



# Posi-STRUT™ Design Manual

Posi-STRUT™ is available only through MiTek® Accredited Fabricators throughout New Zealand



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## PRODUCER STATEMENT

### PS1- Design

**ISSUED BY:** MiTek New Zealand Limited

**TO BE SUPPLIED TO:** Building Consent Authorities in New Zealand

**IN RESPECT OF:** Posi-STRUT™ Design Manual - 04/2019

**AT:** Various Locations in New Zealand

MiTek New Zealand Limited has provided engineering design services in respect of the requirements of Clause B1 of the NZ Building Code for

All  Part only as specified - Posi-STRUT™ trusses of the proposed building work.

The selection charts within this design manual have been prepared in accordance with **Compliance Documents and Verification Method B1/VM1** of the NZ Building Code and in accordance with sound and widely accepted engineering principles.

**On behalf of MiTek New Zealand Limited**, and subject to:

1. The verification of the design assumptions within this manual
2. All proprietary products meeting their performance specification requirements;

**I believe on reasonable grounds** that the use of Posi-STRUT™ trusses in the building if constructed in accordance with the drawings, specifications and other documents provided, will comply with the relevant provisions of the Building Code.

MiTek New Zealand Limited holds a current policy of Professional Indemnity Insurance of not less than \$500,000.

On behalf of MiTek New Zealand Limited

Date: April 2019



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# INTRODUCTION



## Overview

The GANG-NAIL® Posi-STRUT™ system is a light, economical method of providing large clear spans in rafter, purlin and floor joist situations. Frames and supports can be spaced further apart to facilitate open spaces below.

The heart of the Posi-STRUT™ truss is the GANG-NAIL® Posi-STRUT™ web. This is a folded metal web with nail plates at the pointed ends. The metal web is pressed onto timber chords to form a parallel chord truss.

This manual contains the necessary design selection, fabrication and construction information sufficient to detail most projects. MiTek New Zealand Limited provides a design service for applications outside this manual. Special designs are available for

- cantilever trusses
- trusses supporting load bearing walls
- trusses with different chord sizes or orientation
- multi-span trusses
- trusses supporting unusual loads



## Durability

This Section covers the durability of parallel chord Posi-STRUT™ floor trusses to support a light timber floor. Posi-STRUT™ webs are manufactured from 0.91mm ASTM A446 Grade A steel, with a Z275 galvanised coating. The webs are pressed into timber by accredited GANG-NAIL® fabricators to form a parallel chord truss. GANG-NAIL® toothed metal connectors (G300 steel with Z275 galvanised coating) are also used in the manufacture of the trusses to fix the timber members together.

## Midfloor System

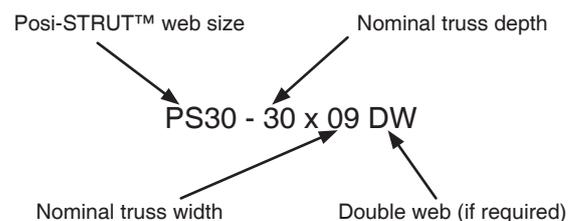
Posi-STRUT™ floor trusses used in midfloor situations are completely closed in and usually require no further protection to satisfy 50 year durability requirements.

## Advantages of Posi-STRUT™

- Services (electrical, plumbing, vacuum systems) are easily run through the trusses without the need to drill holes, weakening the floor.
- Light to lift and fast to install.
- Greater spans for a given depth than solid timber joists.
- Camber is built in, resulting in a flat ceiling line.
- Shrinkage problems through using green timber are eliminated.
- Strongbacks run through the trusses, providing more effective load sharing than solid nogging.
- The ceiling can be fixed directly to the underside of the Posi-STRUT™ trusses, saving time and materials.
- Competes with other floor systems on price.

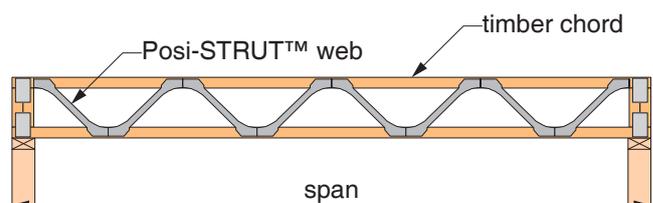
## Definitions

### Truss code



### Span

The span is defined as the distance between the outside faces of the walls.



## Design Loads

Refer also to the following standards NZS 3604 and AS/NZS 1170.

**Posi-STRUT™ trusses supporting load-bearing walls are not covered by these selection charts and require special design.**

### Dead Loads

Heavy Roof Rafter	0.65 kPa
Light Roof Rafter	0.25 kPa
Light Roof Purlin	0.20 kPa
Ceiling	0.20 kPa
Floor (1.5 kPa LL) + ceiling	0.40 kPa
Floor (3.0 kPa LL) + ceiling	0.50 kPa

### Live loads

	Distributed	Conc.
Roof, maintenance	0.25 kPa	1.1 kN
Floor, domestic	1.5 kPa	1.8 kN
Floor, office	3.0 kPa	2.7 kN
Floor, public use	3.0 kPa	2.7 kN

### Wind loads

	Design Wind Speed	$q_u$
Low	32 m/s	0.61 kPa
Medium	37 m/s	0.82 kPa
High	44 m/s	1.16 kPa
Very High	50 m/s	1.50 kPa
Extra High	55 m/s	1.82 kPa

Combined pressure coefficients  $C_{fig} = 1.1$  max.

### Snow loads

Ground snow loads  $S_g$  of 1.0 kPa and 1.5 kPa  
Special design is required for higher snow loads.

## Deflection Criteria

Refer also to BRANZ guidelines.

### Floors

Span/600	10mm maximum under dead and floor live load, short term. (G + 0.7Q)
Span/600	15mm maximum under permanent long term load. (G + 0.4Q, including creep)

### Rafters

Span/400	15mm maximum under permanent long term load
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### Purlins

Span/400	15mm maximum under long term load
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### Cantilevers

Span/300	10mm maximum under dead and floor live load
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## Design Strength

Trusses are designed to the Limit State Design provisions of NZS 3603 and AS/NZS 1170.

### Timber stresses

Timber properties to Table 2.3 NZS 3603:1993 Amendment 4

Timber Grade	Bending Strength $f_b$ (MPa)	Compression Strength $f_c$ (MPa)	Tension Strength $f_t$ (MPa)	Modulus of Elasticity E (GPa)
MSG8	14.0	18.0	6.0	8.0
MSG10	20.0	20.0	8.0	10.0
MSG12	28.0	25.0	14.0	12.0

### Modification factors

$K_1$	Load Case
0.6	Dead load only
0.8	Dead load and floor live load
0.8	Dead load and snow load
1.0	Dead load and roof live load
1.0	Dead load and wind load

## Instructions on the Use of Charts

The selection charts are based on maximum span tables. All spans for rafters (and purlins) are measured along the slope, not horizontal spans. First determine the load condition for the truss, for example floor live load, or type of roof material, wind zone and snow zone.

Based on different truss spacings, the maximum spans for different truss sizes can be selected. Maximum truss spans for intermediate truss spacings may be obtained by interpolating between the published results. Extrapolation beyond maximum and minimum spacings is not permitted.

With snow loads, the wind zone category has to be determined as well in order to use the selection charts. For ground snow loads over 1.5 kPa, please contact MiTek Design Office for assistance.

### Example:

Domestic Floor = 1.5 kPa Live Load, timber MSG8  
Truss Spacing = 450mm. Required span = 4.0 m

Maximum Span (m) at Spacing = S Domestic Floor - 1.5 kPa Live Load					
	Truss Code	D mm	Machine Stress Graded MSG8		
			Spacing "S" mm		
			400	450	600
	PS20-21x07	217	3.7	3.5	3.0
	PS25-25x07	248	4.1	3.8	3.3
	PS30-30x07	302	4.6	4.4	3.7
	PS40-40x07	412	5.5	5.2	4.6

**Maximum allowable span exceeds the required span of 4.0m, therefore use PS30-30x07.**

The correct truss type is the one whose maximum allowable span selected from the charts equals or exceeds the required span. Spans shaded indicate double webs for fabrication. It is important to write 'DW' beside the truss code to indicate the double web requirement.

A number of end support details are possible with Posi-STRUT™ trusses and it is advisable to show the type required for your application. Several possible types of support details are shown in the

Detailing Section of this Manual (page 22), which are by no means exhaustive. Consult the MiTek Design Office if you are looking for an alternative detail.

Special web positions may be possible to incorporate ducting around mid-span (page 21). It is necessary to specify this requirement where duct sizes over 100mm diameter are anticipated.

Details of fire rating and acoustic rating systems can be found on page 34-37.

## Floor Stiffness

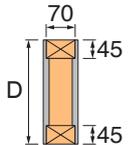
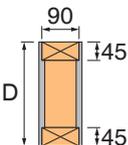
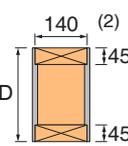
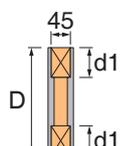
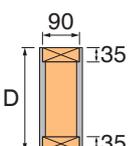
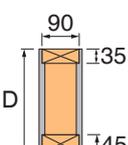
The dynamic response of a floor system to foot traffic and other moving loads is dependent on many factors such as the floor plan of supported walls, applied load, furniture layout, dynamic response of the support structure, etc. The comfort and expectations of occupants also varies widely. Posi-STRUT™ floor trusses are designed to conform to the vibration requirements of the New Zealand Building Standard AS/NZS 1170. When selecting Posi-STRUT™ trusses consideration should be given to the springiness of the floor. Generally the floor stiffness provided by trusses selected from the tables and designed in MiTek 20/20™ and Sapphire™ Structure meets the expectations of most occupants.

*In situations where the trusses are near their maximum span and there are no internal non-loadbearing walls, above or below the floor, the maximum span from the Posi-STRUT™ manual should be reduced by multiplying by 0.9.*

**We recommend the use of Posi-STRUT™ Back Brace to provide positive fixing between the truss and the strongback (see page 27).**

# SELECTION CHARTS

## Floor Trusses Domestic Floor

Maximum Span (m) at Spacing = S 1.5 kPa Live Load								
	Truss Code	D mm	Machine Stress Graded <b>MSG8</b>			Machine Stress Graded <b>MSG10</b> <sup>(1)</sup>		
			Spacing "S" mm					
			400	450	600	400	450	600
	PS20-21x07	217	3.7	3.5	3.0	4.3	4.0	3.5
	PS25-25x07	248	4.1	3.8	3.3	4.7	4.5	3.8
	PS30-30x07	302	4.6	4.4	3.7	5.3	5.0	4.4
	PS40-40x07	412	5.5	5.2	4.6	6.3	6.0	5.2
	PS20-21x09	217	4.2	3.9	3.4	4.7	4.5	3.9
	PS25-25x09	248	4.6	4.3	3.7	5.2	5.0	4.3
	PS30-30x09	302	5.2	4.9	4.2	6.0	5.6	4.9
	PS40-40x09	412	6.3	5.9	5.1	7.2	6.8	5.9
	PS20-21x14	217	5.1	4.7	4.0	5.4	5.1	4.0
	PS25-25x14	248	5.7	5.4	4.7	6.1	5.8	5.3
	PS30-30x14	302	6.5	6.1	5.3	6.8	6.6	6.1
	PS40-40x14	412	7.7	7.3	6.4	8.1	7.8	7.2
	PS40-45x05	D/(d1)						
	PS40-50x05	462/(70)	5.7	5.3	4.6	6.6	6.2	5.4
	PS40-60x05	502/(90)	6.6	6.2	5.3	7.5	7.2	6.2
	PS40-60x05	602/(140)	8.6	7.9	6.9	9.2	8.9	8.0
	PS20-19x09	197	3.6	3.4	2.7	4.2	3.9	3.4
	PS25-23x09	228	3.9	3.7	3.3	4.6	4.3	3.8
	PS30-28x09	282	4.5	4.2	3.7	5.3	5.0	4.3
	PS40-39x09	392	5.4	5.1	4.5	6.3	5.9	5.2
	PS25-24x09 <sup>(3)</sup>	238	4.5	4.2	3.7	4.9	4.7	4.2
	PS30-29x09 <sup>(3)</sup>	292	5.1	4.8	4.2	5.8	5.5	4.8

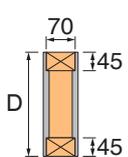
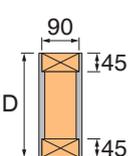
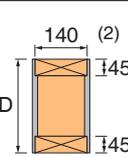
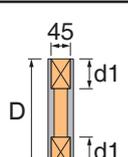
SELECTION CHARTS

- (1) When specifying check the availability of MSG10 timber.
- (2) 140mm wide trusses may not be available from all fabricators.
- (3) These sizes are useful to match solid timber joist sizes.
- (4) Shaded spans indicate double webs (DW) are required at ends (see page 20).

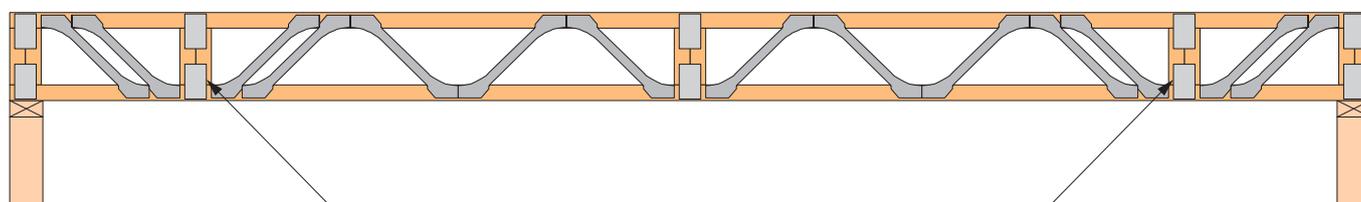
## Floor Trusses

### Office or Public Use Floor

Maximum Span (m) at Spacing = S  
3.0 kPa Live Load

	Truss Code	D mm	Machine Stress Graded <b>MSG8</b>			Machine Stress Graded <b>MSG10</b> <sup>(1)</sup>		
			Spacing "S" mm					
			400	450	600	400	450	600
	PS20-21x07	217	2.3	-	-	3.0	-	-
	PS25-25x07	248	2.7	2.5	2.2	3.4	3.3	2.8
	PS30-30x07	302	3.4	3.1	2.7	3.8	3.7	3.1
	PS40-40x07	412	4.0	3.5	3.1*	4.7	4.4	3.7*
	PS20-21x09	217	3.1	-	-	3.1	-	-
	PS25-25x09	248	3.4	3.2	2.8	3.9	3.7	3.2
	PS30-30x09	302	3.8	3.6	3.1	4.4	4.2	3.5
	PS40-40x09	412	4.6	4.3	3.6*	5.3	5.0	4.1*
	PS20-21x14	217	3.1	-	-	3.2	-	-
	PS25-25x14	248	4.2	4.0	3.4	4.9	4.5	3.8
	PS30-30x14	302	4.8	4.5	3.9	5.5	5.2	4.2
	PS40-40x14	412	5.5	5.3	4.2*	6.5	5.8	4.5
	PS40-45x05	D/(d1)	4.2	4.0	3.3	4.7	4.5	3.9
	PS40-50x05	502/(90)	4.7	4.5	4.0	5.6	5.3	4.5
	PS40-60x05	602/(140)	6.3	5.9	5.1	7.3	6.9	5.7

- (1) When specifying check the availability of MSG10 timber.
- (2) 140mm wide trusses may not be available from all fabricators.
- (3) Shaded spans indicate double webs (DW) are required at ends (see page 20).
- (4) Spans with \* indicate additional vertical webs are required at end panels (see below).



Additional vertical webs at end panels for spans with\*

## Purlin Trusses Light Roof

Maximum Span (m) at Spacing = S Low/Medium Wind - Grade MSG8							
	Truss Code	D mm	Without Ceiling				
			Spacing "S" mm				
			600	900	1200	1500	1800
	PS20-21x07	217	5.7	5.1	4.5	4.0	3.6
	PS25-25x07	248	6.3	5.6	4.8	4.3	3.9
	PS30-30x07	302	7.1	6.3	5.4	4.8	4.4
	PS40-40x07	412	8.5	7.5	6.5	5.8	5.3
	PS20-19x09	197	5.4	4.9	4.4	3.9	3.6
	PS25-23x09	228	6.1	5.5	4.8	4.3	3.9
	PS30-28x09	282	6.9	6.3	5.5	4.9	4.4
	PS40-39x09	392	8.4	7.5	6.7	5.9	5.3
	PS20-21x09	217	6.2	5.6	5.1	4.5	4.2
	PS25-25x09	248	6.7	6.1	5.6	5.0	4.5
	PS30-30x09	302	7.6	6.8	6.3	5.7	5.2
	PS40-40x09	412	9.0	8.1	7.5	6.9	6.2
Maximum Span (m) at Spacing = S High/Very High Wind - Grade MSG8							
	Truss Code	D mm	Without Ceiling				
			Spacing "S" mm				
			600	900	1200	1500	1800
	PS20-21x07	217	4.6	3.8	3.2	2.8	2.4
	PS25-25x07	248	5.1	4.1	3.6	3.1	2.6
	PS30-30x07	302	5.7	4.6	3.9	3.5	2.9
	PS40-40x07	412	6.6	5.3	4.3	3.8*	3.2*
	PS20-19x09	197	4.5	3.7	3.1	2.5	2.0
	PS25-23x09	228	5.0	4.0	3.3	2.6	2.1
	PS30-28x09	282	5.6	4.5	3.8	3.0	2.5
	PS40-39x09	392	6.4	5.1	4.0*	3.6*	3.0*
	PS20-21x09	217	5.4	4.3	3.7	3.2	2.9
	PS25-25x09	248	5.8	4.8	4.0	3.6	3.2
	PS30-30x09	302	6.6	5.3	4.5	4.0	3.7
	PS40-40x09	412	7.8	6.3	5.3	4.6	3.9*

(1) Spans with \* indicate additional vertical webs are required at end panels (see page 6).

## Purlin Trusses Light Roof

Maximum Span (m) at Spacing = S Extra High Wind - Grade MSG8							
	Truss Code	D mm	Without Ceiling				
			Spacing "S" mm				
			600	900	1200	1500	1800
	PS20-21x07	217	4.2	3.3	2.9	2.4	2.1*
	PS25-25x07	248	4.5	3.7	3.1	2.5	2.4*
	PS30-30x07	302	5.1	4.1	3.5	2.7	2.6*
	PS40-40x07	412	6.1	4.7	3.9*	3.1*	3.0*
	PS20-19x09	197	4.1	3.2	2.5	2.0	1.8
	PS25-23x09	228	4.2	3.6	2.6	2.5*	2.0*
	PS30-28x09	282	5.0	3.9	3.1	2.7*	2.4*
	PS40-39x09	392	5.8	4.0	3.2*	3.0*	2.8*
	PS20-21x09	217	4.8	3.8	3.2	2.8	2.4
	PS25-25x09	248	5.1	4.3	3.6	3.1	2.6
	PS30-30x09	302	5.9	4.8	4.0	3.6	3.0
	PS40-40x09	412	6.9	5.4	4.6	3.9*	3.2*

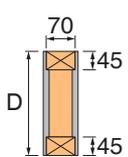
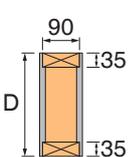
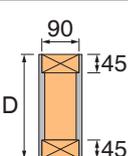
(1) Spans with \* indicate additional vertical webs are required at end panels (see page 6).

## Purlin Trusses Light Roof

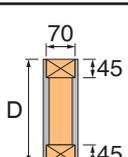
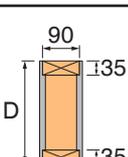
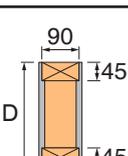
Maximum Span (m) at Spacing = S 1.0 kPa Ground Snow Load - Low/Medium Wind - Grade MSG8							
	Truss Code	D mm	Without Ceiling				
			Spacing "S" mm				
			600	900	1200	1500	1800
	PS20-21x07	217	5.1	4.1	3.6	3.2	2.9
	PS25-25x07	248	5.6	4.5	3.9	3.5	3.2
	PS30-30x07	302	6.3	5.1	4.4	3.9	3.6
	PS40-40x07	412	7.6	6.1	5.4	4.7	4.3
	PS20-19x09	197	4.9	4.0	3.5	3.2	2.8
	PS25-23x09	228	5.4	4.4	3.8	3.4	3.2
	PS30-28x09	282	6.2	5.0	4.4	3.9	3.5
	PS40-39x09	392	7.5	6.1	5.3	4.7	4.2
	PS20-21x09	217	5.7	4.7	4.0	3.6	3.2
	PS25-25x09	248	6.3	5.1	4.5	3.9	3.6
	PS30-30x09	302	7.1	5.8	5.0	4.5	4.1
	PS40-40x09	412	8.5	7.0	6.0	5.4	4.9
Maximum Span (m) at Spacing = S 1.0 kPa Ground Snow Load - High/Very High Wind - Grade MSG8							
	Truss Code	D mm	Without Ceiling				
			Spacing "S" mm				
			600	900	1200	1500	1800
	PS20-21x07	217	4.4	3.5	3.1	2.7	2.4
	PS25-25x07	248	4.7	3.8	3.4	3.0	2.6
	PS30-30x07	302	5.3	4.3	3.8	3.4	2.9
	PS40-40x07	412	6.3	5.2	4.3	3.8*	3.2*
	PS20-19x09	197	4.4	3.7	3.0	2.5	2.0
	PS25-23x09	228	5.0	4.0	3.3	2.6	2.1
	PS30-28x09	282	5.6	4.5	3.8	3.0	2.5
	PS40-39x09	392	6.4	5.1	4.0*	3.6*	3.0*
	PS20-21x09	217	5.4	4.3	3.7	3.2	2.9
	PS25-25x09	248	5.7	4.7	4.0	3.6	3.2
	PS30-30x09	302	6.6	5.3	4.5	4.0	3.7
	PS40-40x09	412	7.8	6.3	5.3	4.6	3.9*

(1) Spans with \* indicate additional vertical webs are required at end panels (see page 6).

## Purlin Trusses Light Roof

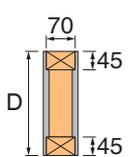
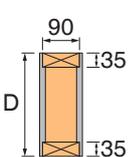
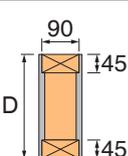
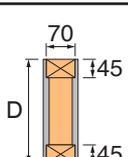
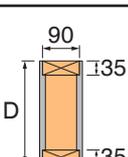
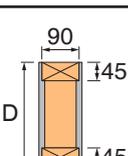
Maximum Span (m) at Spacing = S 1.0 kPa Ground Snow Load - Extra High Wind - Grade MSG8							
	Truss Code	D mm	Without Ceiling				
			Spacing "S" mm				
			600	900	1200	1500	1800
	PS20-21x07	217	4.2	3.3	2.9	2.4	2.1*
	PS25-25x07	248	4.5	3.7	3.1	2.5	2.4*
	PS30-30x07	302	5.1	4.1	3.5	2.7	2.6*
	PS40-40x07	412	6.1	4.7	3.9*	3.1*	3.0*
	PS20-19x09	197	4.1	3.2	2.5	2.0	1.8
	PS25-23x09	228	4.2	3.6	2.6	2.5*	2.0*
	PS30-28x09	282	5.0	3.9	3.1	2.7*	2.4*
	PS40-39x09	392	5.8	4.0	3.2*	3.0*	2.8*
	PS20-21x09	217	4.8	3.8	3.2	2.8	2.4
	PS25-25x09	248	5.1	4.3	3.6	3.1	2.6
	PS30-30x09	302	5.9	4.8	4.0	3.6	3.0
	PS40-40x09	412	6.9	5.4	4.6	3.9*	3.2*

Maximum Span (m) at Spacing = S 1.5 kPa Ground Snow Load - All Wind - Grade MSG8							
	Truss Code	D mm	Without Ceiling				
			Spacing "S" mm				
			600	900	1200	1500	1800
	PS20-21x07	217	4.2	3.3	2.9	2.4	2.1*
	PS25-25x07	248	4.5	3.7	3.1	2.5	2.4*
	PS30-30x07	302	5.1	4.1	3.5	2.7	2.6*
	PS40-40x07	412	6.1	4.7	3.9*	3.1*	3.0*
	PS20-19x09	197	4.1	3.2	2.5	2.0	1.8
	PS25-23x09	228	4.2	3.6	2.6	2.5*	2.1*
	PS30-28x09	282	5.0	3.9	3.1	2.7*	2.4*
	PS40-39x09	392	5.8	4.0	3.2*	3.0*	2.8*
	PS20-21x09	217	4.8	3.8	3.2	2.8	2.4
	PS25-25x09	248	5.1	4.3	3.6	3.1	2.6
	PS30-30x09	302	5.9	4.8	4.0	3.6	3.0
	PS40-40x09	412	6.9	5.4	4.6	3.9*	3.2*

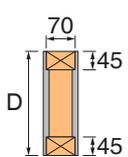
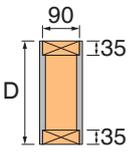
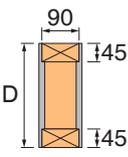
(1) Spans with \* indicate additional vertical webs are required at end panels (see page 6).

## Rafter Trusses Light Roof

Maximum Span (m) at Spacing = S Low/Medium Wind - Grade MSG8										
	Truss Code	D mm	With Ceiling				Without Ceiling			
			Spacing "S" mm							
			600	900	1200	1800	900	1200	1800	2400
	PS20-21x07	217	4.8	4.3	3.8	3.2	4.8	4.6	3.8	3.3
	PS25-25x07	248	5.5	4.8	4.2	3.6	5.5	5.0	4.1	3.5
	PS30-30x07	302	6.3	5.6	4.9	3.9	6.3	5.6	4.6	4.0
	PS40-40x07	412	7.6	6.7	5.7	4.6	7.7	6.7	5.5	4.7
	PS20-19x09	197	4.8	4.0	3.7	3.2	4.8	4.0	3.7	3.2
	PS25-23x09	228	5.1	4.8	4.0	3.5	5.0	4.8	4.0	3.5
	PS30-28x09	282	6.2	5.5	4.8	3.8	6.4	5.7	4.6	3.9
	PS40-39x09	392	7.5	6.5	5.7	4.6*	7.6	6.8	5.4*	4.5*
	PS20-21x09	217	5.6	5.0	4.5	3.7	5.7	5.2	4.3	3.7
	PS25-25x09	248	6.0	5.4	4.9	3.9	6.2	5.7	4.7	4.0
	PS30-30x09	302	6.7	6.1	5.5	4.5	6.9	6.4	5.3	4.6
	PS40-40x09	412	8.0	7.3	6.4	5.3	8.2	7.6	6.3	5.5
Maximum Span (m) at Spacing = S High/Very High Wind - Grade MSG8										
	Truss Code	D mm	With Ceiling				Without Ceiling			
			Spacing "S" mm							
			600	900	1200	1800	900	1200	1800	2400
	PS20-21x07	217	4.8	4.1	3.6	2.8	3.6	3.2	2.5	2.1*
	PS25-25x07	248	5.5	4.4	3.8	3.1	3.9	3.4	2.6	2.3*
	PS30-30x07	302	6.2	5.0	4.3	3.3	4.4	3.8	3.0	2.6*
	PS40-40x07	412	7.2	5.7	5.0	3.8*	5.3	4.5	3.2*	2.6*
	PS20-19x09	197	4.8	3.9	3.3	2.5	3.7	3.1	2.5*	2.0*
	PS25-23x09	228	5.1	4.3	3.7	2.6	4.1	3.3	2.6*	2.1*
	PS30-28x09	282	6.1	4.9	4.2	3.1	4.7	3.8	2.7*	2.5*
	PS40-39x09	392	7.1	5.5	4.7	3.2*	5.3	4.0*	3.1*	2.4*
	PS20-21x09	217	5.5	4.7	4.0	3.2	4.4	3.8	3.0	2.4
	PS25-25x09	248	6.0	5.1	4.4	3.6	4.8	4.1	3.2	2.7*
	PS30-30x09	302	6.7	5.7	4.9	3.9	5.4	4.7	3.7	2.9
	PS40-40x09	412	8.0	6.8	5.9	4.2	6.3	5.4	4.0*	3.2*

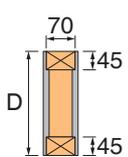
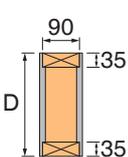
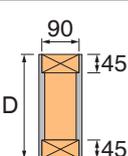
(1) Spans with \* indicate additional vertical webs are required at end panels (see page 6).

## Rafter Trusses Light Roof

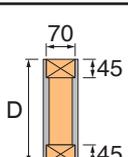
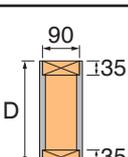
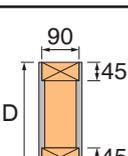
Maximum Span (m) at Spacing = S Extra High Wind - Grade MSG8										
	Truss Code	D mm	With Ceiling				Without Ceiling			
			Spacing "S" mm							
			600	900	1200	1800	900	1200	1800	2400
	PS20-21x07	217	4.4	3.6	3.1	2.5*	3.4	2.9	2.2*	2.0*
	PS25-25x07	248	4.9	3.9	3.2	2.7*	3.7	3.1	2.5*	2.0*
	PS30-30x07	302	5.4	4.4	3.8	2.8*	4.2	3.6	2.7*	2.2*
	PS40-40x07	412	6.4	4.9	4.0	3.1*	4.7	3.9*	3.0*	2.4*
	PS20-19x09	197	4.3	3.4	2.8	2.0	3.2	2.5	2.0*	1.9*
	PS25-23x09	228	4.8	3.8	2.9	2.5*	3.6	2.7	2.2*	1.9*
	PS30-28x09	282	5.3	4.2	3.7	2.6*	3.9	3.1	2.5*	2.3*
	PS40-39x09	392	6.2	4.6	3.3	3.0*	4.0	3.2*	3.0*	2.3*
	PS20-21x09	217	5.1	4.1	3.6	2.6	3.9	3.3	2.6*	2.2*
	PS25-25x09	248	5.5	4.4	3.8	3.1	4.3	3.7	2.7	2.5*
	PS30-30x09	302	6.1	5.0	4.3	3.4	4.8	4.1	3.1	2.6*
	PS40-40x09	412	7.2	6.0	4.8	3.4*	5.5	4.7	3.3*	2.7*

- (1) Spans with \* indicate additional vertical webs are required at end panels (see page 6).  
 (2) Shaded spans indicate double webs (DW) are required at ends (see page 20).

## Rafter Trusses Light Roof

Maximum Span (m) at Spacing = S 1.0 kPa Ground Snow Load - Low/Medium Wind - Grade MSG8										
	Truss Code	D mm	With Ceiling				Without Ceiling			
			Spacing "S" mm							
			600	900	1200	1800	900	1200	1800	2400
	PS20-21x07	217	4.6	3.7	3.2	2.6	4.0	3.4	2.8	2.4
	PS25-25x07	248	5.0	4.1	3.5	2.9	4.4	3.8	3.1	2.7
	PS30-30x07	302	5.6	4.6	3.9	3.2	5.0	4.3	3.5	3.1
	PS40-40x07	412	6.8	5.5	4.7	3.9	6.0	5.2	4.2	3.5
	PS20-19x09	197	4.5	3.6	3.2	2.5	3.9	3.4	2.7	2.3
	PS25-23x09	228	4.9	3.9	3.4	2.7	4.3	3.7	3.1	2.6
	PS30-28x09	282	5.6	4.5	3.9	3.2	4.9	4.3	3.4	3.0
	PS40-39x09	392	6.7	5.4	4.7	3.8*	5.9	5.1	4.0	3.6*
	PS20-21x09	217	5.1	4.2	3.6	2.9	4.6	3.9	3.2	2.7
	PS25-25x09	248	5.7	4.6	3.9	3.3	5.0	4.3	3.5	3.1
	PS30-30x09	302	6.4	5.2	4.5	3.7	5.6	4.9	3.9	3.4
	PS40-40x09	412	7.7	6.2	5.4	4.4	6.8	5.9	4.8	4.1

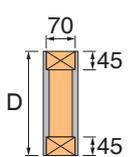
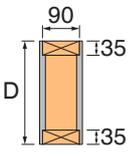
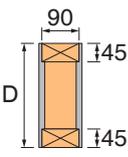
  

Maximum Span (m) at Spacing = S 1.0 kPa Ground Snow Load - High/Very High Wind - Grade MSG8										
	Truss Code	D mm	With Ceiling				Without Ceiling			
			Spacing "S" mm							
			600	900	1200	1800	900	1200	1800	2400
	PS20-21x07	217	4.6	3.7	3.2	2.6	3.6	3.2	2.5	1.9
	PS25-25x07	248	5.0	4.1	3.5	2.9	3.9	3.4	2.6	2.0
	PS30-30x07	302	5.6	4.6	3.9	3.2	4.4	3.8	3.0	2.1
	PS40-40x07	412	6.8	5.5	4.7	3.8*	5.3	4.3	3.2*	2.6*
	PS20-19x09	197	4.5	3.6	3.2	2.5	3.7	3.1	2.5*	2.0*
	PS25-23x09	228	4.9	3.9	3.4	2.6	4.1	3.3	2.6*	2.1*
	PS30-28x09	282	5.6	4.5	3.9	3.0	4.5	3.8	2.7*	2.5*
	PS40-39x09	392	6.7	5.4	4.6	3.6*	5.3	4.0*	3.1*	2.4*
	PS20-21x09	217	5.1	4.2	3.6	2.9	4.4	3.8	3.0	2.4
	PS25-25x09	248	5.7	4.6	3.9	3.3	4.8	4.1	3.2	2.6
	PS30-30x09	302	6.4	5.2	4.5	3.7	5.4	4.5	3.7	2.9
	PS40-40x09	412	7.7	6.2	5.4	4.3	6.3	5.4	4.0*	3.2*

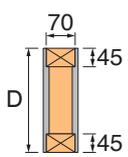
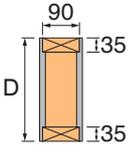
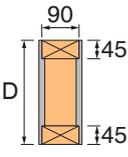
SELECTION CHARTS

- (1) Spans with \* indicate additional vertical webs are required at end panels (see page 6).
- (2) Shaded spans indicate double webs (DW) are required at ends (see page 20).

## Rafter Trusses Light Roof

Maximum Span (m) at Spacing = S 1.0 kPa Ground Snow Load - Extra High Wind - Grade MSG8										
	Truss Code	D mm	With Ceiling				Without Ceiling			
			Spacing "S" mm							
			600	900	1200	1800	900	1200	1800	2400
	PS20-21x07	217	4.4	3.6	3.1	2.5*	3.4	2.9	2.2*	2.0*
	PS25-25x07	248	4.9	3.9	3.2	2.7*	3.7	3.1	2.5*	2.0*
	PS30-30x07	302	5.4	4.4	3.8	2.8*	4.2	3.6	2.7*	2.2*
	PS40-40x07	412	6.4	4.9	4.0	3.1*	4.7	3.9*	3.0*	2.4*
	PS20-19x09	197	4.3	3.4	2.8	2.0	3.2	2.5	2.0*	1.9*
	PS25-23x09	228	4.8	3.8	2.9	2.5*	3.6	2.7	2.2*	1.9*
	PS30-28x09	282	5.3	4.2	3.7	2.6*	3.9	3.1	2.5*	2.3*
	PS40-39x09	392	6.2	4.6	3.3	3.0*	4.0	3.2*	3.0*	2.3*
	PS20-21x09	217	5.1	4.1	3.6	2.6	3.9	3.3	2.6*	2.2*
	PS25-25x09	248	5.5	4.4	3.8	3.1	4.3	3.7	2.7	2.5*
	PS30-30x09	302	6.1	5.0	4.3	3.4	4.8	4.1	3.1	2.6*
	PS40-40x09	412	7.2	6.0	4.8	3.4*	5.5	4.7	3.3*	2.7*

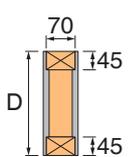
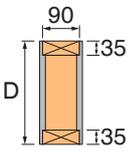
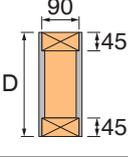
  

Maximum Span (m) at Spacing = S 1.5 kPa Ground Snow Load - All Wind - Grade MSG8										
	Truss Code	D mm	With Ceiling				Without Ceiling			
			Spacing "S" mm							
			600	900	1200	1800	900	1200	1800	2400
	PS20-21x07	217	4.0	3.3	2.8	2.3*	3.4	2.9	2.1*	2.0*
	PS25-25x07	248	4.4	3.6	3.1	2.5	3.7	3.1	2.5*	2.0*
	PS30-30x07	302	5.0	4.0	3.5	2.8*	4.2	3.6	2.7*	2.2*
	PS40-40x07	412	6.0	4.8	4.0	3.1*	4.7	3.9*	3.0*	2.4*
	PS20-19x09	197	3.9	3.2	2.7	2.2*	3.2	2.5	2.1*	1.9*
	PS25-23x09	228	4.3	3.5	3.1	2.5*	3.6	2.7	2.2*	1.9*
	PS30-28x09	282	4.9	3.9	3.5	2.6*	3.9	3.1	2.5*	2.3*
	PS40-39x09	392	5.9	4.7	3.9*	3.0*	4.0	3.2*	3.0*	2.3*
	PS20-21x09	217	4.6	3.7	3.2	2.5	3.9	3.3	2.4*	2.1*
	PS25-25x09	248	4.9	4.1	3.5	2.9	4.3	3.7	2.7	2.5*
	PS30-30x09	302	5.6	4.6	3.9	3.3	4.8	4.1	3.1	2.6*
	PS40-40x09	412	6.7	5.5	4.7	3.8*	5.5	4.7	3.3*	2.7*

(1) Spans with \* indicate additional vertical webs are required at end panels (see page 6).

(2) Shaded spans indicate double webs (DW) are required at ends (see page 20).

## Rafter Trusses Heavy Roof

Maximum Span (m) at Spacing = S All Wind - Grade MSG8								
	Truss Code	D mm	With Ceiling			Without Ceiling		
			Spacing "S" mm					
			600	900	1200	600	900	1200
	PS20-21x07	217	3.9	3.3	2.8	4.0	3.6	3.2
	PS25-25x07	248	4.4	3.6	3.2	4.7	4.0	3.5
	PS30-30x07	302	5.0	4.0	3.6	5.3	4.5	3.9
	PS40-40x07	412	6.0	4.8	4.1	6.6	5.4	4.6
	PS20-19x09	197	3.8	3.3	2.7	4.0	3.6	3.2
	PS25-23x09	228	4.3	3.6	3.0	4.7	3.9	3.4
	PS30-28x09	282	5.0	4.0	3.5	5.1	4.3	3.8
	PS40-39x09	392	5.7	4.7*	4.1*	6.4	4.9*	4.0*
	PS20-21x09	217	4.6	3.8	3.2	4.9	4.1	3.6
	PS25-25x09	248	5.0	4.0	3.6	5.4	4.6	3.9
	PS30-30x09	302	5.6	4.6	4.0	6.2	5.1	4.5
	PS40-40x09	412	6.8	5.5	4.7	7.4	6.1	5.3

- (1) Spans with \* indicate additional vertical webs are required at end panels (see page 6).
- (2) Shaded spans indicate double webs (DW) are required at ends (see page 20).

## Rafter Trusses Heavy Roof

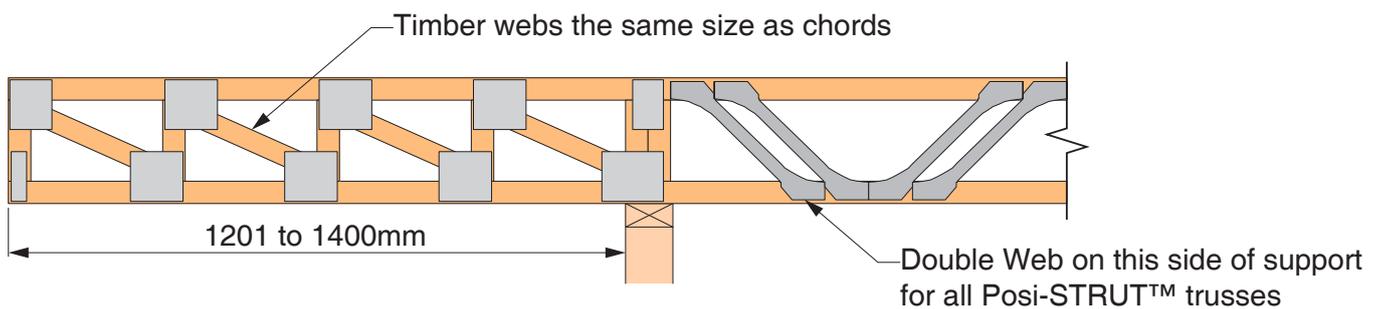
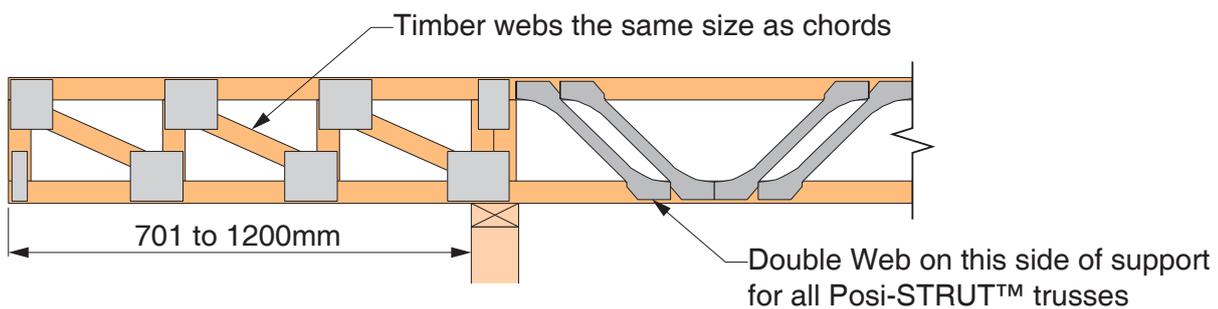
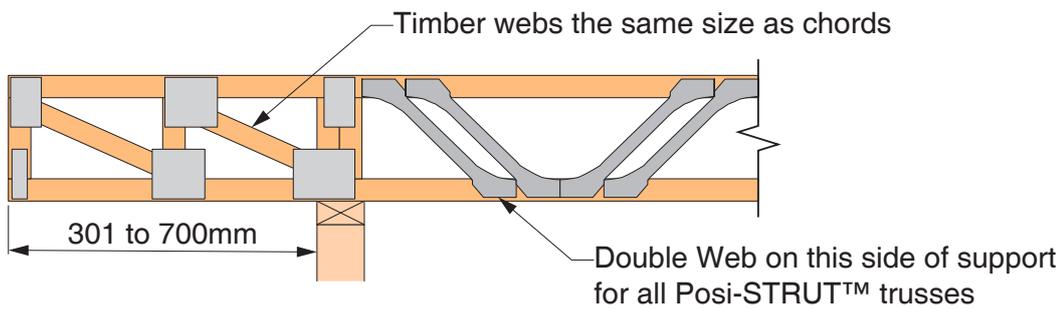
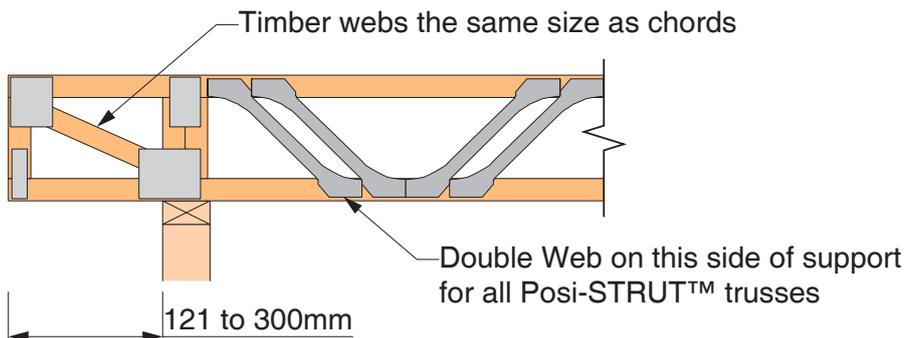
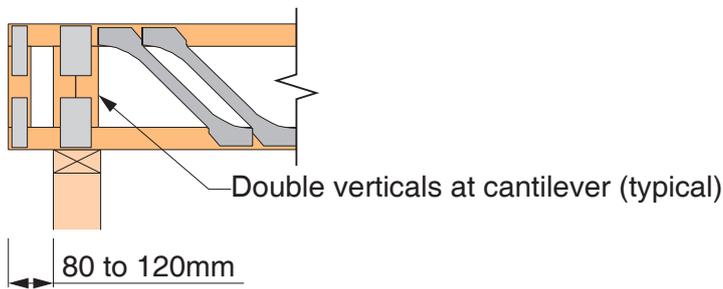
Maximum Span (m) at Spacing = S 1.0 kPa Ground Snow Load - All Wind - Grade MSG8								
	Truss Code	D mm	With Ceiling			Without Ceiling		
			Spacing "S" mm					
			600	900	1200	600	900	1200
	PS20-21x07	217	3.8	3.2	2.7	4.0	3.4	2.9
	PS25-25x07	248	4.2	3.3	3.0	4.5	3.6	3.2
	PS30-30x07	302	4.8	3.9	3.4	5.0	4.1	3.5
	PS40-40x07	412	5.7	4.6	4.0	6.1	5.0	4.2*
	PS20-19x09	197	3.8	3.1	2.6	3.9	3.3	2.8
	PS25-23x09	228	4.1	3.4	2.9	4.4	3.5	3.1
	PS30-28x09	282	4.7	3.8	3.3	5.0	4.1	3.5*
	PS40-39x09	392	5.6	4.6*	4.0*	6.0	4.9*	4.0*
	PS20-21x09	217	4.4	3.6	3.1	4.6	3.8	3.3
	PS25-25x09	248	4.8	3.9	3.4	5.1	4.1	3.5
	PS30-30x09	302	5.4	4.4	3.8	5.7	4.7	4.0
	PS40-40x09	412	6.5	5.3	4.6	6.9	5.6	4.8
Maximum Span (m) at Spacing = S 1.5 kPa Ground Snow Load - All Wind - Grade MSG8								
	Truss Code	D mm	With Ceiling			Without Ceiling		
			Spacing "S" mm					
			600	900	1200	600	900	1200
	PS20-21x07	217	3.5	2.9	2.5	3.7	3.0	2.6
	PS25-25x07	248	3.8	3.2	2.7	4.0	3.3	2.8
	PS30-30x07	302	4.3	3.5	3.1	4.5	3.7	3.3
	PS40-40x07	412	5.2	4.3	3.7	5.5	4.4	3.9
	PS20-19x09	197	3.4	2.7	2.2	3.6	3.0	2.4
	PS25-23x09	228	3.7	3.1	2.5	3.9	3.3	2.7
	PS30-28x09	282	4.3	3.5	3.0	4.5	3.7	3.2
	PS40-39x09	392	5.1	4.2*	3.3*	5.4	4.4*	3.3*
	PS20-21x09	217	3.9	3.2	2.7	4.2	3.4	2.9
	PS25-25x09	248	4.4	3.5	3.1	4.6	3.7	3.3
	PS30-30x09	302	4.9	4.0	3.5	5.1	4.2	3.7
	PS40-40x09	412	5.9	4.8	4.1	6.2	5.0	4.3

(1) Spans with \* indicate additional vertical webs are required at end panels (see page 6).

(2) Shaded spans indicate double webs (DW) are required at ends (see page 20).



## Cantilever Truss Details



SELECTION CHARTS

## Posi-STRUT™ Web Sizes

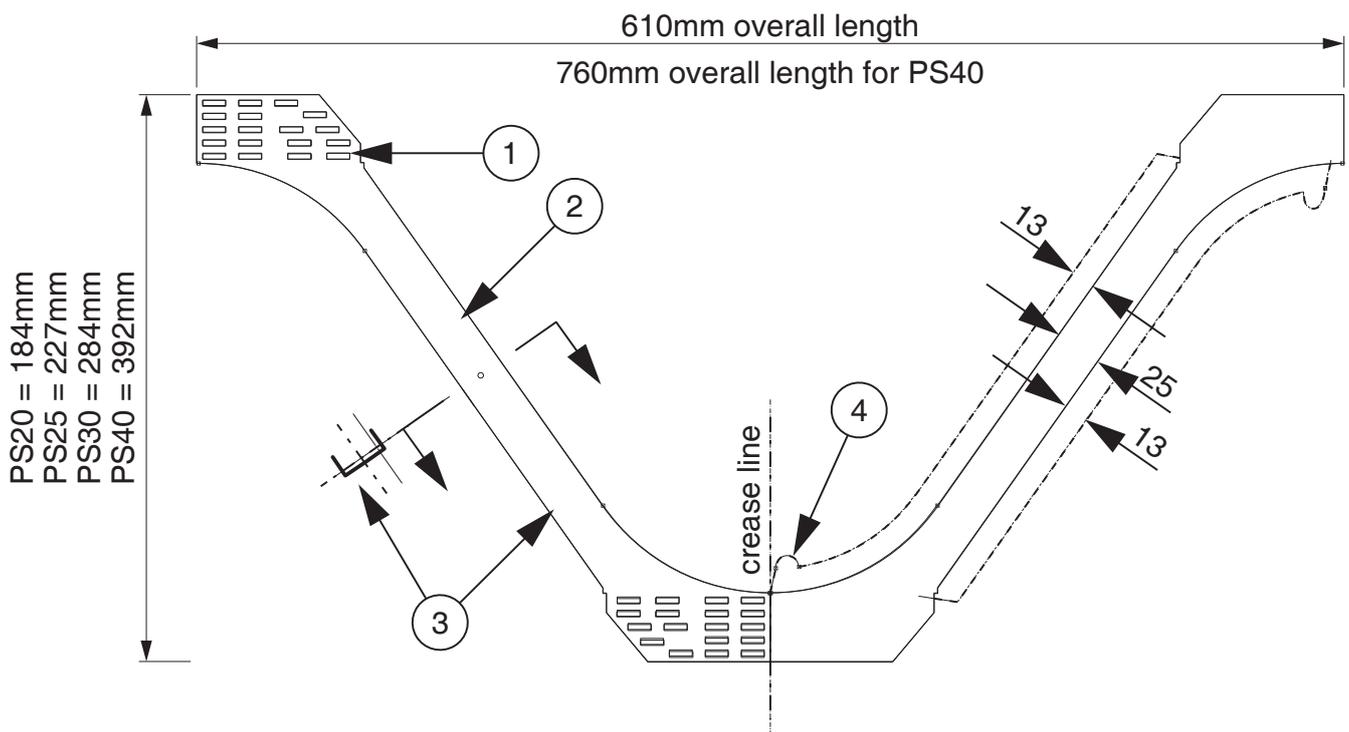
The GANG-NAIL® Posi-STRUT™ is a V-shaped metal web stamped from 0.91mm ASTM A446 Grade A (yield strength 230 MPa, ultimate strength 310 MPa) steel with a Z275 galvanised coating. Posi-STRUT™ is available in four depths or sizes: PS20, PS25, PS30 and PS40.

The modular length of Posi-STRUT™ is 610mm (760mm for PS40), which can be split in half at a crease in the middle to form two 305mm (380mm for PS40) half webs. The various depth of sections are as follows:

Web Size	Web Depth	Weight per web	Truss Weight (90x45 chords)	Number of teeth (ends/crotch)
PS20	184mm	0.24 kg	4.85 kg/m	14/28
PS25	227mm	0.29 kg	5.02 kg/m	18/36
PS30	284mm	0.37 kg	5.28 kg/m	20/40
PS40	392mm	0.50 kg	5.72 kg/m	24/38

### Posi-STRUT™ metal web

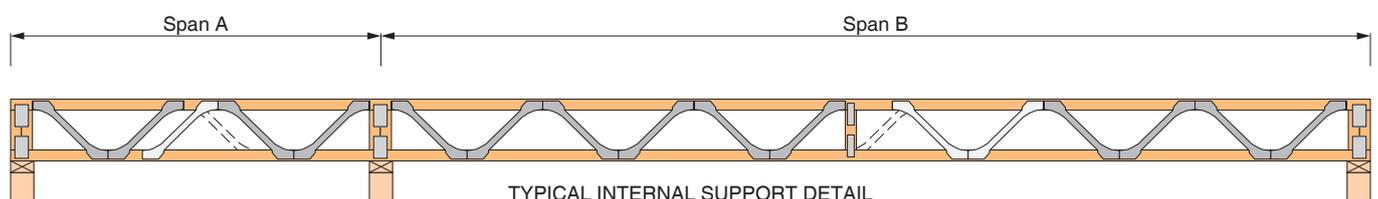
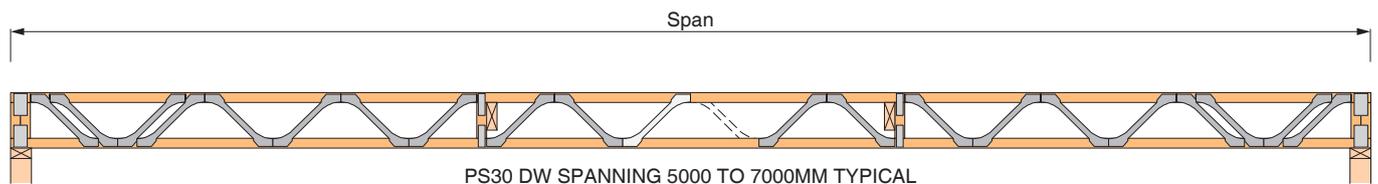
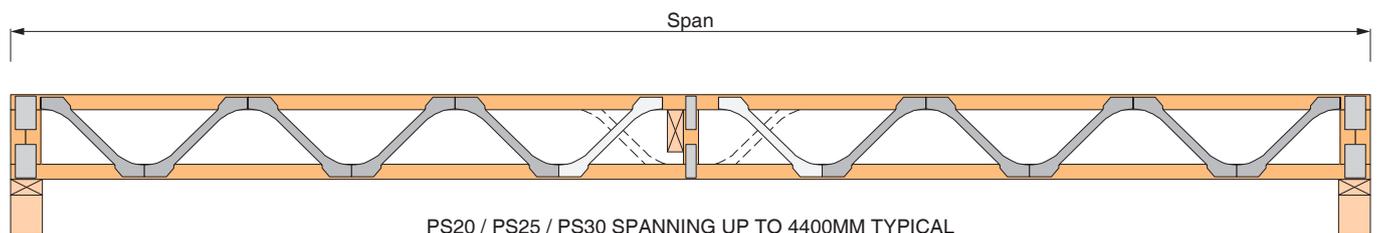
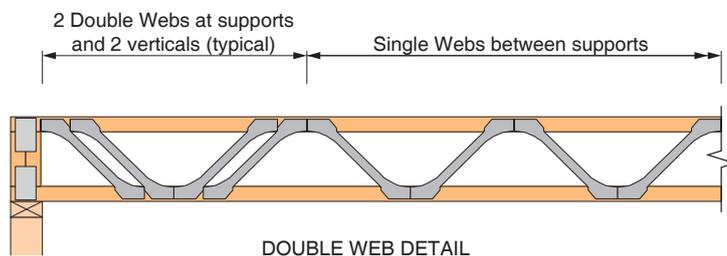
1. Posi-tooth cluster
2. Flat surface channels
3. Deep channel cross section
4. Positioning tabs



## Web Layouts

The following rules should be followed when laying out the webs:

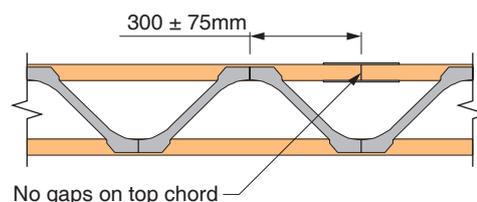
1. Always start detailing from the supports and work inwards towards the centre of the span.
2. The first web from a support always meets the top chord, not the bottom chord.
3. A timber web is required at each support and at each strongback location. Strongbacks may also be fixed using Posi-STRUT™ Back Brace (see page 27).
4. The strongback should be placed hard up against the top chord. On-site the strongback should be clamped against the top chord and nailed. To achieve this, the adjacent Posi-STRUT™ web should meet the bottom chord at the strongback location.
5. The number of webs required is reduced over the middle of the truss. This is achieved through staggering alternating  $\frac{1}{2}$  webs at the middle of the span.
6. The requirement for alternating  $\frac{1}{2}$  webs in the middle of the truss allows adjustment to be made to suit the span of the truss.
7. The maximum gap between adjacent webs is 3mm.
8. Where double webs are called up in the selection tables (as shaded area on chart, and/or followed by 'DW' in the truss code) the double webs are required at the vicinity of support locations as shown on the double web detail.



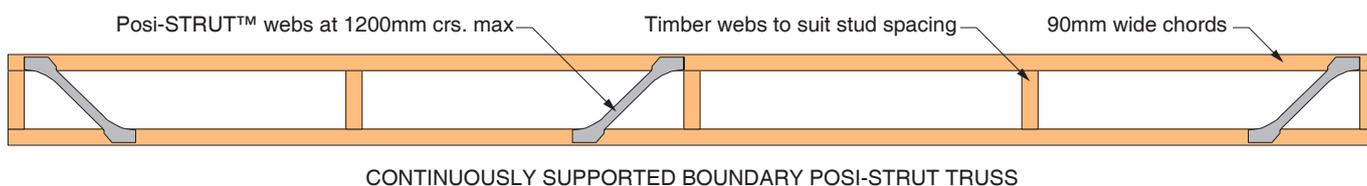
## Splicing

Chord butt splices are pressed symmetrically across the joint on both sides, on the wide faces of the timber chord. These splices are normally applied before assembly as a truss, and should be positioned away from web panel points. Where both top and bottom chords are spliced, splices should occur at opposite ends of the truss. The ends of top chords to be spliced should be in contact with no gaps. The splice plate size is as designed in MiTek 20/20™ / MiTek Sapphire™ or as shown in adjacent table.

Chord Size	Splice Plate Size	
	MSG8	MSG10
70x45	GN16-7x27	GN16-7x27
90x45	GNQ-8x20	GN16-7x27
90x35	GNQ-8x15	GNQ-8x20
140x45	GN16-14x27	GN16-14x27

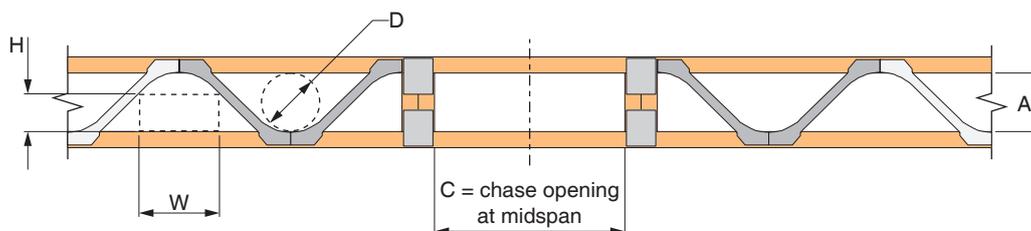


## Boundary Trusses



The truss that lies in the wall does not need to have Posi-STRUT™ webs all along it, it merely needs some bracing webs to keep it square. Ensure that this truss is labelled so that it will be installed as the boundary truss.

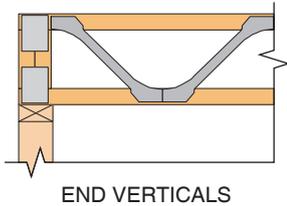
## Mechanical Service Clearances



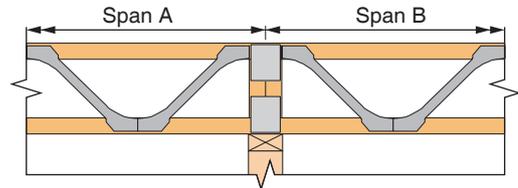
	PS20	PS25	PS30	PS40
<b>A (mm)</b>	127	158	212	322
<b>D (mm)</b>	120	152	203	280
<b>C (mm)</b>	500	500	500	500
<b>H (mm)</b>	<b>W (mm)</b>			
50	280	311	342	494
75	200	260	304	460
100	120	209	260	416
125	-	158	215	377
150	-	69	177	338
175	-	-	139	300
200	-	-	76	258

## Support Detailing

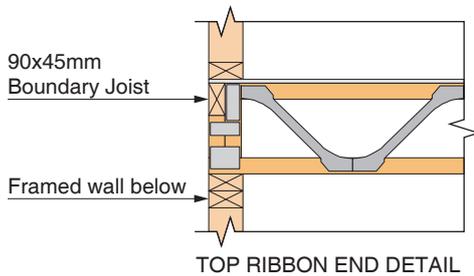
The Posi-STRUT™ web is always plated both sides at the top chord over support points whether they be at the ends of trusses or at intermediate locations, unless it is clearly specified otherwise. Various end and intermediate details are shown in 'Rafter and Purlin Truss Detailing' Section. GANG-NAIL® connectors for vertical timber webs are typically as shown below. All fixings are indicative only.



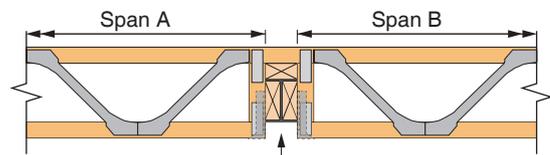
END VERTICALS



CENTRAL BOTTOM SUPPORT TO TIMBER WALL  
(RECOMMENDED)

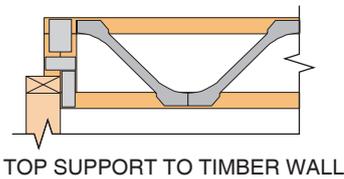


TOP RIBBON END DETAIL

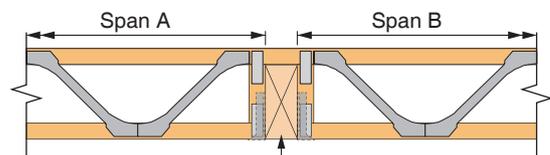


Cut bottom chord at installation.  
Fix with LUMBERLOK® Joist Hangers.

CENTRAL TOP SUPPORT TO STEEL BEAM

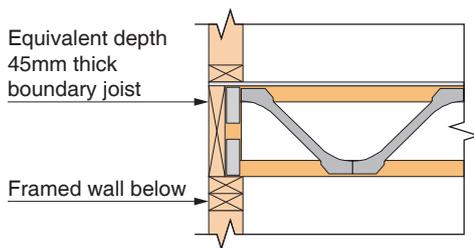


TOP SUPPORT TO TIMBER WALL

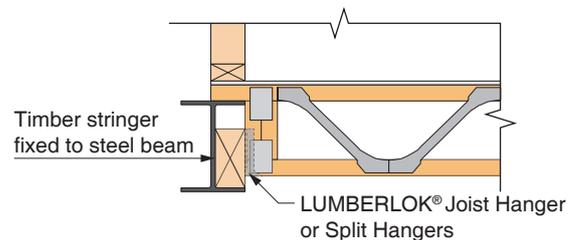


Cut bottom chord at installation.  
Fix with LUMBERLOK® Joist Hangers.

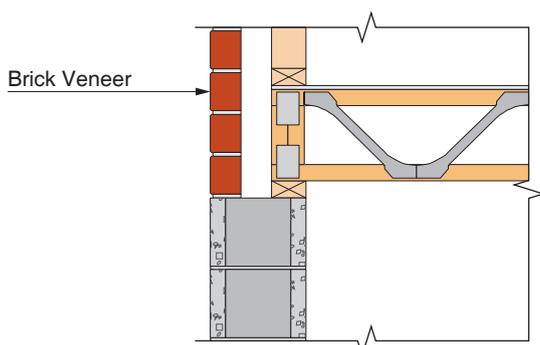
CENTRAL TOP SUPPORT TO TIMBER BEAM



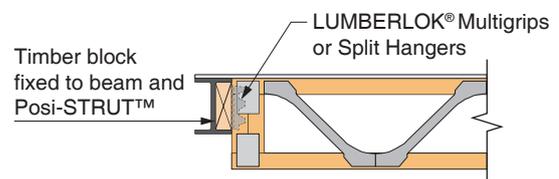
BOTTOM SUPPORT TO TIMBER WALL



TOP CHORD BEARING



BOTTOM SUPPORT TO BLOCK WALL



FLUSH WITH TOP OF STEEL BEAM

DETAILING

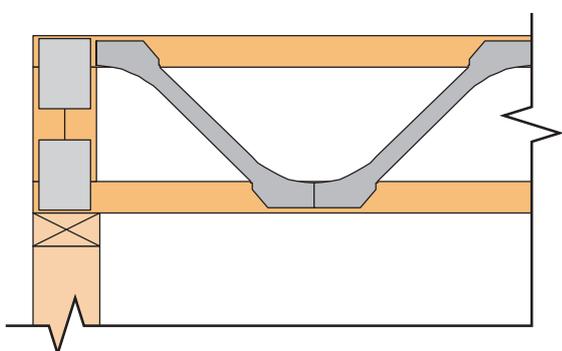
## Floor Truss Detailing

### Setout and Placement

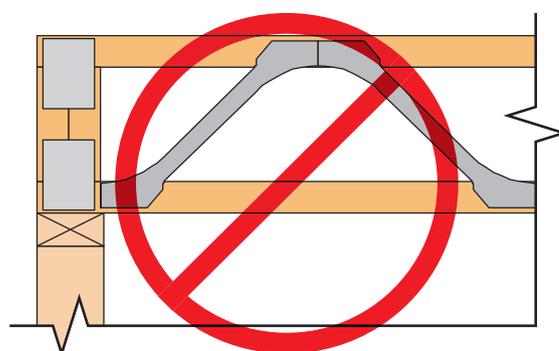
Posi-STRUT™ floor trusses are generally placed perpendicular to load bearing walls and should be spaced equally between ends of the building. Spacing as centre-to-centre is usually nominated on the job design sheet, and must not be exceeded.

A floor truss layout is also normally supplied by the manufacturer which will show the correct placement of special trusses, double trusses, openings or any other special requirements.

Care should be taken to place the Posi-STRUT™ truss the right way up. The Posi-STRUT™ web is always plated on the top chord directly over support points.



CORRECT TRUSS PLACEMENT



INCORRECT TRUSS PLACEMENT

### Non-load Bearing Walls

The placing of non-load bearing partitions on floor truss systems may necessitate additional stiffening of the structure. There are three situations:

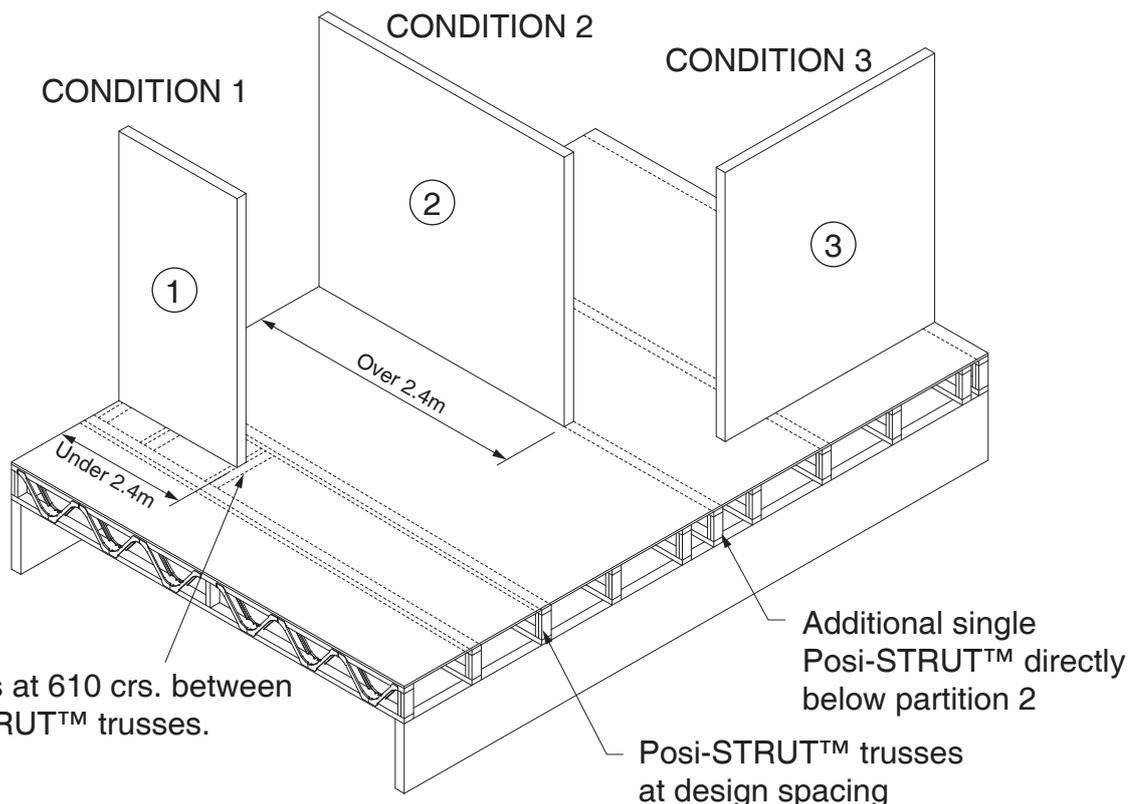
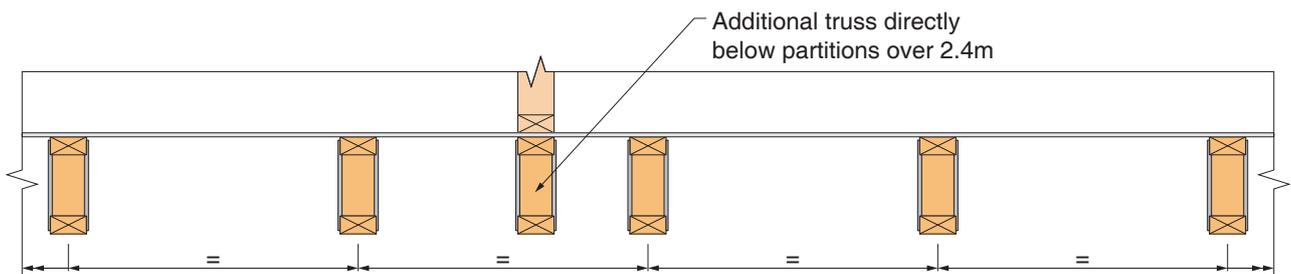
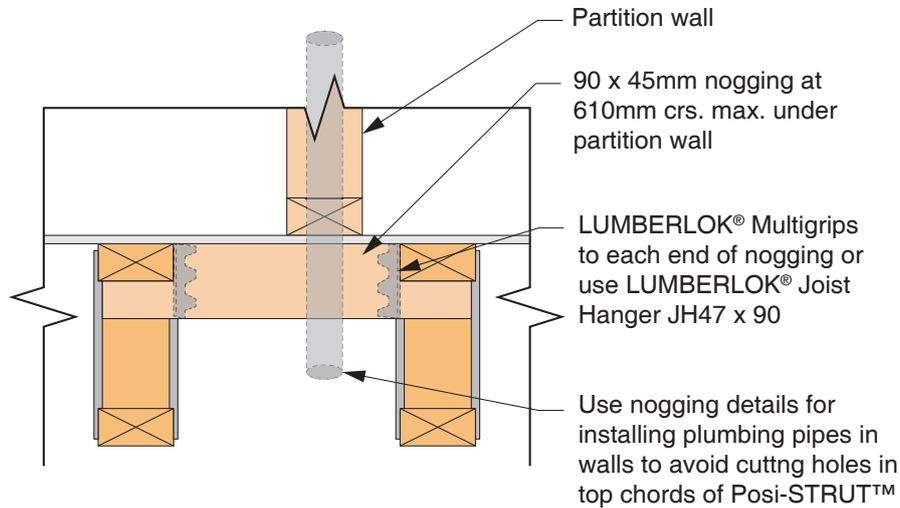
1. If length of partition wall parallel to the trusses does not exceed 2.4 metres, no additional truss support is required. If partition wall falls in between two trusses, noggings are required at 610mm centres (at truss web points) to support wall. Use similar noggling details to allow plumbing pipes through wall.
2. Where the length of the partition exceeds 2.4 metres, an additional truss is required below the partition.

**Under normal circumstances top and bottom chords of Posi-STRUT™ shall not be cut.**

3. Generally for partitions placed perpendicular to the trusses, no additional support is required.

### Load Bearing Walls

Posi-STRUT™ trusses supporting load bearing walls require Specific Design by MiTek New Zealand Limited. Generally engineered beams within floor space will be required to support load bearing walls.



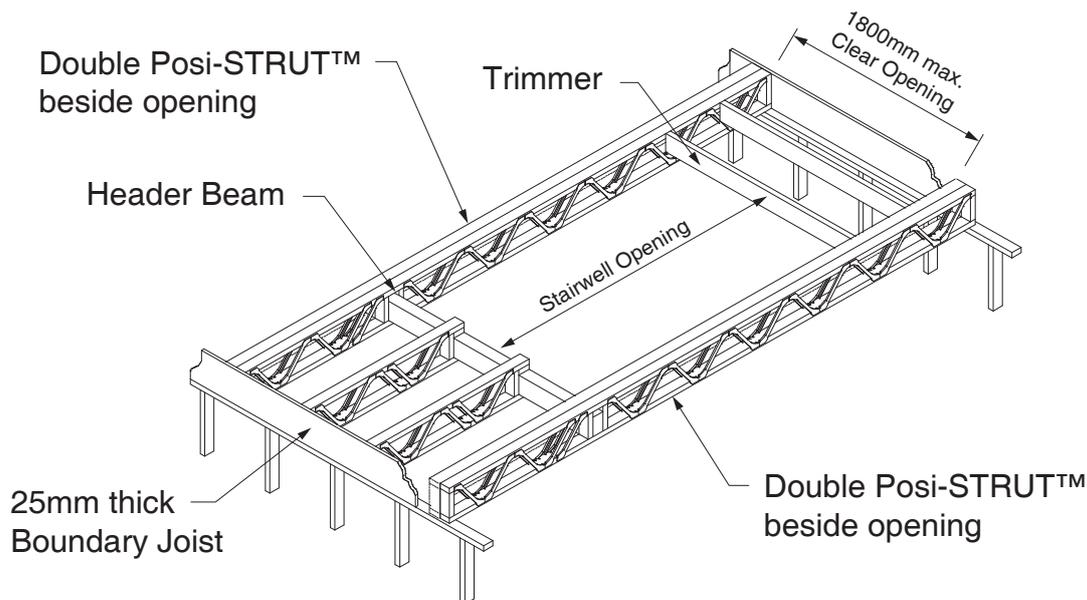
DETAILING

### Stairwell Openings

Where openings are required on the upper floor for access due to stairways, it is possible to stop one or more Posi-STRUT™ trusses short and support them on headers fixed to adjacent Posi-STRUT™ trusses.

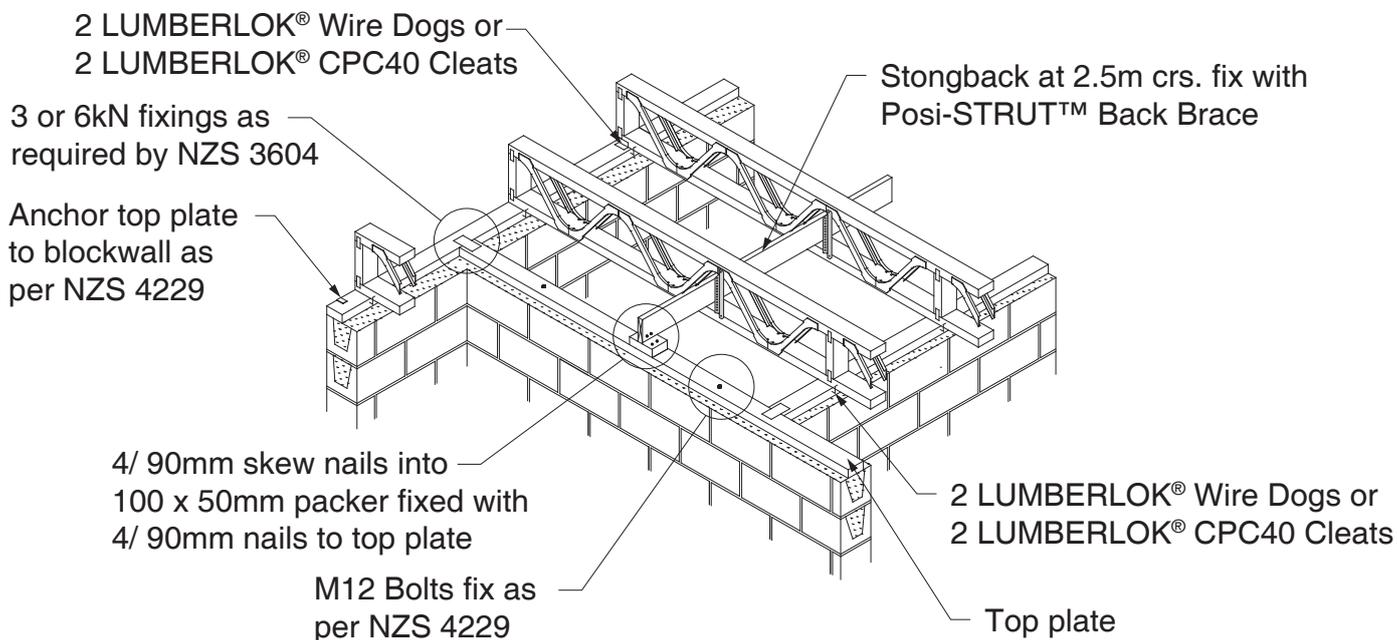
Provided not more than two Posi-STRUT™ trusses are stopped short, the adjacent Posi-STRUT™ trusses can be double trusses and the connection of the header to the double Posi-STRUT™ is as shown.

The recommended header beam size using either solid timber or GANG-NAIL® GANGLAM beam can be obtained from Table 9 in the GANG-NAIL® GANGLAM Selection manual.



### Fixings and Connections

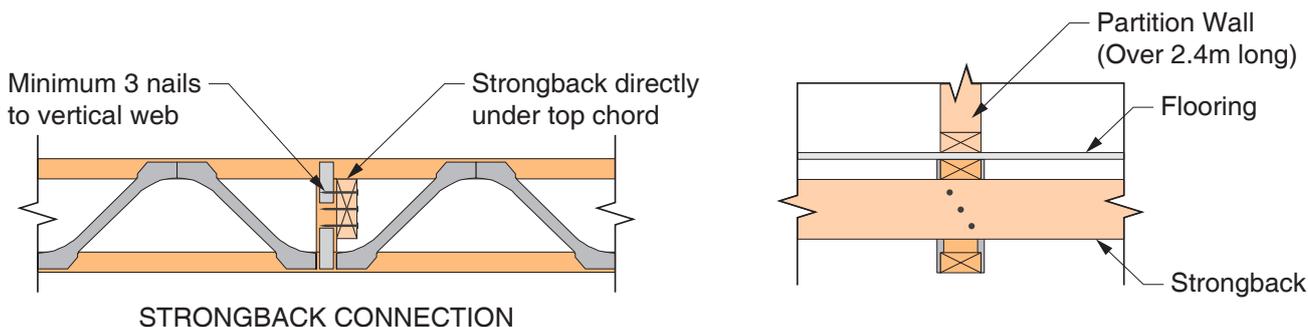
#### FIXINGS TO TOP PLATE



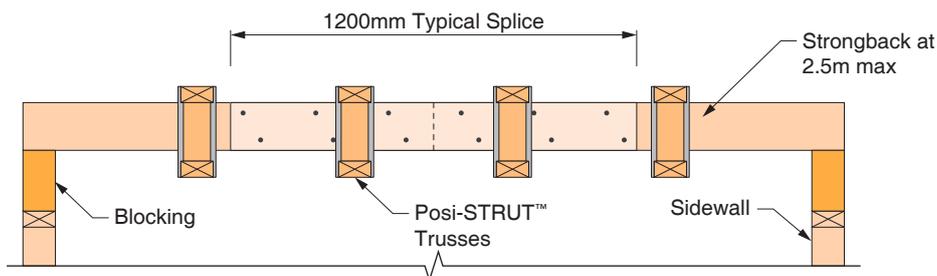
### Strongbacks Selection and Detailing

Strongbacks are required for floor Posi-STRUT™ trusses, and are recommended for rafters and purlins. They are continuous members fixed to each Posi-STRUT™ and their primary function is much the same as solid blocking or herringbone strutting, which is to provide load sharing thereby increasing strength and rigidity, and restricting bounciness of the floor.

Strongbacks should be placed at right angles to the Posi-STRUT™ just below the top chord at 2.5m maximum centres in positions as symmetrical as possible between supports. They should also be continuous from sidewall to sidewall. If splicing is necessary, follow the recommended detail shown.



STRONGBACK CONNECTION



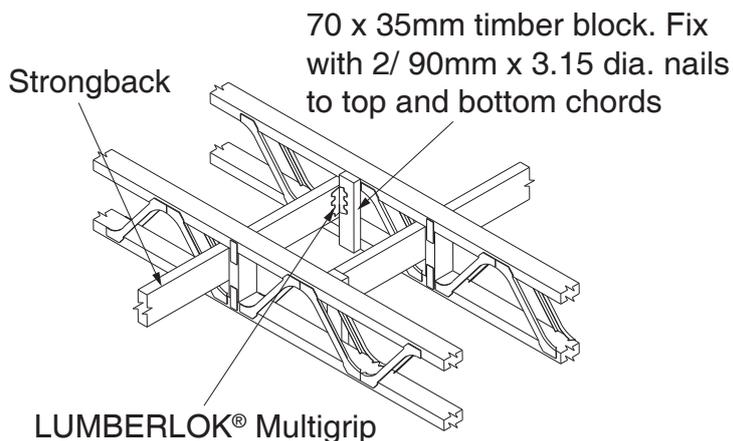
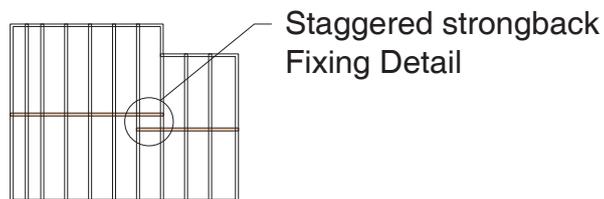
Strongbacks shall be continuous from sidewall to sidewall. If splicing is necessary, use 1.2m long scab centred over splice and join with 12/ 90mm x 3.15 dia. nails equally spaced.

STRONGBACK SPLICE

The recommended sizes of strongbacks are as per the following table. We recommend that strongbacks are clamped to the top chord and fixed to vertical webs with 3/ 90x3.15mm diameter nails. At the end of buildings they should be supported on side walls with timber packers or solid blocking.

Posi-STRUT™ Size	Recommended Strongback Size
PS20	90x45
PS25	140x45
PS30	140x45 / 190x45
PS40	190x45 / 240x45

Note that these are the recommended sizes only. Larger strongbacks can be used for prestige floors subject to sufficient depth between the chords of the Posi-STRUT™.

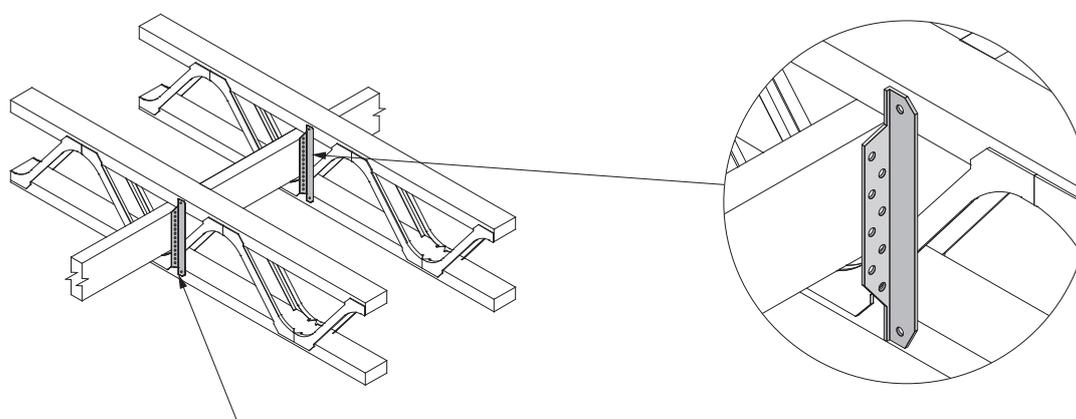


## Using Posi-STRUT™ Back Braces

The MiTek® Back Brace allows a degree of flexibility in the positioning of strongbacks as they do not need to be placed at truss panel points. This enables small variations in span to be accommodated without changing jig settings or strongback locations.

Product Code	Posi-STRUT™ Size	Back Brace Length
PSBB20	PS20	192mm
PSBB25	PS25	240mm
PSBB30	PS30	288mm
PSBB40	PS40	400mm

**Specification Grade G2 Thickness 1.23mm Galvanised coating Z275  
Screws Type 17-14g x 35mm, Nails 30 x 3.15 dia.**



Posi-STRUT™ Back Brace. Fix with 2 x Type 17-14g x 35mm Screws. One screw to each chord and 4 nails to the strongback.

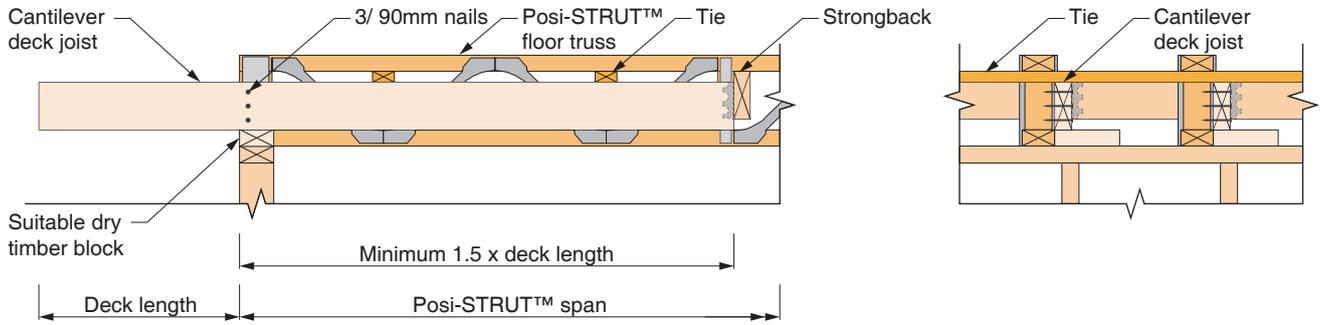
The Back Brace allows quick and easy fixing of strongbacks to Posi-STRUT™ trusses without the need for timber vertical webs.

1. Insert strongbacks through trusses in accordance with the floor plan provided by Posi-STRUT™ truss designer. Ensure that the strongbacks are no greater than 2.5 metres spacing from supports or other strongbacks. Select where possible an opening in the Posi-STRUT™ which allows the Strongback to rest on the bottom chord away from the Posi-STRUT™ web tooth cluster.
2. Place the Back Brace in position so that the leg with multiple holes is against the strongback and the vertical position is such that the screw holes in the leg against the Posi-STRUT™ are close to the centres of the timber chords. Fix bottom of Back Brace to bottom chord with 1 screw while maintaining strongback location.
3. Raise strongback and clamp to top chord. Fix Back Brace to strongback with 2 screws, selecting a pre-punched hole which is approximately 30mm from the top and bottom edges of the strongback.
4. Fix Back Brace to top chord with 1 screw through hole provided.

**Do not over tighten screws.**

### Cantilevers for Decks

This detail for a cantilevered deck fixed to a Posi-STRUT™ floor allow for a step down to the deck and the Posi-STRUT™ is protected from the weather.



DECK JOIST FIXED TO SIDE OF Posi-STRUT™

**Deck length no greater than Posi-STRUT™ span/5, size joist from NZS 3604**

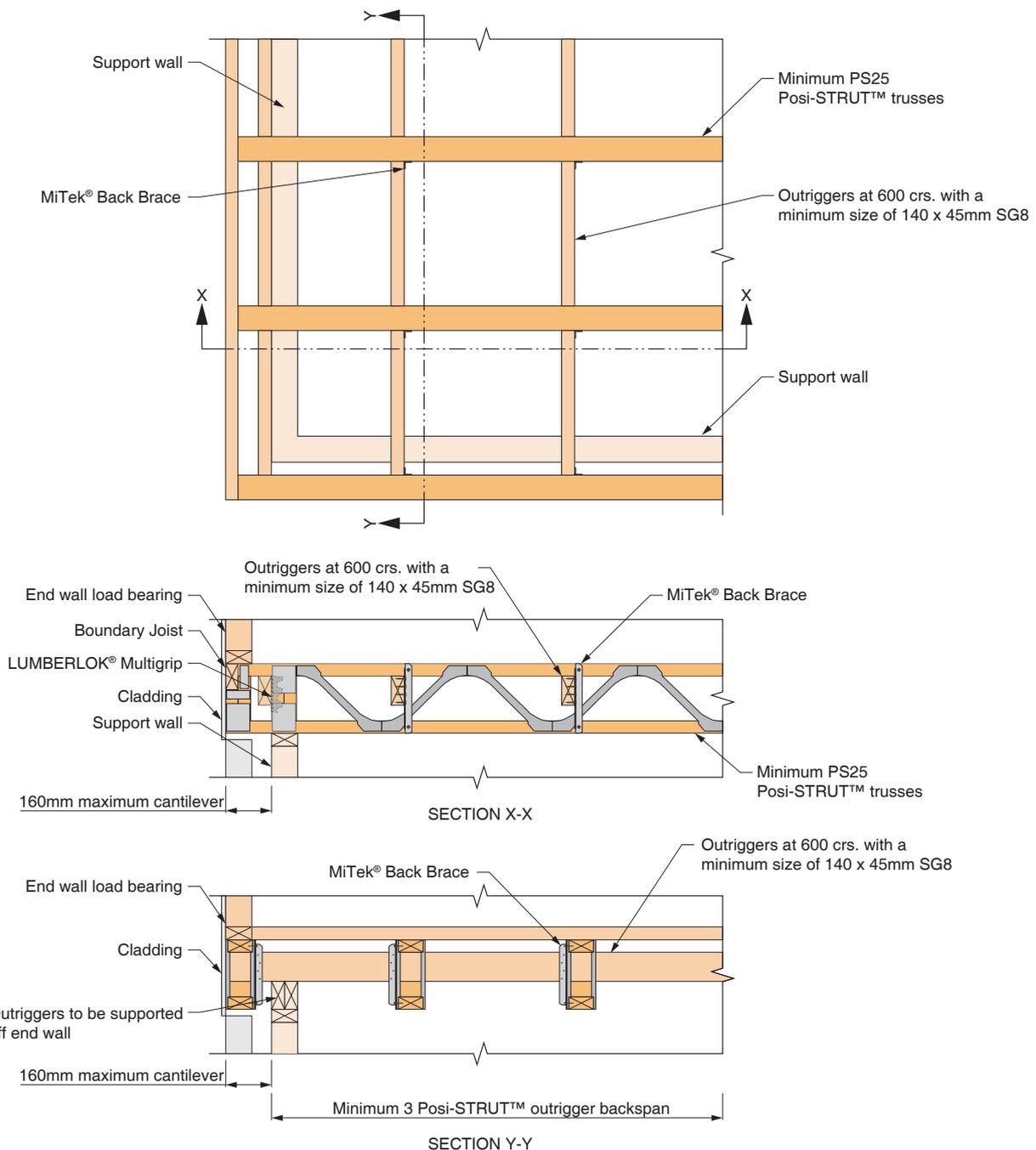
DETAILING

### Load Bearing Walls with Small Cantilevers

Posi-STRUT™ standard outrigger system is recommended for Posi-STRUT™ floor trusses with small cantilevers with the following limitations :

- End wall supporting maximum 8m roof span for all roof types
- All floor trusses at maximum 600mm centres supporting 1.5kPa floor load
- Not for girder loads
- Maximum wall height of 2.4m (light weight)

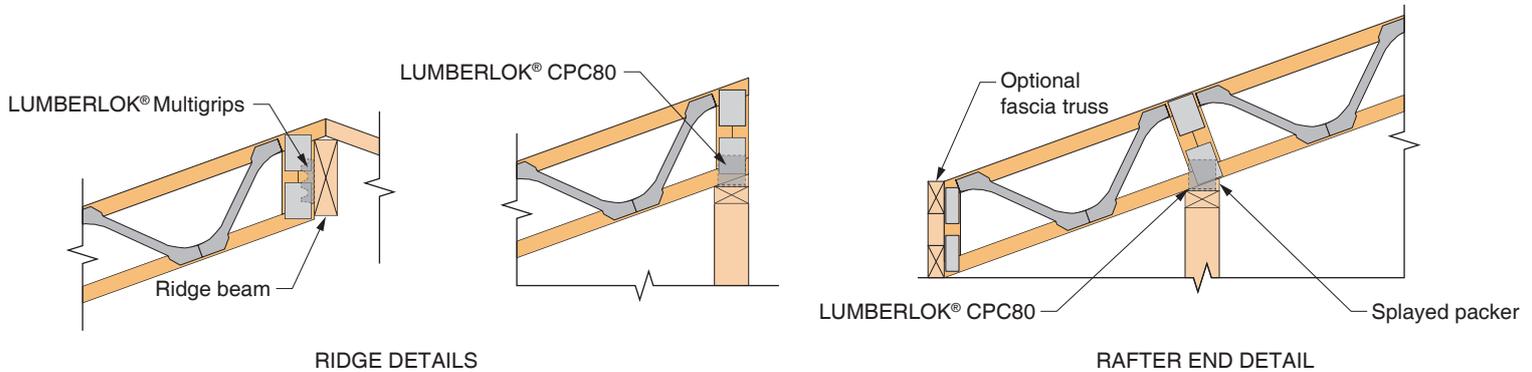
For girder loads contact MiTek® for more information.



## Rafter and Purlin Truss Detailing

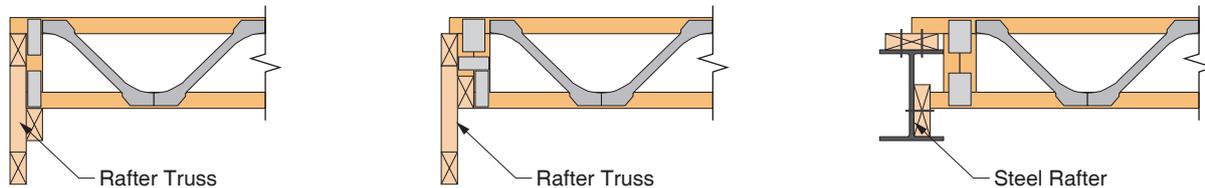
### Rafter Details

There is a large number of possible details for the ends of rafter trusses depending on style of eaves and fixing requirements. Some typical end support construction details suitable for Posi-STRUT™ rafters up to around 30 degrees pitch are shown as follows:



### Purlin Details

Depending on the end support, there is a wide number of possible end fixing details for Posi-STRUT™ purlins. Posi-STRUT™ purlins may be set out vertically upright between supports, or perpendicular to the pitched rafter support. In the latter case, where the rafter pitch exceeds 5 degrees, it is necessary to fix both top and bottom chords at the support and to provide sufficient lateral support at midspan to prevent Posi-STRUT™ twisting under gravity. Some common details for ends of Posi-STRUT™ purlins are shown as follows:

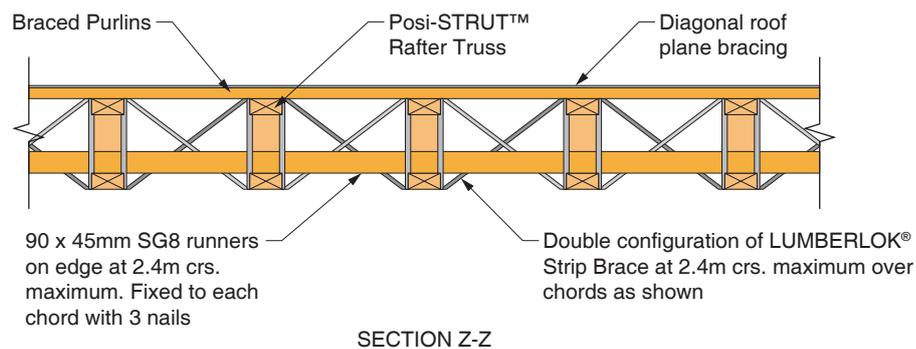
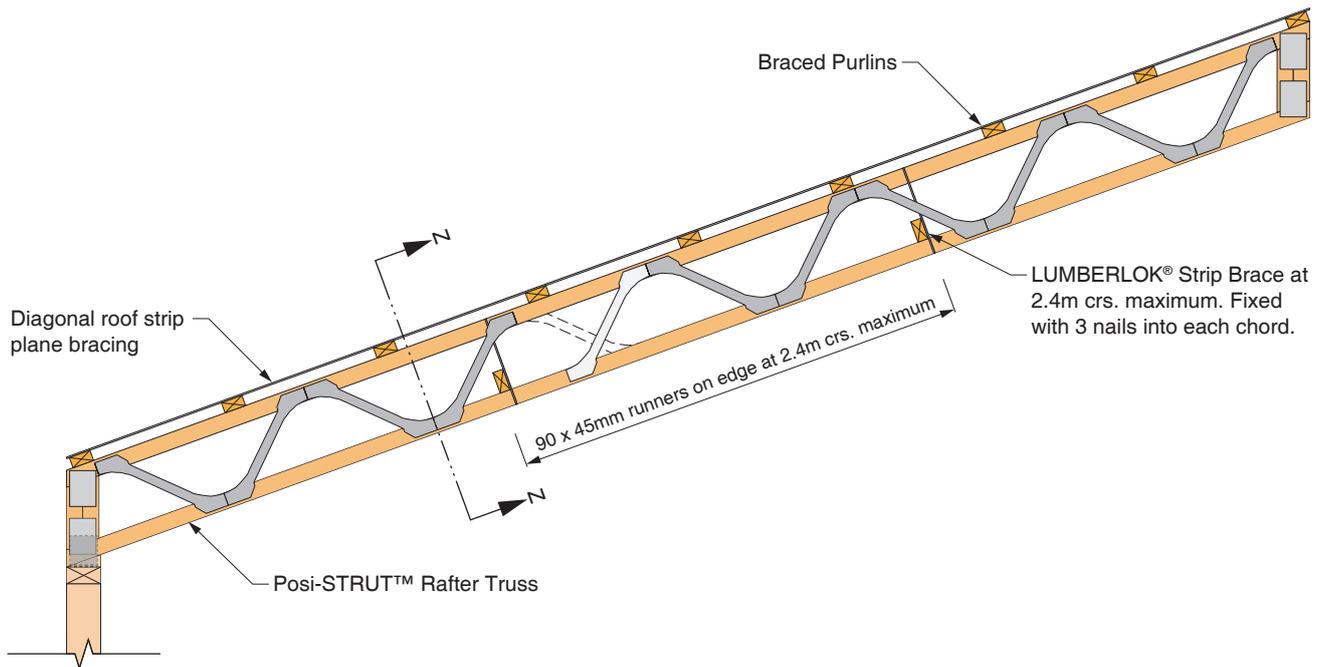


DETAILING

## Bracing

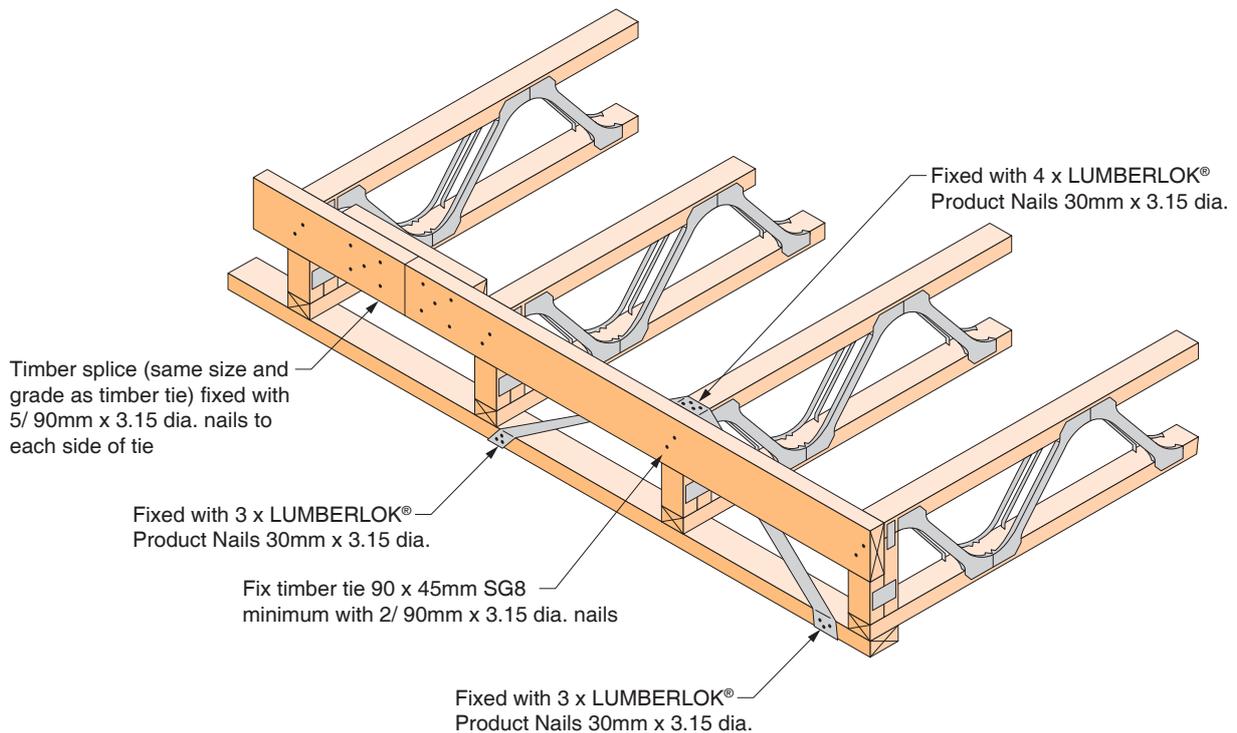
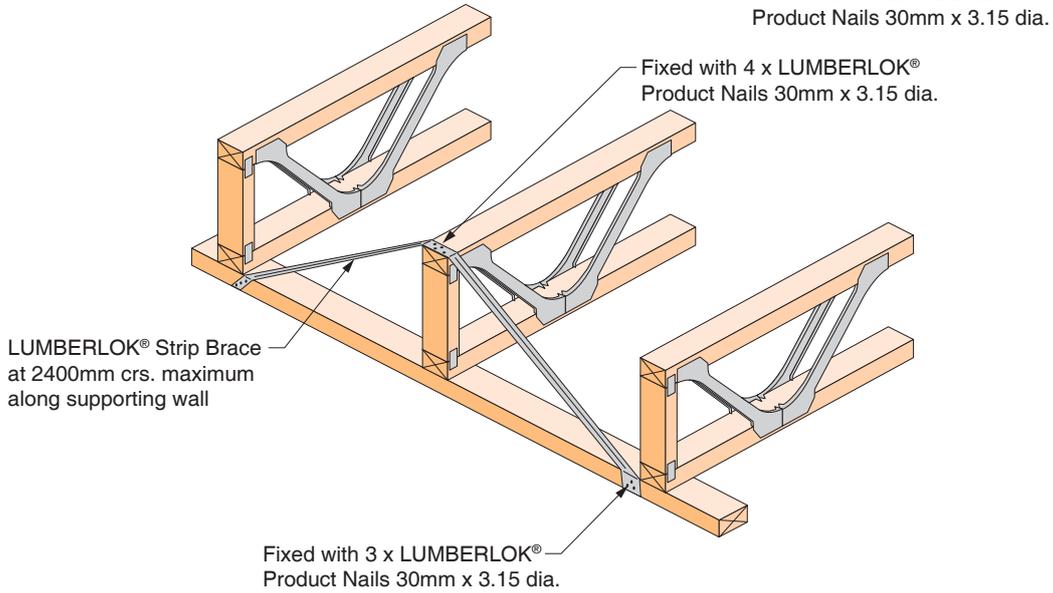
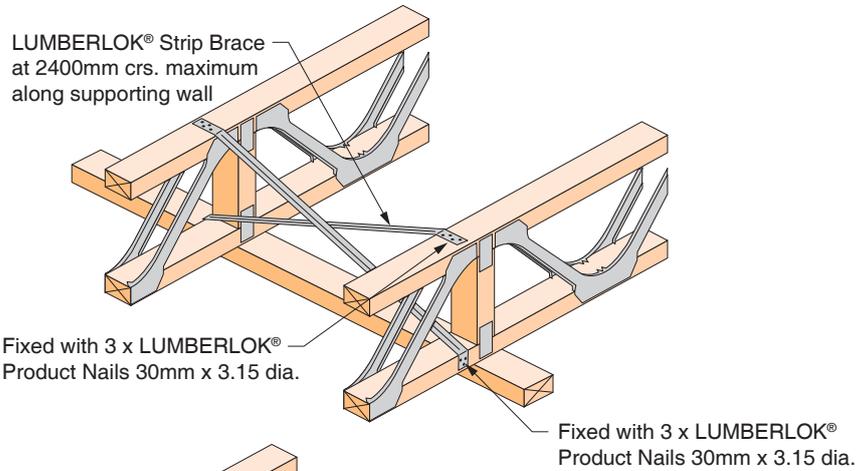
### Stability Bracing

The following details cover ancillary bracing for truss stability only, and not roof bracing for the total roof or building structure, which will have to be separately designed. The top chord stability is provided by purlins. The bottom chord needs to be restrained during wind uplift. Ceiling battens fixed to bottom chord will provide this restraint. Otherwise specific design will be required. Generally 90x45mm runners at 2.4m spacing may be sufficient.



## End and Internal Support Bracing

Strip Brace bracing at 2400mm maximum centres along supporting walls.



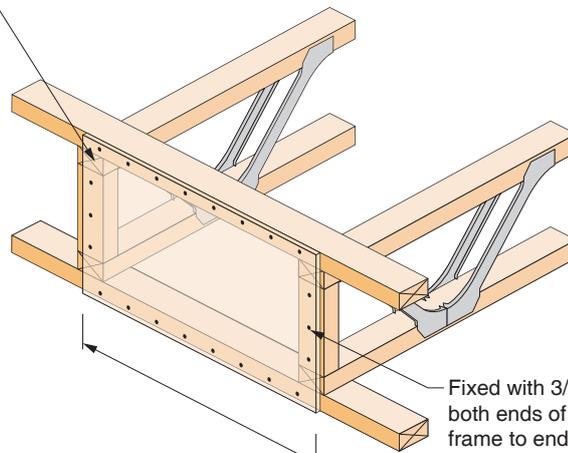
DETAILING

### Alternative End and Support Bracing

Plywood bracing frame at 2400mm maximum centres.

7mm structural plywood or similar fixed to top and bottom plates with 50mm x 3.15 dia. nails at 75mm crs. maximum

Truss height plus height of top and bottom plates



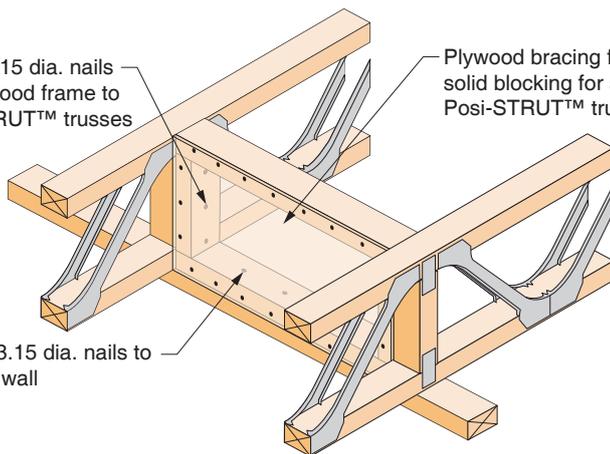
Fixed with 3/ 90mm x 3.15 dia. nails at both ends of the plywood bracing frame to end of Posi-STRUT™ trusses

Standard truss crs plus web width

Fixed with 3/ 90mm x 3.15 dia. nails at both ends of the plywood frame to vertical web of Posi-STRUT™ trusses

Plywood bracing frame or solid blocking for smaller Posi-STRUT™ truss sizes

3/ 90mm x 3.15 dia. nails to top plate of wall

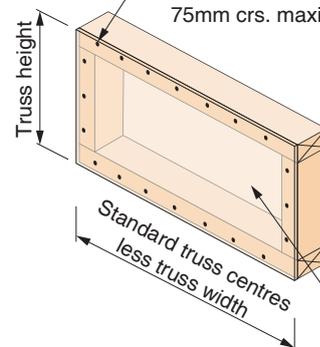


Fixed to top and bottom plates with 50mm x 3.15 dia. nails at 75mm crs. maximum

Truss height

Standard truss centres less truss width

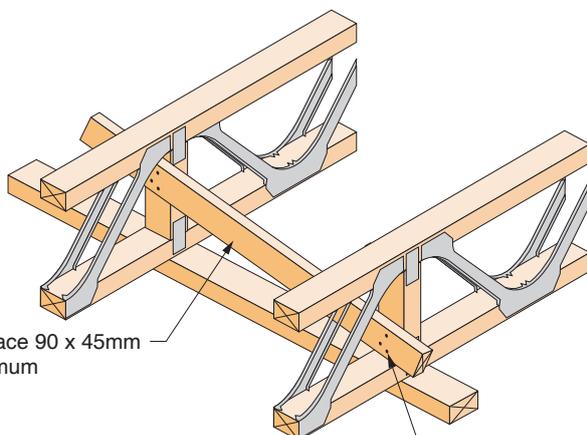
7mm structural plywood or similar



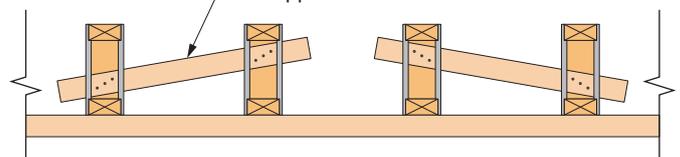
Timber diagonal bracing at 1800mm maximum centres.

Timber brace 90 x 45mm SG8 minimum

3/ 90mm x 3.15 dia. nails typical



Alternative brace to be in opposite direction



## Fire Resistance Rating

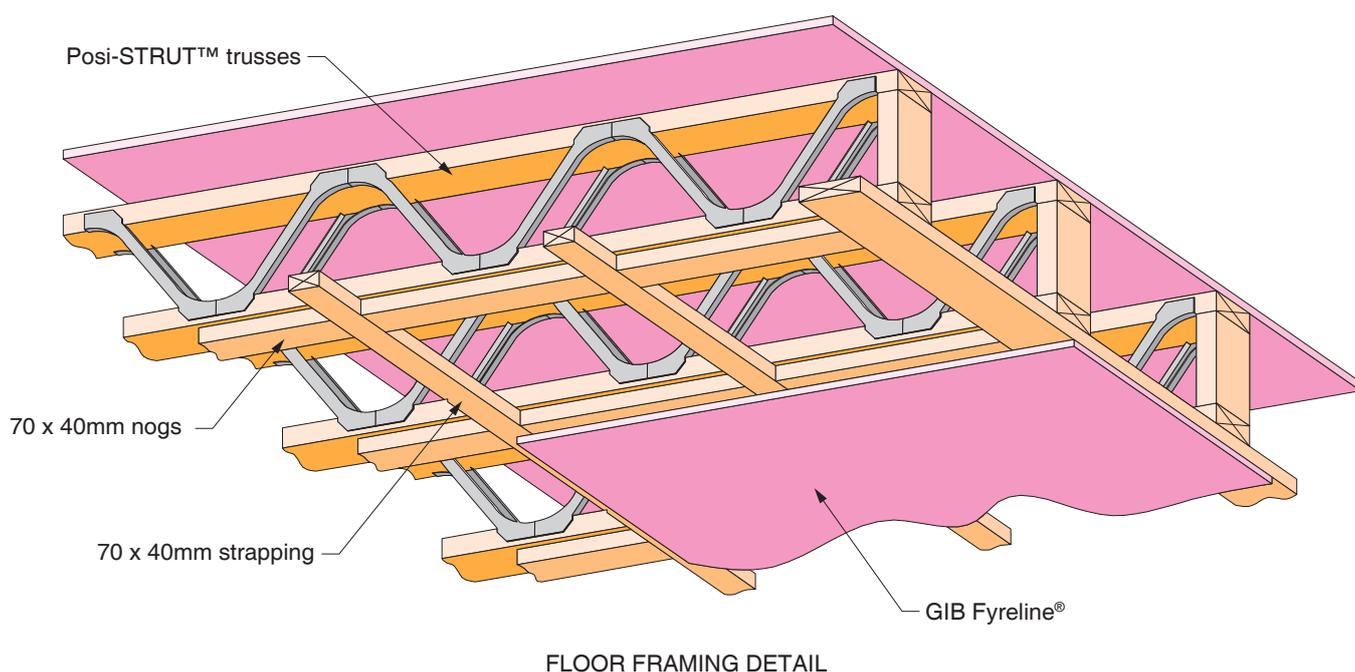
There are two systems for fire rating Posi-STRUT™ floor truss systems:

- **Fire Rated Floor/Ceiling Systems.** The GIB Fyreline® is fixed to a 600mm grid of ceiling strapping and nogging.
- **Fire Rated Ceiling Systems.** More layers of GIB Fyreline® can be fixed directly to the underside of the Posi-STRUT™ trusses. Refer to the “GIB® Fire Rated Systems, October 2018” published by Winstones Wallboards Ltd.

### Posi-STRUT™ Truss Selection

Using a fire rated ceiling system places a higher load on the Posi-STRUT™ floor trusses because the Fyreline is heavier. Use the following table to select which selection chart to use in the Posi-STRUT™ manual.

Design Floor Live Load to use in Selection Charts		
Fire System	Floor Loading kPa	
	1.5 kPa	3.0 kPa
GBFC 30	1.5	3.0
GBFC 60	3.0	3.0
GBFC 90	3.0	Specific Design
GBUC 30	1.5	3.0
GBUC 60	3.0	Specific Design
GBUC 90	3.0	Specific Design



## Fire Rated Floor/Ceiling Systems

Specification	Fire Resistance Rating	Lining Requirement
GBFC 30	30/30/30 (30 minutes)	1 layer 13mm GIB Fyrelite®
GBFC 45	45/45/45 (45 minutes)	1 layer 13mm GIB Fyrelite®
GBFC 60	60/60/60 (60 minutes)	1 layer 16mm GIB Fyrelite®
GBFC 90	90/90/90 (90 minutes)	2 layers 16mm GIB Fyrelite®

### Floor Framing

The fire rated system is for Posi-STRUT™ floor trusses using Posi-STRUT™ PS20, PS25, PS30 or PS40 webs with 90 x 35mm, 90 x 45mm, 70 x 45mm or 140 x 45mm timber chords. Trusses should not be spaced at greater than 600mm centres. 75 x 40mm ceiling strapping at maximum 600mm centres should be fixed to the bottom chords, perpendicular to the orientation of the trusses. 75 x 40mm nogs parallel to the trusses should be fixed to the bottom chord of the trusses.

For the **GBFC 30** specification the ceiling strapping can be omitted, with the GIB Fyrelite® fixed directly to the underside of the trusses and to 75 x 40mm nogs at 600mm centres maximum.

### Flooring

The flooring shall be 20mm thick particle board. The flooring shall be nailed to the Posi -STRUT™ trusses with 60 x 2.8mm galvanised jolt head nails at 150mm centres to all sheet edges and 300mm centres to intermediate trusses.

### Ceiling Lining

Ceiling lining is as shown in above table. GIB Fyrelite® shall be fixed at right angles to the floor trusses. For **GBFC 90** the joints of the second layer are to be offset 600mm from the first layer. All joints must occur on joists, solid strutting or nogs.

### Fixing

Single layer ceiling sheets shall be fixed with:

- 51mm x 7g GIB® Grabber® drywall screws at 150mm centres around the perimeter of each sheet and fixed at 200mm centres across each batten or nog.

For the GBFC 90 system, the two layers of GIB Fyrelite® shall be fixed with:

- Inner layer - 51mm x 7g GIB® Grabber® drywall screws at 150mm centres around the perimeter of each sheet and across each batten or nog.
- Outer layer - 76mm x 8g GIB® Grabber® drywall screws at 150mm centres around the perimeter of each sheet and across each batten or nog.

### Corners

The internal angle between ceilings and walls shall be protected by GIB Cove fixed with GIB Cove adhesive, or with corners filled and taped in accordance with the “GIB® Site Guide, September 2018”.

### Jointing

All joints must occur on joists, solid strutting or nogs. To achieve the Fire Resistance Rating and strong flush joints for painted surfaces, the jointing and finishing of joints and fastener heads must be carried out in accordance with the “GIB® Site Guide, September 2018”.

## Fire Rated Ceiling Systems

Specification	Fire Resistance Rating	Lining Requirement
GBUC 30	30/30/30 (30 minutes)	1 layer 16mm GIB Fyreline®
GBUC 60	60/60/60 (60 minutes)	2 layers 13mm GIB Fyreline®
GBUC 90	90/90/90 (90 minutes)	2 layers 19mm GIB Fyreline®

### Floor Framing

The fire rated system is for Posi-STRUT™ floor trusses using Posi-STRUT™ PS20, PS25, PS30 or PS40 webs with 90 x 35mm, 90 x 45mm, 70 x 45mm or 140 x 45mm timber chords. Trusses should not be spaced at greater than 600mm centres. Ceiling strapping and nogs are not required.

### Flooring

Any flooring material that meets structural criteria for strength and serviceability may be used.

### Ceiling Lining

Ceiling lining is as shown in above table. The first layer of GIB Fyreline® shall be fixed at right angles to the floor trusses. Where a second layer is required the joints of the second layer are to be offset 600mm from the first layer. All sheet joints must occur over solid framing.

### Fixing

- First layer of GIB Fyreline® - fix with 41mm x 6g GIB® Grabber® drywall screws.
- Second layer GIB Fyreline® - fix with 51mm x 7g GIB® Grabber® drywall screws.

Fixing centres:

At 200mm centres along each intermediate truss, and at 200mm centres to framing members at sheet joints.

### Corners

The internal angle between ceilings and walls shall be protected by GIB® Cove fixed with GIB® Cove adhesive, or with corners filled and taped in accordance with the “GIB® Site Guide, September 2018”.

### Jointing

All fastener heads in the second layer to be stopped and all sheet joints in the second layer to be tape reinforced and stopped in accordance with the “GIB® Site Guide, September 2018”.

## Acoustic Rating

Inter-tenancy floors usually require both fire resistance and sound rating. The GBDFFA and GBSCA systems are suitable for use with Posi-STRUT™ trusses. Refer to the “GIB® Noise Control Systems September 2017”, published by Winstones Wallboards Ltd. Note that the lining requirements are to the underside of the support frame.

Specification	STC	IIC		Fire Resistance Rating	Lining Requirement
		Bare Floor	Carpet		
GBDFFA 60b	57	47	69	60/60/60 (60 minutes)	2 layers 13mm GIB Fyrelite®
GBSCA 45	56	39	71	45/45/45 (45 minutes)	2 layers 13mm GIB Fyrelite®
GBSCA 60a	56	39	72	60/60/60 (60 minutes)	1 layer 13mm GIB Fyrelite® & 1 layer 16mm GIB Fyrelite®

**STC = Sound Transmission Class**

**IIC = Impact Insulation Class**

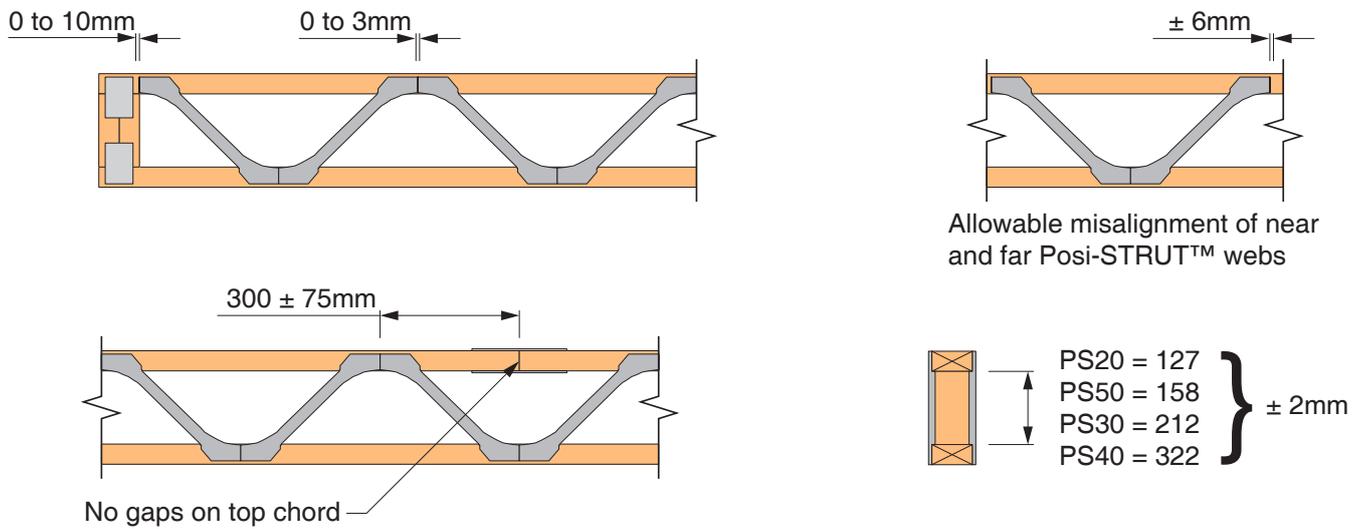
## Timber Specification

Radiata Pine or Douglas Fir machine stress graded MSG8, MSG10 or MSG12 to NZS 3622:2004.

Treatment - TPA Specification H1.2 or none for general floors; H3.1 under bathrooms or as specified in NZS 3602:2003.

## Manufacturing Tolerances

The following manufacturing tolerances apply to the fabrication of Posi-STRUT™ trusses:



## Camber

Mid-span camber is normally set at Span/600 but not greater than 15mm for Posi-STRUT™ floor trusses; Span/500 but not greater than 18mm for Posi-STRUT™ purlins and rafters. The camber should be reduced for trusses spanning less than the maximum span. The following are some recommended camber in millimetres for various spans:

Span (mm)	Camber (mm)		
	Span/500 (purlins)	Span/500 (rafters)	Span/600 (floor)
4000	8	8	7
5000	10	10	8
6000	12	12	10
7000	14	14	12
8000	16	16	13
9000	18	18	15

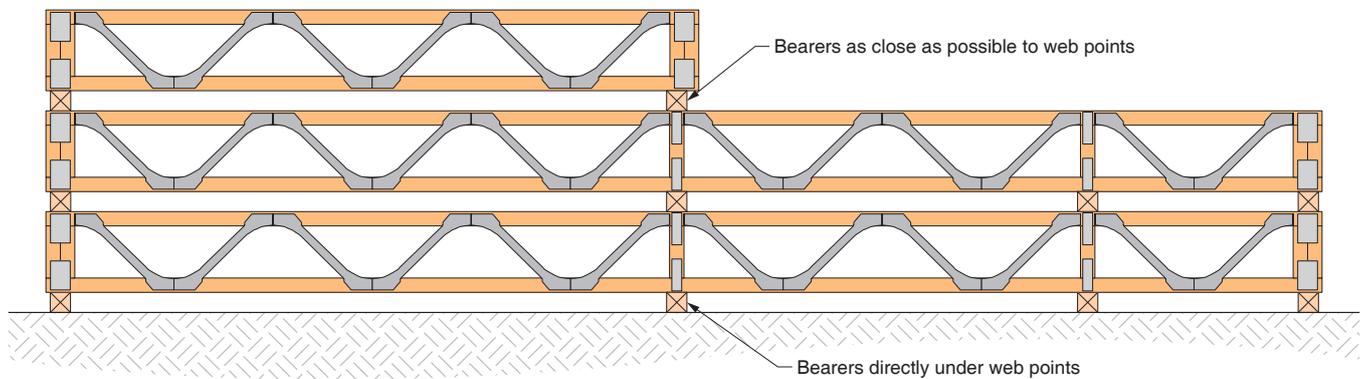
## Handling and Storage

Posi-STRUT™ trusses should be strapped and stacked upright with the bottom chord clear off the ground and on level fillets or dunnage directly underneath web points. Posi-STRUT™ trusses may be stacked on top of each other with fillets aligned as closely as possible to web panel points.

Posi-STRUT™ trusses should not be left exposed to weather for extended periods of time without adequate protection. If covered, adequate air circulation should be ensured around the Posi-STRUT™ trusses.

Care should be taken when handling the Posi-STRUT™ not to bend, collide, twist or drop. Handling should be confined to the timber chords, and no weight should be applied to the metal webs which could cause buckling.

Any Posi-STRUT™ trusses damaged in transport or handling cannot be repaired on site without the advice or approval of the fabricator and MiTek New Zealand Limited.



This section is for the builder to use on-site. It may be photocopied and supplied with the Posi-STRUT™ trusses.

## Do's and Don'ts

- Posi-STRUT™ trusses are not to be modified in any way on site without the approval of the fabricator and MiTek® New Zealand Limited.
- Posi-STRUT™ trusses are not to be subject to excessive construction loads e.g. no stacks of concrete tiles or particle board.
- Remember to install the strongbacks before closing in the ends.

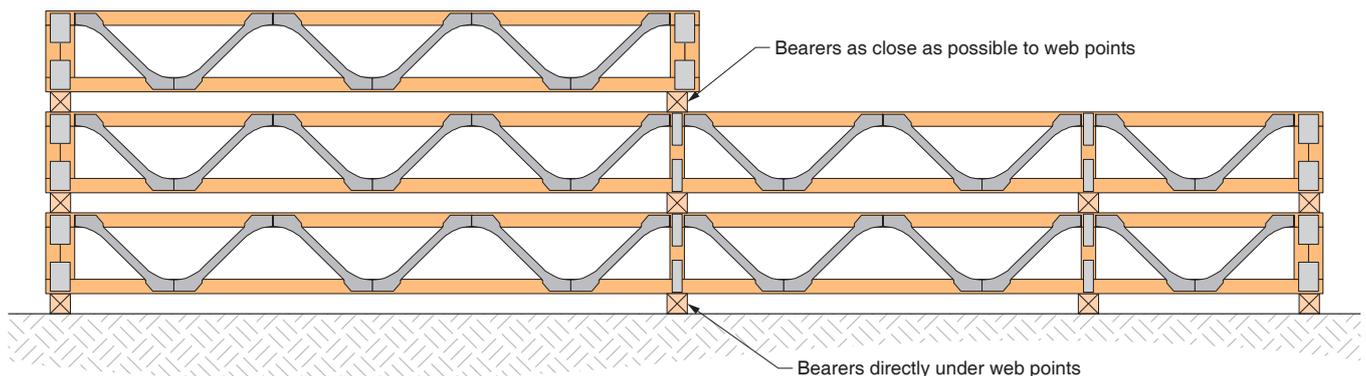
## Stacking and Storage

Posi-STRUT™ trusses should be strapped and stacked upright with the bottom chord clear off the ground and on level fillets or dunnage directly underneath web points. Posi-STRUT™ trusses may be stacked on top of each other with fillets aligned as closely as possible to web panel points.

Posi-STRUT™ trusses should not be left exposed to weather for extended periods of time without adequate protection. If covered, adequate air circulation should be ensured around the Posi-STRUT™ trusses.

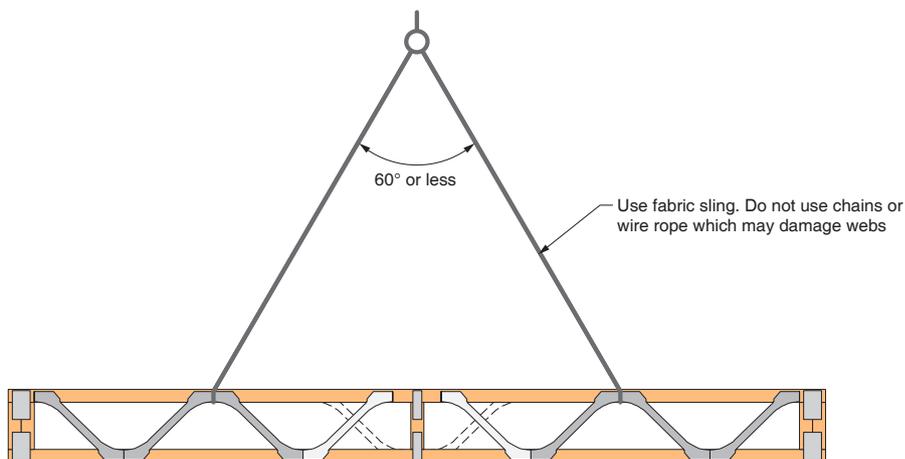
Care should be taken when handling the Posi-STRUT™ not to bend, collide, twist or drop. Handling should be confined to the timber chords, and no weight should be applied to the metal webs which could cause buckling.

Any Posi-STRUT™ trusses damaged in transport or handling cannot be repaired on site without the advice or approval of the fabricator and MiTek New Zealand Limited.



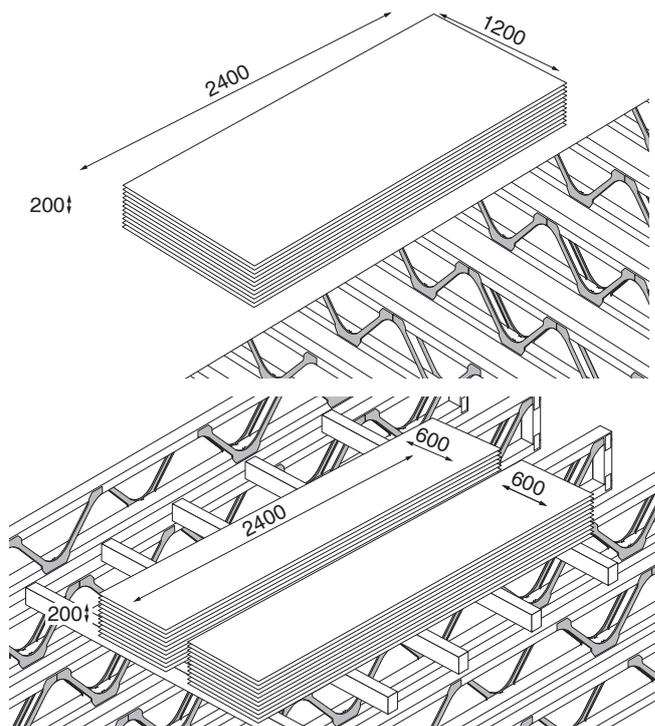
## Typical Handling of Posi-STRUT™ Trusses

Care should be taken when handling the Posi-STRUT™ to avoid bending, twisting or dropping. Slings should always be attached to the timber chords, and not to the metal webs to avoid buckling. When lifting Posi-STRUT™ trusses with a crane, slings should be attached at panel points closest to the truss quarter points.



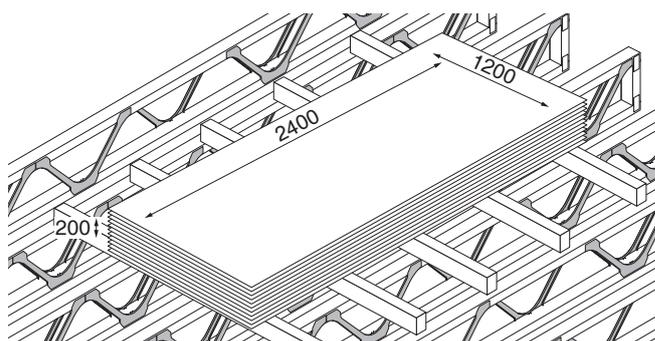
The maximum allowable load of sheet materials temporarily stored on the Posi-STRUT™ purlins and rafter trusses is 70kg/m<sup>2</sup> and should not be greater than 150mm deep. For typical plywood sheets that are sized at 2.4m x 1.2m, this equates to:

Number of Plywood Sheets	Sheet Thickness
11	12mm
9	15mm
8	17mm
7	19mm
6	21mm
5	25mm



The maximum allowable load of sheet materials temporarily stored on the Posi-STRUT™ floor trusses is 175kg/m<sup>2</sup> and should not be greater than 200mm deep. For particle board sheets this equates to:

Number of Particle Board Sheets	Sheet Thickness
15	13mm
10	19mm
9	22mm



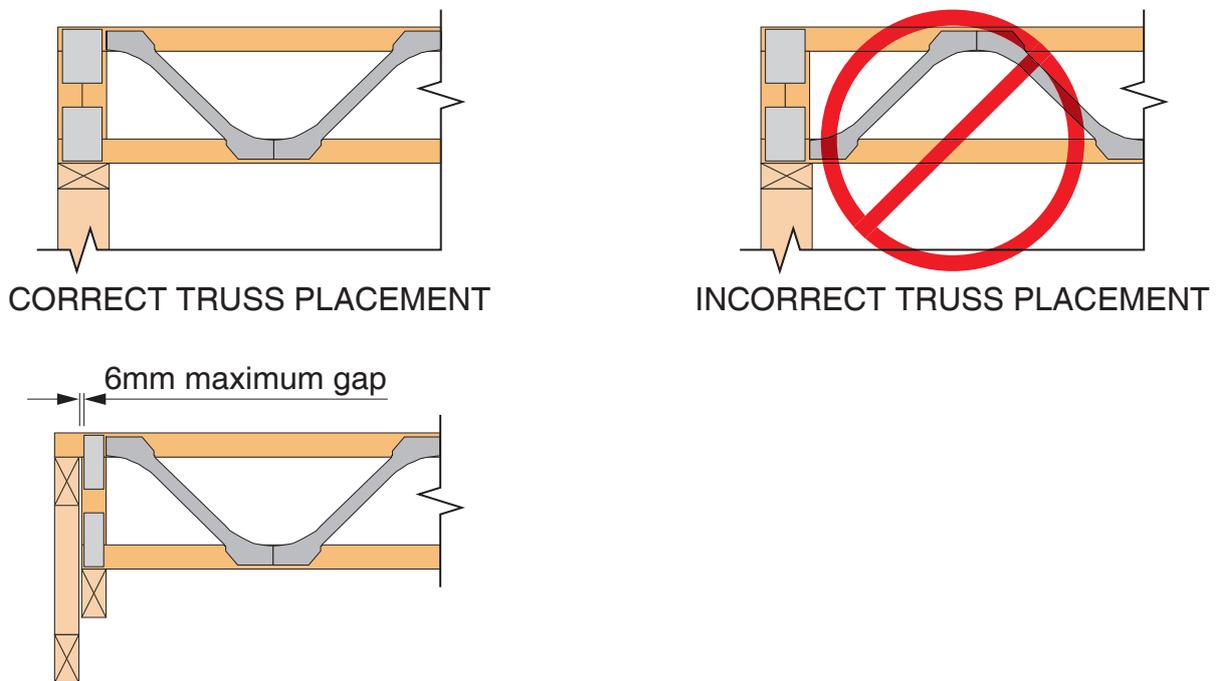
Where the sheets are stacked by hand they should span lengthways across the joists. When lifted mechanically they should be seated on 5 bearers the width of which are 600mm longer than the width of the board.

## Installation Instructions

Posi-STRUT™ trusses are generally placed perpendicular to load bearing supporting walls and should be located so that distance between them does not exceed the designed spacing.

Care should be taken to place the Posi-STRUT™ trusses the right way up. Unless marked otherwise Posi-STRUT™ trusses are always manufactured so that Posi-STRUT™ webs starts at the top chord at each support point. There are occasions where it is necessary to design and manufacture Posi-STRUT™ trusses with the first web starting at bottom chord level. In this case trusses will be marked “THIS WAY UP”.

Posi-STRUT™ trusses must be installed plumb and straight. Support location tolerance is 50mm with no reduced bearing. Check bearing strength where bearing area is reduced. For top chord support, the gap between bearing and timber web must not exceed 6mm.

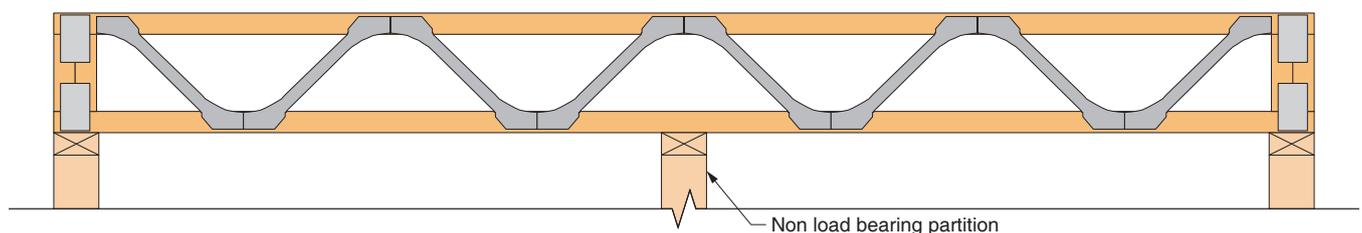


## Clearance over Non-Load Bearing Internal Walls

Posi-STRUT™ floor trusses on the upper storey of multi-storey dwellings should be kept clear of internal non-load bearing walls of the lower storey.

It is recommended that the Posi-STRUT™ floor be connected to these internal partition walls in order to provide lateral stability to the wall below with fixings that will also allow the Posi-STRUT™ trusses to deflect under load.

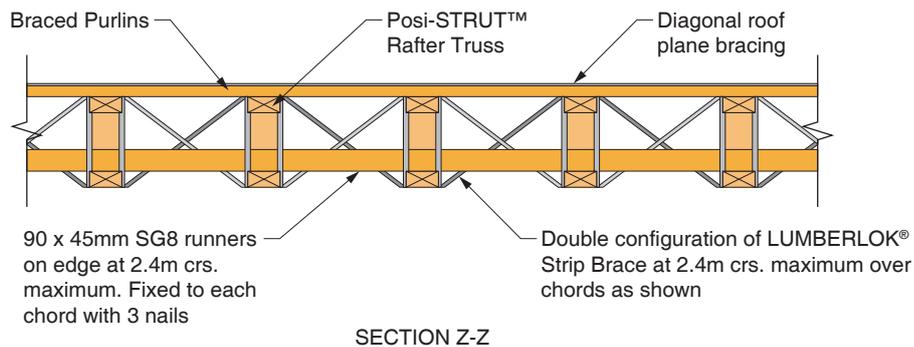
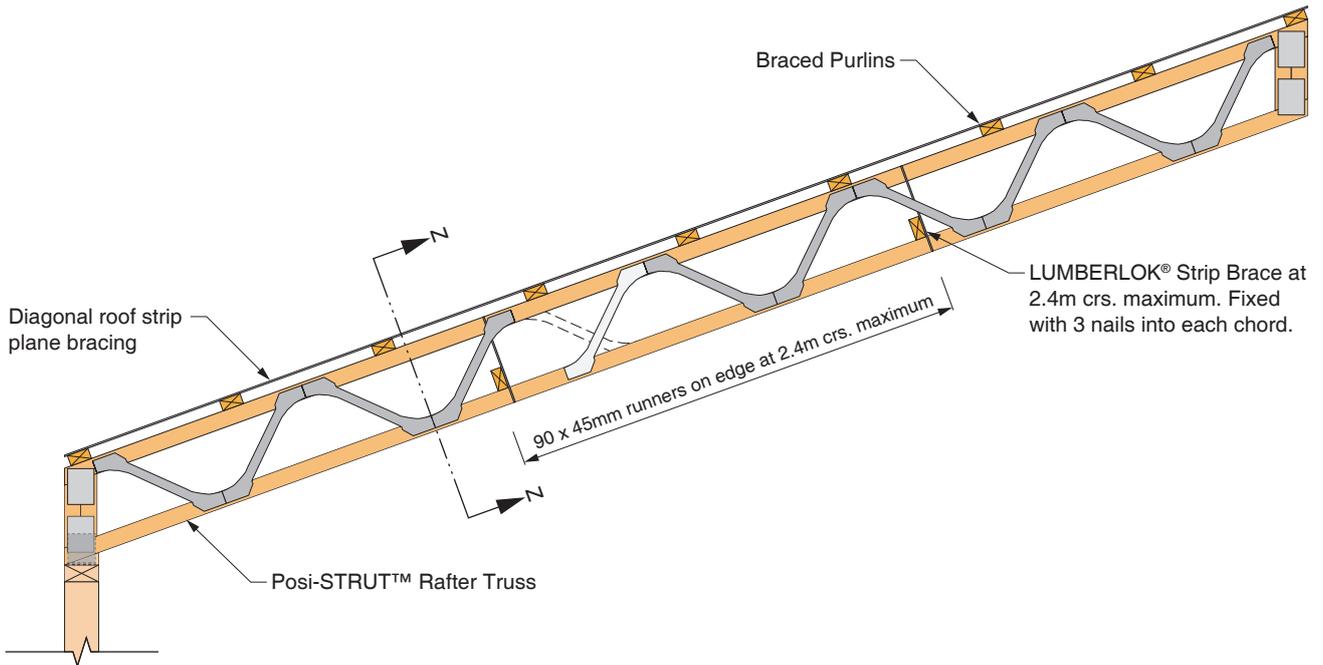
Internal walls should be level to enable truss camber to provide clearance between the wall and truss.



## Rafter and Purlin Stability Bracing

The following details cover ancillary bracing for Posi-STRUT™ stability only, and not roof bracing for the total roof or building structure which will have to be separately detailed.

The top chord stability is provided by purlins. The bottom chord needs to be restrained during wind uplift. Ceiling battens fixed to bottom chord will provide this restraint. Otherwise specific design will be required. Generally 90x45mm runners at 2.4m spacing may be sufficient.



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