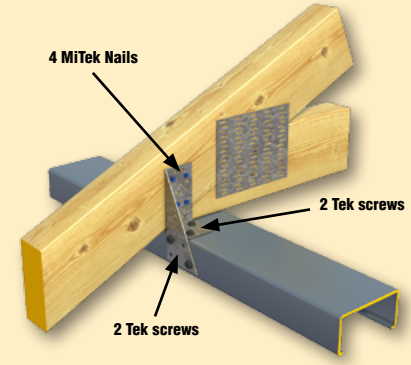
Steel Grade of Framing Component	Steel Framing Thickness (mm)	Limit State Design Capacity in Wind Uplift (kN)	
		Screw Size	
		10	12
G300	0.80	3.1*	3.2*
G300	1.00	4.4*	4.6*
G300	1.20	5.0	5.0
G300	1.24	5.0	5.0
G300	1.64	5.0	5.0
G450	1.65	5.0	5.0
G550	0.60	2.3*	2.5*
G550	0.80	4.5*	4.7*
G550	0.85	4.9	5.0
G550	1.00	5.0	5.0



3 MiTek MSA1430 and 5 Tek screws Connection Detail

Table 9 - Design Capacities using 4 MiTek nails & 4 Tek screws per connection

Steel Grade of Framing Component	Steel Framing Thickness (mm)	Limit State Design Capacity in Wind Uplift (kN)	
		Screw Size	
		10	12
G300	0.80	2.0*	2.2*
G300	1.00	2.6	2.6
G300	1.20	2.6	2.6
G300	1.24	2.6	2.6
G300	1.64	2.6	2.6
G450	1.65	2.6	2.6
G550	0.60	1.5*	1.6*
G550	0.80	2.6	2.6
G550	0.85	2.6	2.6
G550	1.00	2.6	2.6



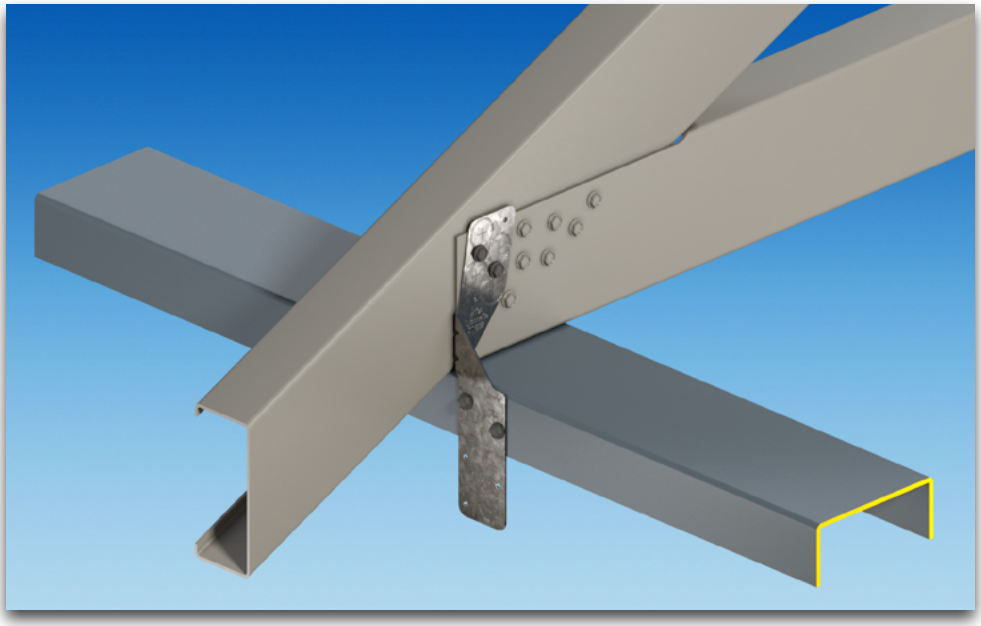
4 MiTek Nails and 4 Tek screws Connection Detail

Notes:

a) * Adjustment factors do not apply to this value, refer to MiTek nail and screw specifications on page 5 for details.

b) Adopt the minimum design capacity determined from the tables when different material type, material thickness and grade are used for rafter/truss and the wall plate.

c) The capacity is doubled when a pair of Trip-L-Grips are used in the connection.



The CT180 is used to secure rafters and trusses to top plates in areas subject to cyclonic or high wind conditions.

Specifications

Product Code	Steel Grade	Galvanized Coating	Total Coated Thickness
CT180L & CT180R	G300	Z275	1.0mm

Notes:

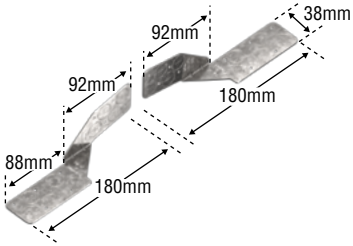
a) Do not apply the adjustment factors to the values marked with * in Table 11, refer to MiTek nail and screw specifications on page 5 for details.

b) Adopt the minimum design capacity determined from the table when different material type, material thickness and grade are used for rafter/truss and the wall plate.

c) The capacity is doubled when a pair of CT180s are used in the connection.

d) MiTek nails are 30x2.8mm blue galvanized reinforced head nails, hammered into pre-punched holes in the connector.

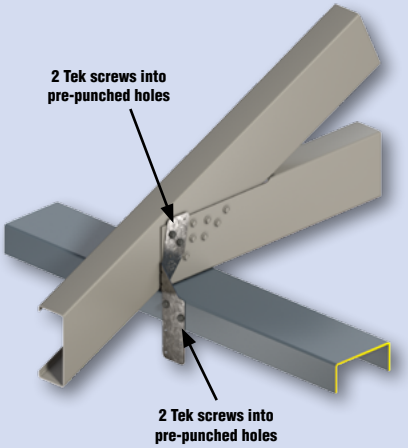
e) Optional gun nails are 32x2.5mm dia. AS 2334 compliant helical twist shank hardened galvanized nails. Centrally locate nail gun's nozzle within the target rings and pneumatically drive the gun nails into the crosshairs. Do not direct gun nails into pre-punched holes.



Fixing into steel roof trusses

Table 10 – Design Capacities using 4 Tek screws per connection

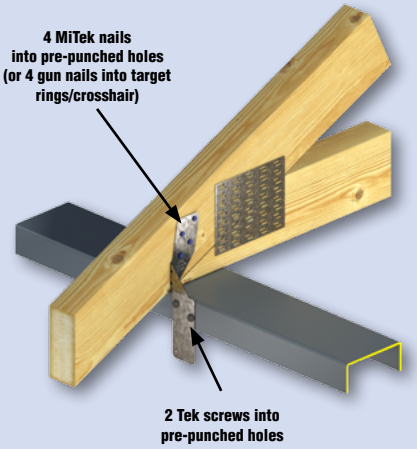
Steel Grade of Framing Component	Total Thickness including Coating (mm)	Limit State Design Capacity in Wind Uplift (kN)	
		Screw Size	
		10	12
G300	0.80	2.0	2.2
G300	1.00	2.9	3.1
G300	1.20	3.7	3.7
G300	1.24	3.7	3.7
G300	1.64	3.7	3.7
G450	1.65	3.7	3.7
G550	0.60	1.5	1.6
G550	0.80	3.0	3.1
G550	0.85	3.3	3.5
G550	≥ 1.00	3.7	3.7

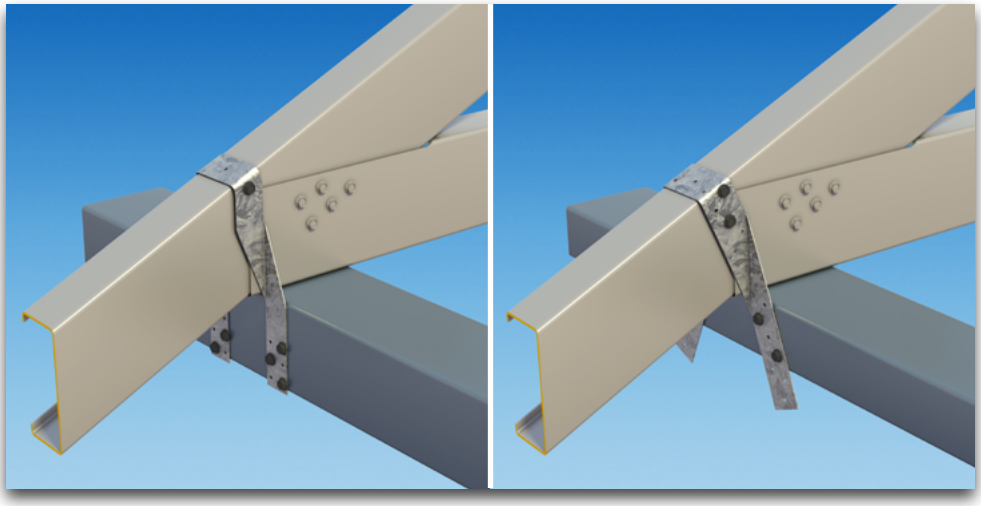


Fixing into timber roof trusses

Table 11 – Design Capacities using 4 MiTek nails (or 4 gun nails) and 2 Tek screws per connection

Steel Grade of Framing Component	Total Thickness including Coating (mm)	Limit State Design Capacity in Wind Uplift (kN)	
		Screw Size	
		10	12
G300	0.80	2.0*	2.2*
G300	1.00	2.6	2.6
G300	1.20	2.6	2.6
G300	1.24	2.6	2.6
G300	1.64	2.6	2.6
G450	1.65	2.6	2.6
G550	0.60	1.5*	1.6*
G550	0.80	2.6	2.6
G550	0.85	2.6	2.6
G550	≥ 1.00	2.6	2.6





CycloneTies are used to secure rafters and trusses to top plates in areas subject to cyclonic or high wind conditions.

Specifications

Product Code	Steel Grade	Galvanized Coating	Total Coated Thickness
CT400	G300	Z275	1.0mm
CT600	G300	Z275	1.2mm
CT900	G300	Z275	1.0mm
CT1200	G300	Z275	0.8mm

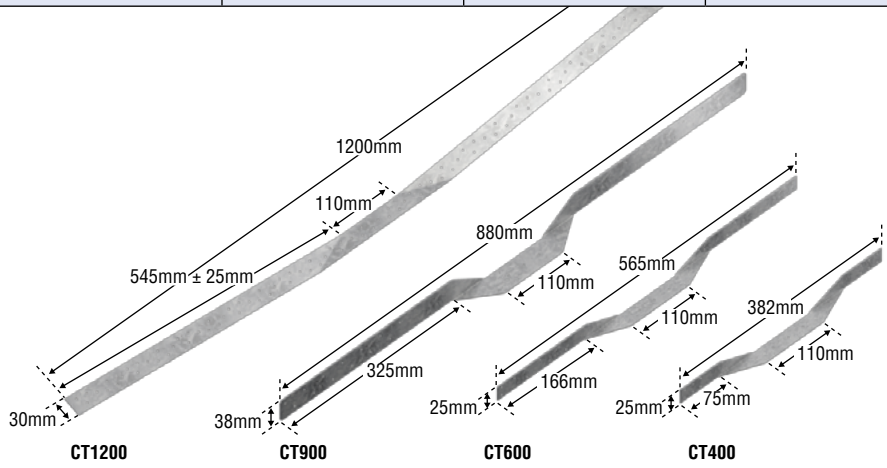
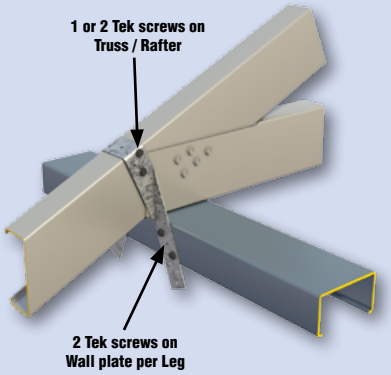
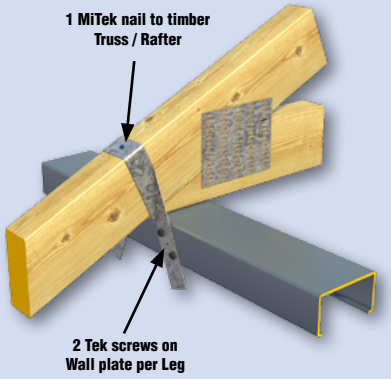


Table 12 - Design Capacities using 2 Tek screws per leg on wall plate

Steel Grade of Framing Component	Steel Framing Thickness (mm)	Limit State Design Capacity in Wind Uplift (kN)	
		Screw Size	
		10	12
CycloneTie CT1200			
G300	1.20	6.7	7.3
G300	1.24	6.7	7.3
G300	1.64	6.7	7.3
G450	1.65	6.7	7.3
G550	0.60	3.1	3.3
G550	0.80	6.0	6.3
G550	0.85	6.6	6.9
G550	1.00	6.7	7.3
CycloneTie CT400 & CT900			
G300	1.20	7.8	8.2
G300	1.24	8.2	8.7
G300	1.64	8.6	9.6
G450	1.65	8.6	9.6
G550	0.60	3.1	3.3
G550	0.80	6.0	6.3
G550	0.85	6.6	6.9
G550	1.00	8.6	9.6
CycloneTie CT600			
G300	1.20	7.8	8.2
G300	1.24	8.2	8.7
G300	1.64	10.4	11.6
G450	1.65	10.4	11.6
G550	0.60	3.1	3.3
G550	0.80	6.0	6.3
G550	0.85	6.6	6.9
G550	1.00	9.4	10.0



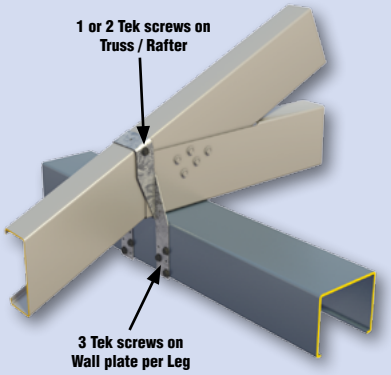


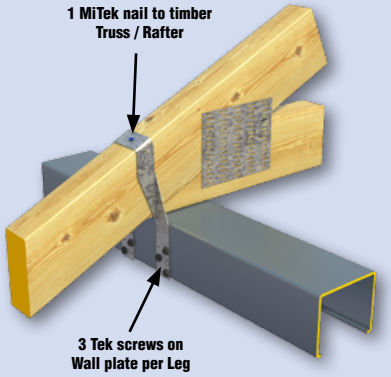
Notes:

Select the design capacity from the steel framing material thickness and grade.

Table 13 - Design Capacities using 3 Tek screws per leg on wall plate

Steel Grade of Framing Component	Steel Framing Thickness (mm)	Limit State Design Capacity in Wind Uplift (kN)	
		Screw Size	
		10	12
CycloneTie CT1200			
G300	1.20	9.6	9.6
G300	1.24	9.6	9.6
G300	1.64	9.6	9.6
G450	1.65	9.6	9.6
G550	0.60	4.7	4.9
G550	0.80	9.6	9.6
G550	0.85	9.6	9.6
G550	1.00	9.6	9.6
CycloneTie CT400 & CT900			
G300	1.20	9.8	9.8
G300	1.24	9.8	9.8
G300	1.64	9.8	9.8
G450	1.65	9.8	9.8
G550	0.60	4.7	4.9
G550	0.80	8.9	9.4
G550	0.85	9.8	9.8
G550	1.00	9.8	9.8
CycloneTie CT600			
G300	1.20	11.8	11.8
G300	1.24	11.8	11.8
G300	1.64	11.8	11.8
G450	1.65	11.8	11.8
G550	0.60	4.7	4.9
G550	0.80	8.9	9.4
G550	0.85	9.8	10.4
G550	1.00	11.8	11.8

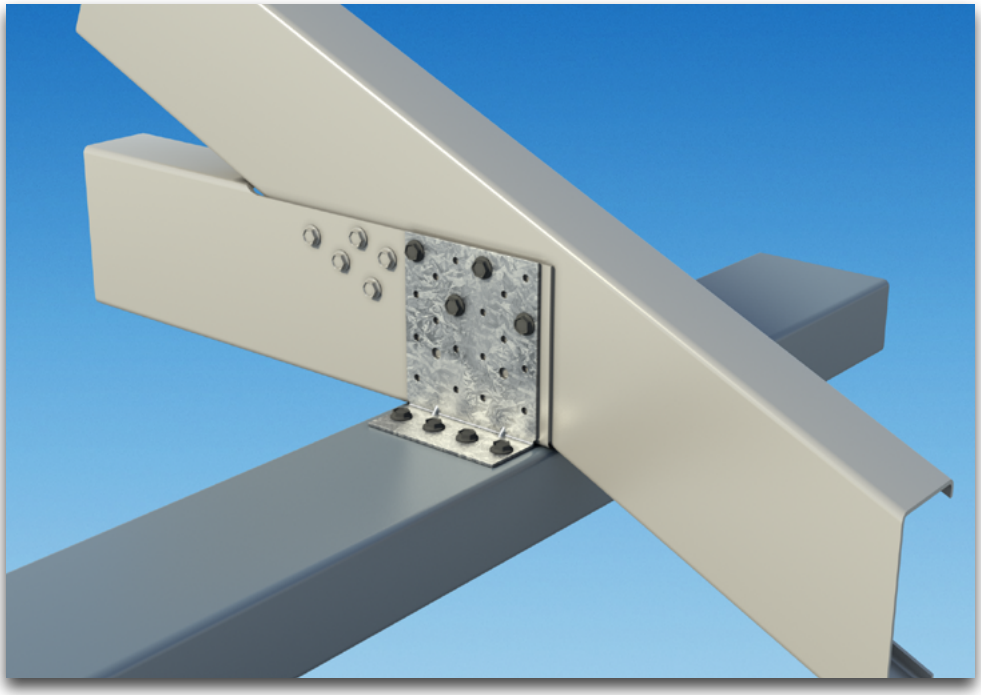




Notes:

Select the design capacity from the steel framing material thickness and grade.

Concealed Purlin Cleat



The Concealed Purlin Cleat is an economical bracket for fixing rafters, or trusses to top of walls to resist wind uplift.

Specifications

Product Code	Steel Grade	Galvanized Coating	Total Coated Thickness
CPC80	G300	Z275	1.55mm

Installation:

1. The required number of screws into the support depends on its width as shown in the table below. The location of the group of screws is to be centred on the support.

Table 14 - Required width of support

Minimum support width (mm)	Number of screws into support
90	4
70	3
50	2

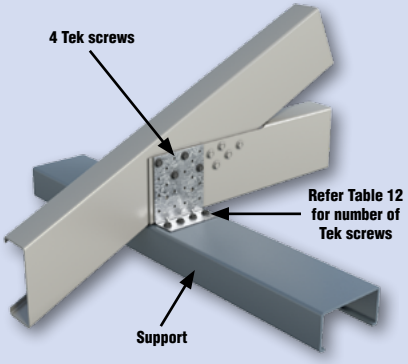
2. Always fix 4 screws in large holes into the side of the truss no matter how many screws are fixed into the support. Use the same Tek screw size when fixing into steel trusses and frames. Use MiTek MSA1430 screws when fixing into timber trusses.

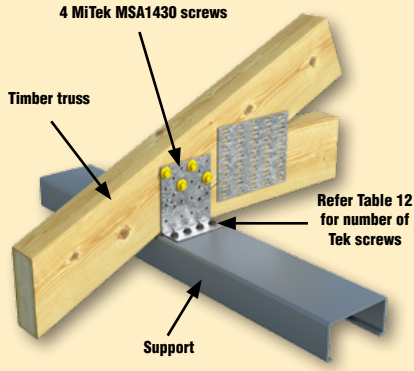
Table 15 - Design Capacities per Concealed Purlin Cleat

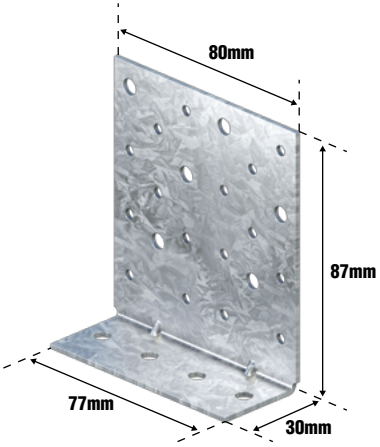
Steel Grade of Framing Component	Steel Framing Thickness (mm)	Limit State Design Capacity in Wind Uplift (kN)					
		Number of 10g Tek Screws			Number of 12g Tek Screws		
		2	3	4	2	3	4
G300	1.00	1.3	2.0	2.7	1.5	2.2	3.0
G300	1.20	1.6	2.4	3.2	1.8	2.7	3.6
G300	1.24	1.7	2.5	3.4	1.9	2.8	3.7
G300	1.64	2.2	3.4	4.5	2.5	3.7	5.0
G450	1.65	3.2	4.8	6.4	3.5	5.3	6.6
G550	1.00	2.2	3.2	4.3	2.4	3.6	4.8

Notes:

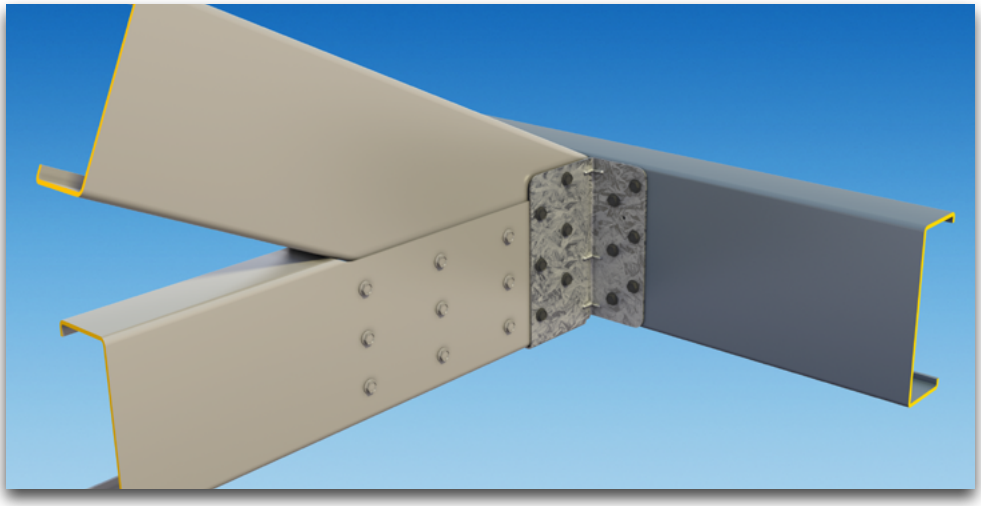
The capacity is doubled when a pair of cleats are used in the connection.







SplitHanger



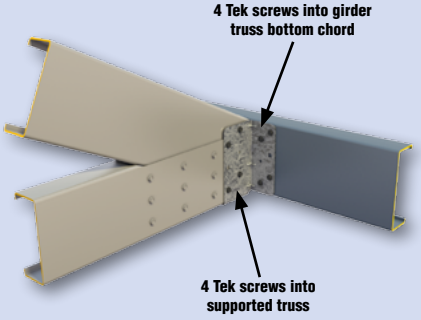
SplitHanger provides a fast and easy fixing method for truss to truss and truss to lintel connection.

Specifications

Product Code	Steel Grade	Galvanized Coating	Total Coated Thickness
SPH140	G300	Z275	1.55mm

Table 16 - Design Capacities of a single SplitHanger using 4 screws into girder and 4 screws into supporting truss

Steel Grade of Framing Component	Steel Framing Thickness (mm)	Limit State Design Capacity (kN)	
		Screw Size	
		10	12
G300	0.80	1.3	1.4
G300	1.00	1.9	2.0
G300	1.20	2.6	2.7
G300	1.24	2.7	2.9
G550	0.80	2.0	2.1
G550	0.85	2.2	2.3
G550	1.00	3.1	3.3

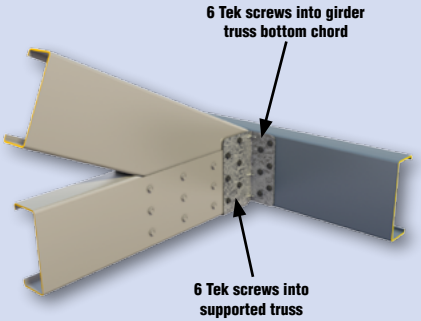


8 Tek screws Connection Detail

Notes apply, see page 17.

Table 17 - Design Capacities of a single SplitHanger using 6 screws into girder and 6 screws into supporting truss

Steel Grade of Framing Component	Steel Framing Thickness (mm)	Limit State Design Capacity (kN)	
		Screw Size	
		10	12
G300	0.80	2.0	2.1
G300	1.00	2.9	3.1
G300	1.20	3.9	4.1
G300	1.24	4.1	4.3
G550	0.80	3.0	3.1
G550	0.85	3.3	3.4
G550	1.00	4.7	5.0



12 Tek screws Connection Detail

Notes:

a) The design capacities are based on a single SplitHanger on one side of the connection.

b) When the girder trusses and supported trusses are made from different materials, the design capacity is the lower of the two.

c) Ensure additional restraints are provided to the girder bottom chord against twisting under high loads at the connection.

d) Ensure no gaps at each screw connection between fixing materials.

Structural Bracing Strap

Structural Bracing Strap is suitable for a wide variety of bracing applications.

Specifications

Product Code	Steel Grade	Galvanized Coating	Description	Total Coated Thickness
PS223010	G300	Z275	30mm wide x 10m long	0.8mm
PS223030	G300	Z275	30mm wide x 30m long	0.8mm
PS223050	G300	Z275	30mm wide x 50m long	0.8mm
PS203010	G300	Z275	30mm wide x 10m long	1.0mm
PS203020	G300	Z275	30mm wide x 20m long	1.0mm
PS203030	G300	Z275	30mm wide x 30m long	1.0mm
PS203050	G300	Z275	30mm wide x 50m long	1.0mm

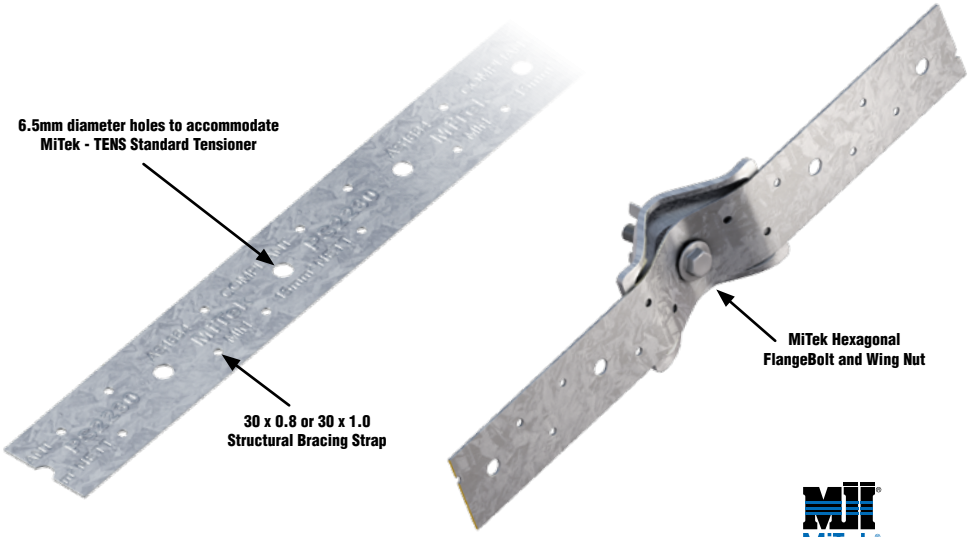
Table 18 - Design Tensile Capacities

Size	Design Tension Capacity (kN)
30 x 0.8	5.0
30 x 1.0	6.1

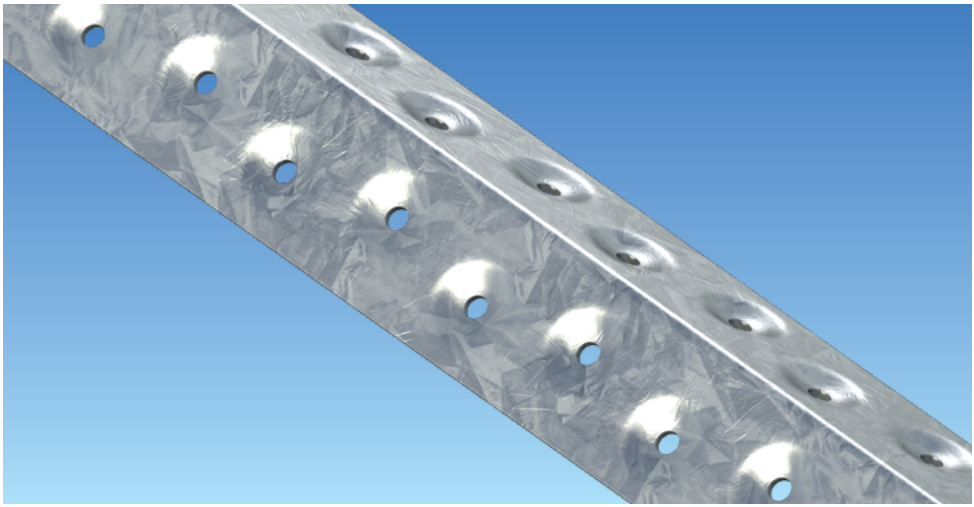
Tensioner provides fast tensioning for Structural Bracing Strap. A MiTek hexagonal flanged bolt and wingnut are included for power or hand tightening.

Specifications

Product Code	Steel Grade	Galvanized Coating	Total Coated Thickness
TENS	G300	Z275	2.50mm



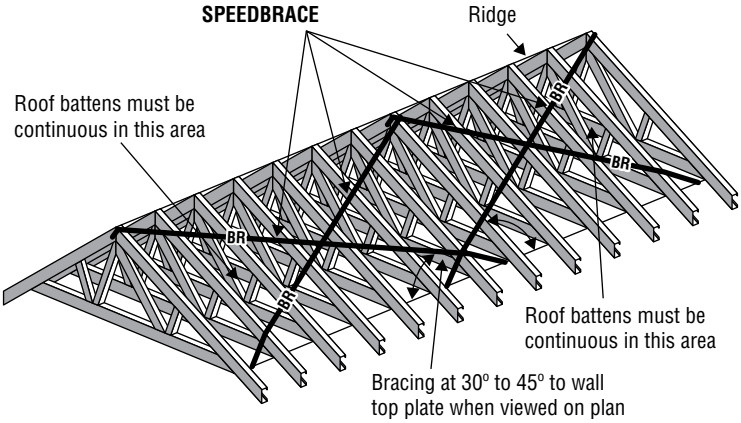
SpeedBrace for Roof Bracing



SpeedBrace is suitable for roof top chord bracing to transfer the forces generated in the top chord restraints back to the supporting structures. It is assumed that the roof battens are also installed to provide the lateral restraints for the top chords of the roof trusses and the walls are stable in its own right.

Specifications

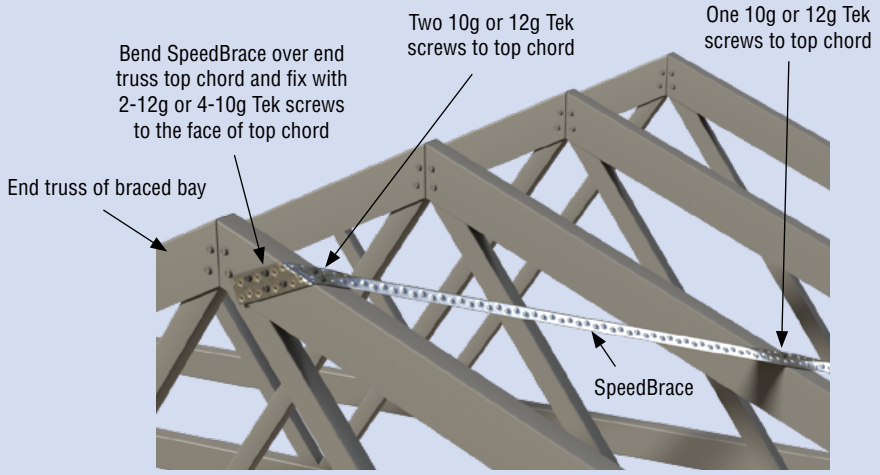
Product Code	Steel Grade	Galvanized Coating	Total Coated Thickness
SB3.6-3.6m	G300	Z275	1.0mm
SB4.0-4.0m			
SB5.0-5.0m			
SB6.0-6.0m			



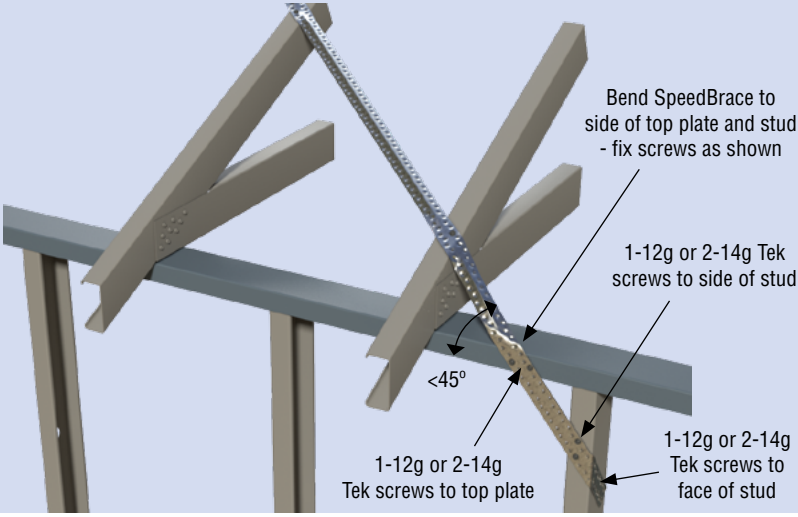
The following typical fixing details provides limit state design capacity of 8.4 kN for the SpeedBrace in tension and design capacity of 7.2 kN for splicing. Note that for lap splice, the splice is located not less than 2.5 m from the anchorage point measured along the SpeedBrace. The details are applicable to framing component with steel grade G550 with thickness of 0.8mm and 1.0mm.

Fixing SpeedBrace to Steel Trusses and Wall Frame

Fixing at apex and each truss crossing

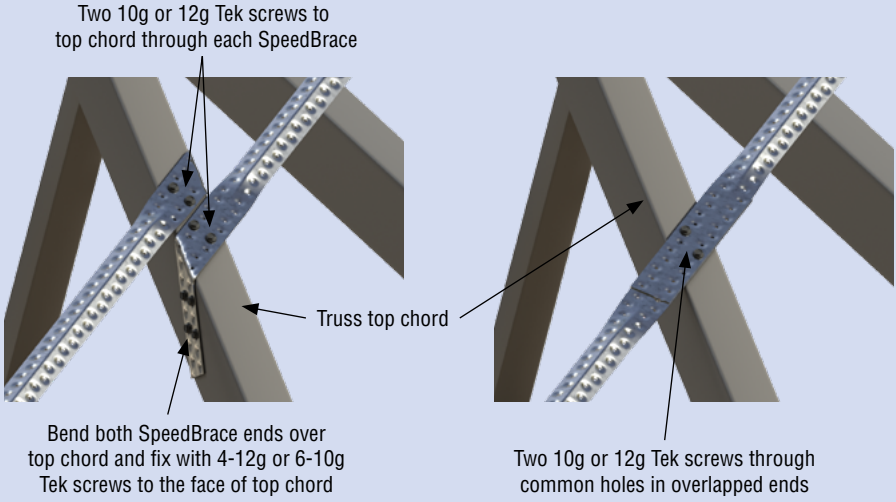


Fixing at Ends



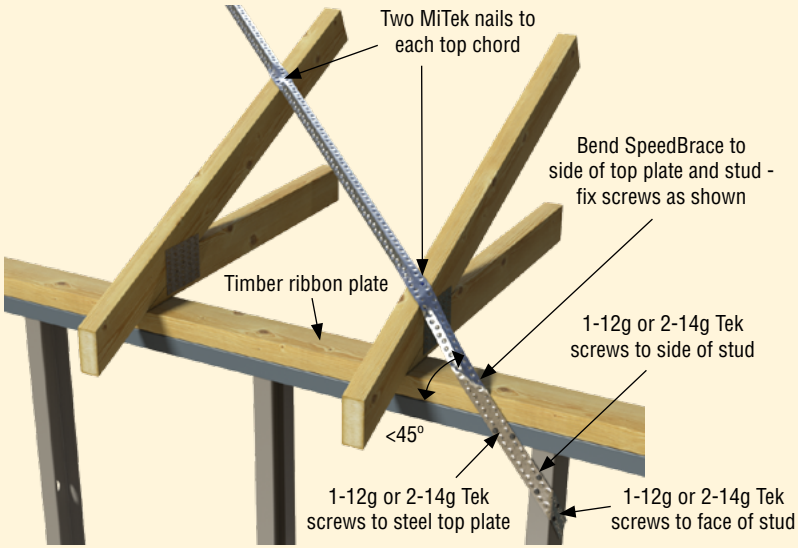
SpeedBrace for Roof Bracing

Splice details



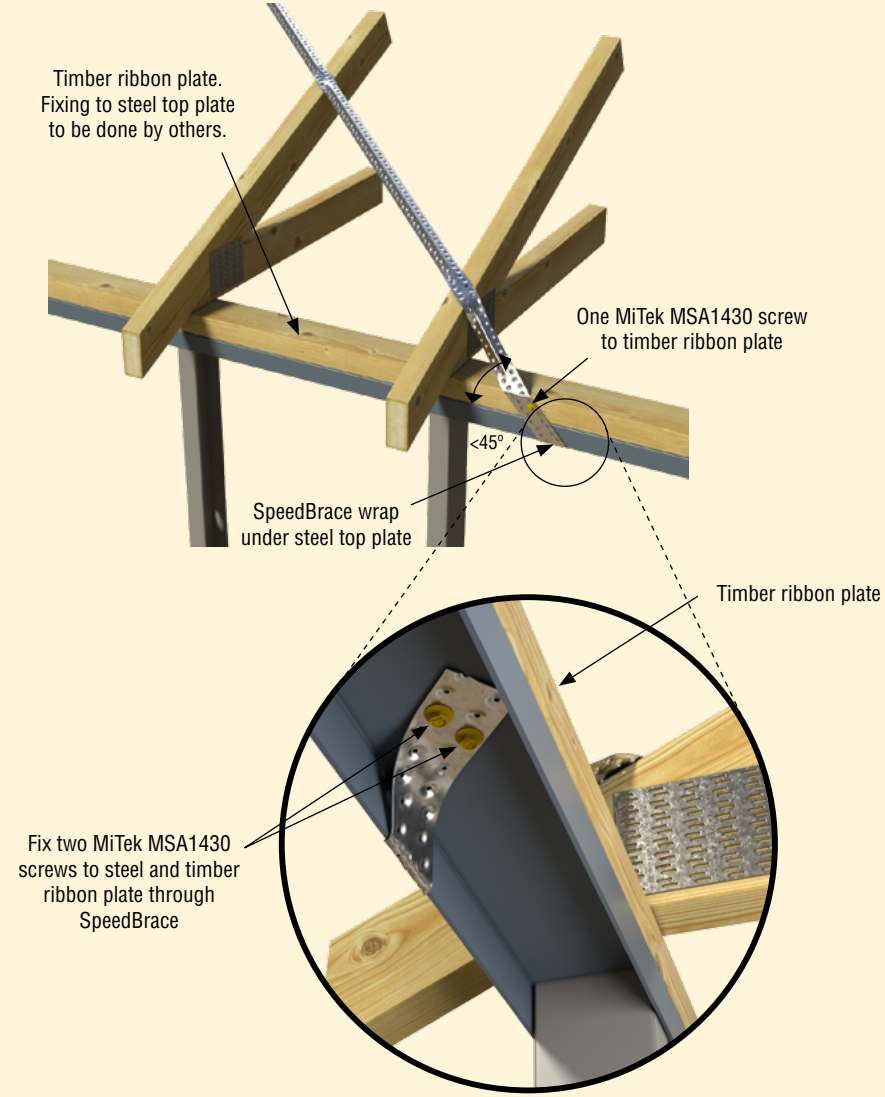
Fixing SpeedBrace to Timber Trusses and Steel Wall Frame

Fixing at Ends



Note:
Refer to MiTek's Installation Instructions for fixing SpeedBrace to timber roof trusses at apex and splice details.

Fixing at Ends - Wrap under with Timber Ribbon Plate



Note:
Refer to MiTek's Installation Instructions for fixing SpeedBrace to timber roof trusses at apex and splice details.

Wall Bracing

Installation:

- Structural Bracing Strap is a tension brace and therefore must be installed in pairs, in opposing diagonal directions.
- Apply each length of Bracing Strap with MiTek Tensioner and ensure the strap is properly tightened. Too much tension will reduce the effectiveness of the strap.
- The angle of the strap must be between 30 and 60 degrees to the horizontal.
- Ensure minimum edge and end distance requirements are met when fixing screws to prevent tear out and reduced capacities. Refer to Tables 2 & 3 on pages 4 & 5 for details.
- Tie down is required at each end of the bracing wall to resist uplift reaction produced by the raking forces.

Table 19 - Bracing Capacity for G550, 0.8mm framing

Structural bracing strap	Wall height (mm)	Bracing Capacity (kN)				
		Bracing Wall length (mm)				
		1800	2100	2400	2700	3000
2/10g screws per bracing strap at each ends & 1/10g screw to each stud crossing						
30 x 0.8	2400	1.8	2.0	2.1	2.2	2.3
	2700	1.7	1.8	2.0	2.1	2.2
	3000	1.5	1.7	1.9	2.0	2.1
30 x 1.0	2400	1.8	2.0	2.1	2.2	2.3
	2700	1.7	1.8	2.0	2.1	2.2
	3000	1.5	1.7	1.9	2.0	2.1
2/12g screws per bracing strap at each ends & 1/12g screw to each stud crossing						
30 x 0.8	2400	1.9	2.0	2.2	2.3	2.4
	2700	1.7	1.9	2.1	2.2	2.3
	3000	1.6	1.8	1.9	2.1	2.2
30 x 1.0	2400	1.9	2.0	2.2	2.3	2.4
	2700	1.7	1.9	2.1	2.2	2.3
	3000	1.6	1.8	1.9	2.1	2.2

Table 20 - Bracing Capacity for G550, 1.0mm framing

Structural bracing strap	Wall height (mm)	Bracing Capacity (kN)				
		Bracing Wall length (mm)				
		1800	2100	2400	2700	3000
2/10g screws per bracing strap at each ends & 1/10g screw to each stud crossing						
30 x 0.8	2400	2.0	2.2	2.3	2.5	2.6
	2700	1.8	2.0	2.2	2.3	2.5
	3000	1.7	1.9	2.1	2.2	2.3
30 x 1.0	2400	2.6	2.8	3.0	3.2	3.4
	2700	2.4	2.6	2.9	3.0	3.2
	3000	2.2	2.5	2.7	2.9	3.0
2/12g screws per bracing strap at each ends & 1/12g screw to each stud crossing						
30 x 0.8	2400	2.2	2.4	2.5	2.7	2.8
	2700	2.0	2.2	2.4	2.5	2.7
	3000	1.9	2.1	2.2	2.4	2.5
30 x 1.0	2400	2.9	3.2	3.4	3.6	3.7
	2700	2.7	2.9	3.2	3.4	3.6
	3000	2.5	2.8	3.0	3.2	3.4

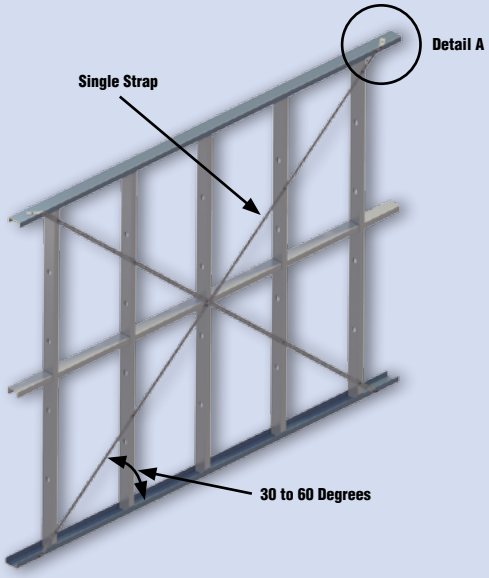
Notes:

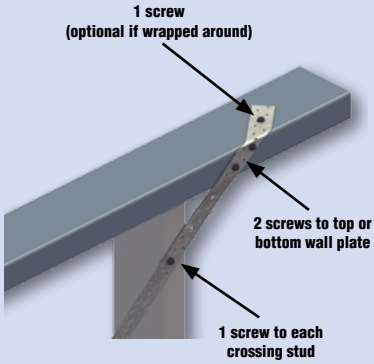
a) The values in the tables do not include the nominal 0.45 kN/m sheet bracing capacity from plywood or plasterboard lining.

b) The bracing capacity in the tables above are doubled when double bracing straps are used in the bracing wall.

Wall Bracing

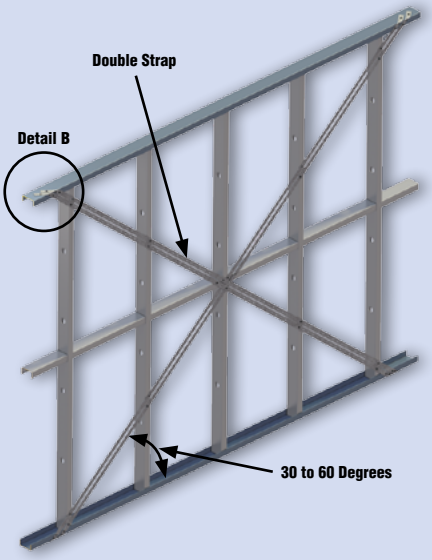
Fixing Details - Bracing Panel with Single Bracing Strap

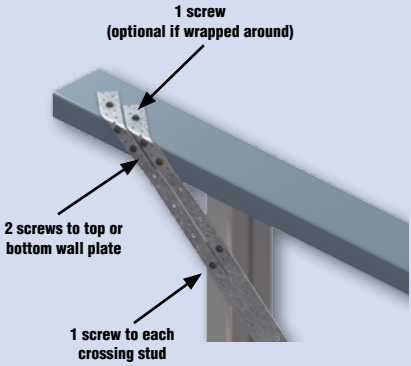




Detail A

Fixing Details - Bracing Panel with Double Bracing Strap





Detail B

Notes: Screws must be driven through pre-punched holes so the strength of the Bracing Strap is not reduced.

References

1) AS 1397-2001 Steel sheet and strip – Hot-dip zinc coated or aluminium/zinc coated

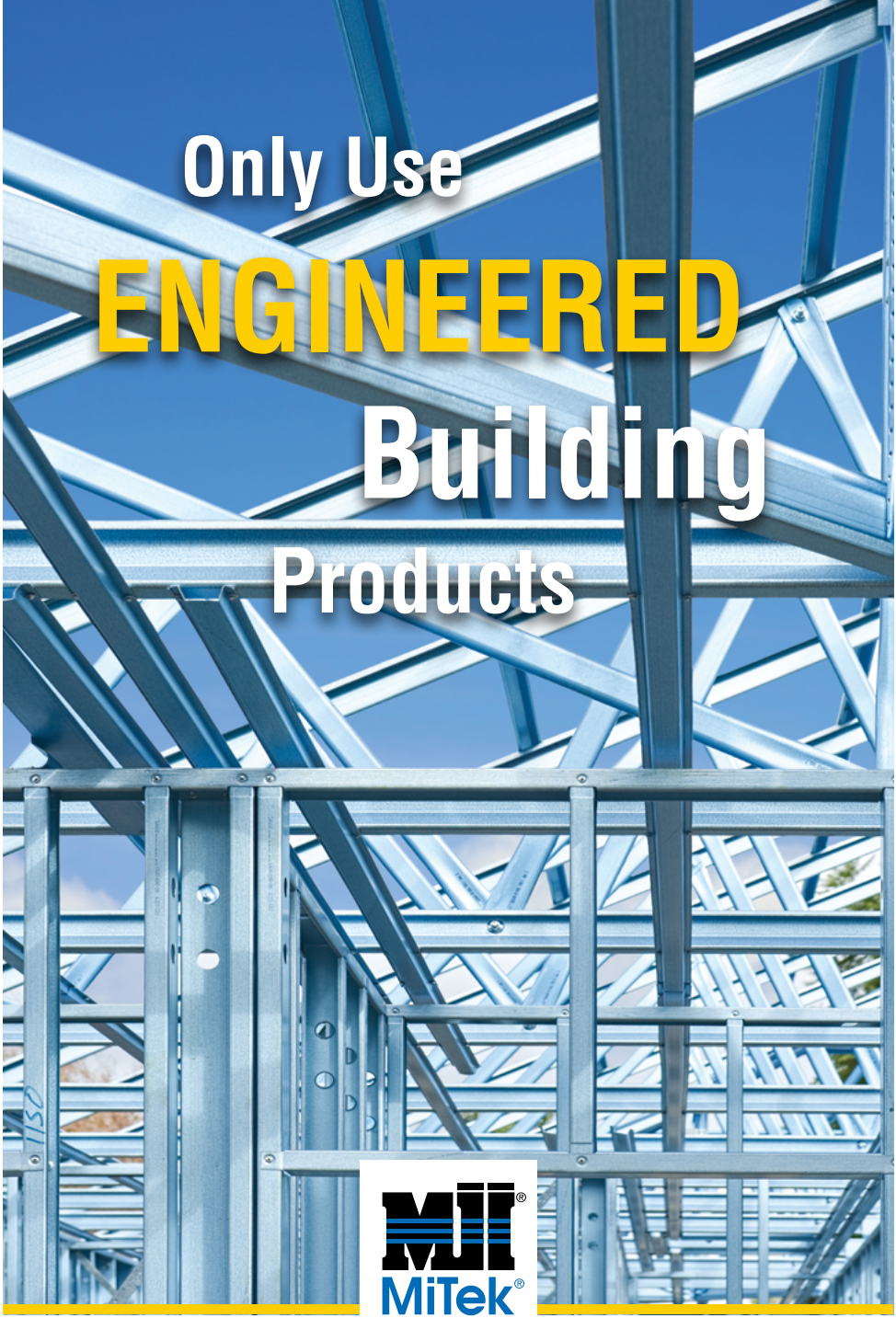
2) AS 3566.1-2002 Self-drilling screws for the building and construction industries – General requirements and mechanical properties

3) AS 3566.2-2002 Self-drilling screws for the building and construction industries – Corrosion resistance requirements

4) AS/NZS 4600-2005 Cold-formed steel structures

5) AS 1720.1-2010 Timber structures Part 1: Design methods

Personal Notes:



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