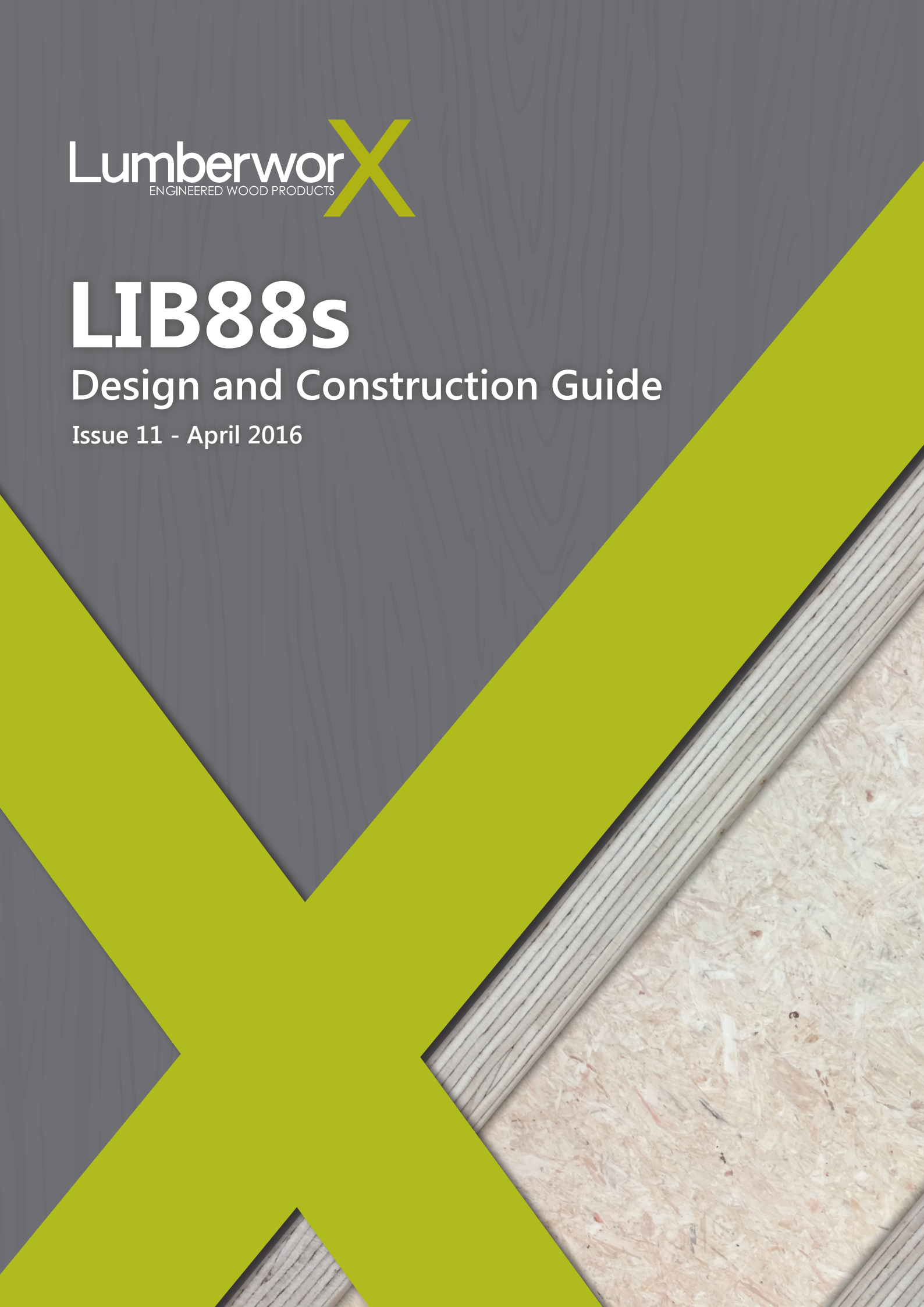




# LIB88s

## Design and Construction Guide

Issue 11 - April 2016



## CodeMark

A CodeMark is proof that a building product or system meets the requirements of the New Zealand Building Code.

CodeMark is a voluntary product certification scheme that provides an easily-understood and robust way to show a building product meets the requirements of the New Zealand Building Code. It is especially suitable for innovative products or where an Acceptable Solution or NZ Standard does not exist or around which there might be confusion.

CodeMark is unchallengeable and building consent authorities must accept a product certificate as evidence of compliance with the Building Code when used as specified in the CodeMark certificate.



AQ-011116-CMNZ

### The CodeMark Advantage - AQ-011116-CMNZ

✓	Assures compliance with NZBC	✓	Simplifies consenting process
✓	Provides consumer confidence	✓	Encourages innovation and raises standards
✓	Independently audited and certified by accredited product assurance bodies		

## AZOTEK™ WOOD PROTECTION

Azotek™ is an innovative wood protection technology from Lonza for the protection of veneered wood products from insects and decay.

Azotek™ is a combination of both fungicides and an insecticide added to the glueline during manufacture to deliver outstanding protection from the exterior through to the core.



### The Azotek™ Advantage

✓	Full penetration treatment	✓	No residual solvents as in LOSP treatment
✓	Leaves product dry and ready to use	✓	No effect on structural properties
✓	Meets NZS3640 (amendment 5), AS/NZS1604.3.2012 & AS/NZS1604.4.2012	✓	Post treatment cutting and drilling does not affect integrity of treatment
✓	Treatment quality accredited by third party laboratory		



## NEW ZEALAND MADE FOR NEW ZEALAND CONDITIONS

The Lumberworx LIB88s is made in New Zealand to meet NZ building codes and standards. Manufactured at the Lumberworx facility under strict quality controls, the LIB arrives on-site ready for installation straight and true.

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# Description and Design

## 1.0 Structural Design

The LumberworX I-Beam (LIB) is an 'I' shaped engineered timber structural member for use in residential and light commercial construction.

This guide includes flooring and roofing applications; review by a design professional is required for uses beyond the scope of this guide. (See table 1 — page 5 for design properties).

Structural design meets the requirements of the New Zealand Building Code and the load conditions and deflection recommendations of AS/NZS 1170.0 Structural Design Actions.

### Materials

- 88 x 35mm LVL E11 Flanges to AS/NZS 4357.0:2005
- 12mm Structural Strandboard
- Resorcinol type structural adhesive rated for service class 3 AS/NZS4364:2010 Timber - Bond Performance of Structural Adhesives

### Tolerances

- Camber Maximum 1mm per metre
- Depth +2mm, -0mm

## 1.1 Verification

Lumberworx has been issued CodeMark AQ-011116-CMNZ by AsureQuality.

This follows type testing by SCION in accordance with ASTM 5055-4 "Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.

SCION also tested the strandboard for rigidity in accordance with ASTM D2719 "Standard Test Method for Structural Panels in Shear Through-the-Thickness".



## 1.2 Exposure to Weather

Lumberworx engineered wood products can be exposed to weather during construction for a period of up to 2 months without suffering structural deterioration. If wetting occurs products must be left to dry before applying framing loads and if members are horizontal it is recommended they be propped while drying to avoid accelerated creep. Please also note the handling and storage requirements.

## 1.3 Glossary

**Flanges** are the top and bottom timber members being structural LVL E11 to AS/NZS 4357.0:2005 standard. Both top and bottom flanges are of the same type and grade. The flange width is 88mm and the depth is 35mm.

**Webs** are the vertical element of the LIB and are 12mm Structural Strandboard

**Adhesive** used in all LIB joints is Resorcinol type structural adhesive rated for external use (service class 3).

**Four Depths** of LIB joists are available. 200mm, 240mm, 300mm & 360mm.

**Beam Lengths** are available from 3.0m to 9.6m in 600mm increments.

**Joist Hangers** are metal shoes fixed to a wall or beam in which an LIB sits.

**Rimboards** are attached continuously to the ends of LIB joists. Rimboards can also be used as part of the parallel boundary joist.

**Web Stiffeners** are plywood blocks added to the sides of an LIB web for additional support under concentrated or bearing loads.

**Squash Blocks** are timber members fixed on both sides at the end of an LIB at the location of concentrated loads from walls above. Squash blocks are field cut.

**Packing Blocks** are packers that fit between the flanges of an LIB from the web to the flange edge for fixing other timber members or connectors.

**Appearance** may show adhesive runs or stains.

**Nail** references in this publication refer to power driven nails; see NZS 3604:2011 for hand driven alternatives.

**Certified Design Software** is available through Lumberworx and its partners, and is used to calculate spans for other loadings and spacings. Contact the Lumberworx team for details.

## 1.4 Treatment

The LumberworX I-Beam (LIB) is treated to H1.2 hazard class by fabricating with components treated to H1.2 hazard class by full penetration methods to the retention levels prescribed in NZS3640:2003 (including amendment 5).

The LIB can be installed within the building envelope wherever H1.2 hazard class is specified in NZS3602:2003. This includes sub floor, mid floor and roof spaces, while also being fit for purpose under wet areas.

## 1.5 LIB Properties

Table 1 Properties	CHARACTERISTIC PROPERTIES 88x35mm LVL E11 Flange & 12mm Strandboard Web						
	LumberworX I-Beam	Joist Depth (mm)	Flange Width (mm)	Joist Weight (kg/m)	øM <sub>x</sub> (kNm)	øV <sub>x</sub> (kN)	EI <sub>x</sub> (kNm <sup>2</sup> )
LIB 200.88s	200	88	4.8	12.53	17.2	518	2.60
LIB 240.88s	240	88	5.1	17.32	18.3	789	3.12
LIB 300.88s	300	88	5.6	21.44	18.8	1297	3.91
LIB 360.88s	360	88	6.1	26.94	16.8	1923	4.69

## Symbols

- $\phi M_x$  Design Bending strength of section for bending about the x-axis.
- $\phi V_x$  Design Shear strength of section for shear force in the y direction.
- $EI_x$  Rigidity in bending about the x-x axis.
- $G_w A_w$  Shear rigidity for shear force in the y direction.
- $\phi$  Capacity reduction factor from NZS3603  $\phi = 0.90$

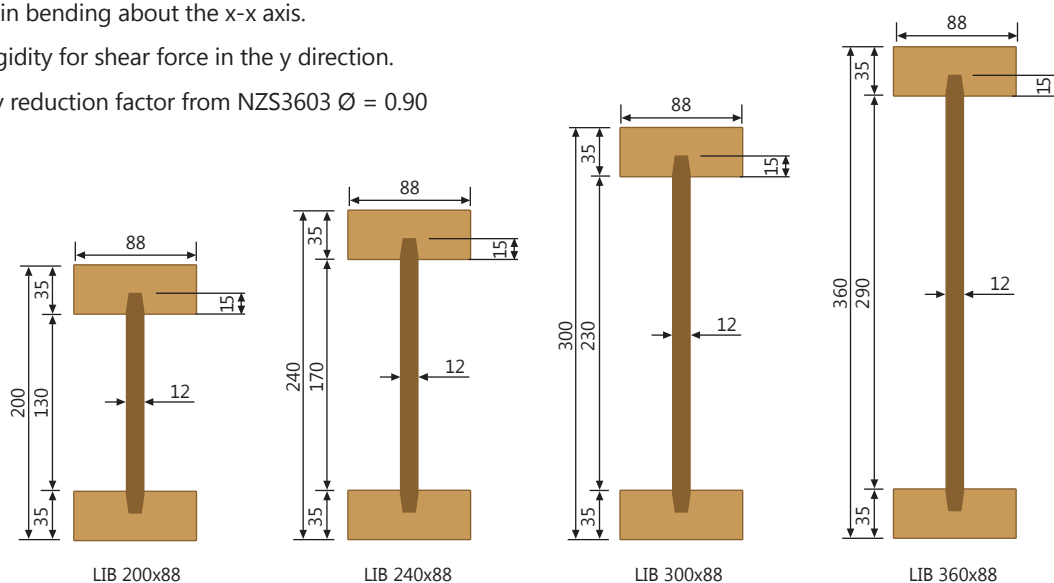
## Deflection

### (Bending Deflection + Shear Deflection)

For a uniformly distributed load  $w$ , over a span  $L$ :

$$Y = k_2(5wL^4 / 384EI_x + wL^2 / 8G_w A_w)$$

For long duration loads  $k_2 = 2$  (Ref. NZS 3603:1993)



# Flooring Applications



## 2.0 Floor Span Information and Tables

Spans for a uniformly loaded floor have been engineered for each LIB at various spacings and are included in Table 2 and 3.

These spans define the maximum allowable spans in millimetres for a residential floor load of 1.5 kPa. These spans will provide a satisfactory floor system within the requirements & recommendations of NZS 1170.0.

The calculation of spans in table 2 and 3 **include**:

- A superimposed dead load of 50kg/m<sup>2</sup> (30kg/m<sup>2</sup> flooring x 20kg/m<sup>2</sup> ceiling)
- A serviceable deflection limit calculated in accordance with

NZS1170 (Structural Design Actions). This calculation is a combination of dead load + 0.7 x live load for short term loading, and dead + 0.4 live load for long term loading, with an imposed service deflection of span/300 and 15mm maximum

- Dynamic criteria of 1-2mm deflection under 1kN point load

The calculation of spans in Table 2 and 3 **exclude**:

- Concentrated loads from load bearing walls above without a corresponding load bearing wall below.

Spans for other loadings and spacings can be calculated using certified Design Software. Contact Lumberworx for details.

Table 2 Floor Joist Span Tables 1.5 kPa		Single Span Two Supports			
		Floor Joist Single Spans in mm at spacing of:			
Beam Size	Flooring Load kPa	300 [mm]	400 [mm]	450 [mm]	600 [mm]
LIB 200.88s	0.50	5200	4600	4400	4300
LIB 240.88s	0.50	5800	5400	5200	4800
LIB 300.88s	0.50	6500	6100	5900	5500
LIB 360.88s	0.50	7200	6700	6500	6000

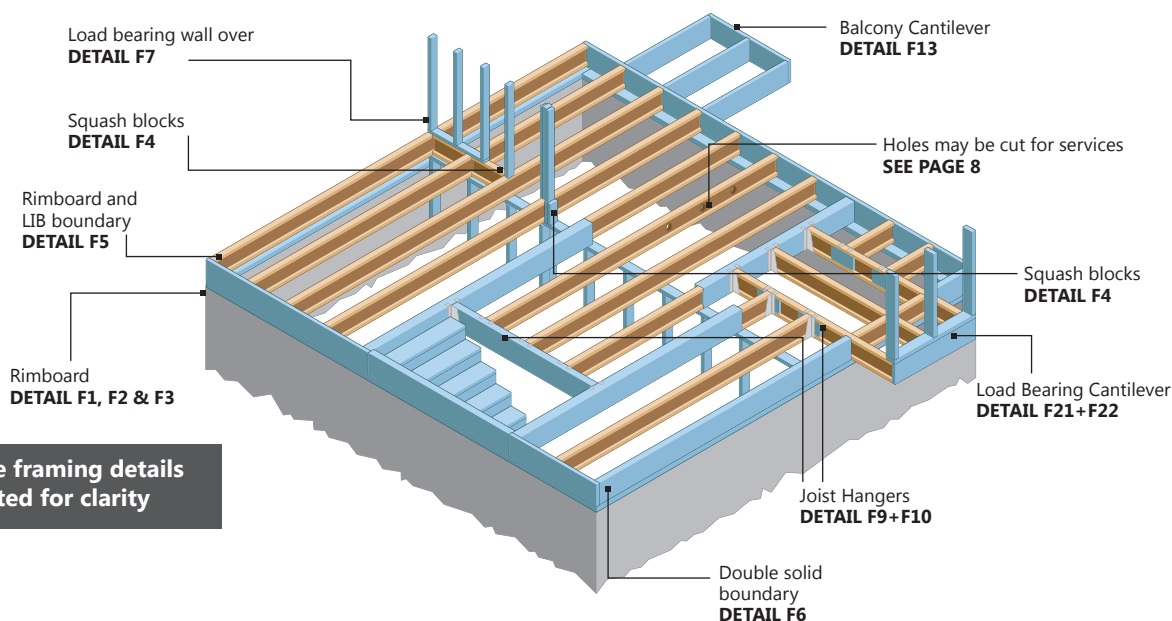
Table 3 Floor Joist Span Tables 1.5 kPa		Continuous Span More than Two Supports			
		Floor Joist Continuous Spans in mm at spacing of:			
Beam Size	Flooring Load kPa	300 [mm]	400 [mm]	450 [mm]	600 [mm]
LIB 200.88s	0.50	5700	5200	4900	4700
LIB 240.88s	0.50	6300	5800	5700	5200
LIB 300.88s	0.50	7100	6600	6400	5900
LIB 360.88s	0.50	7900	7300	7100	6600*

Note: Minor span must be 60% or more of major span to use continuous span table. If less than 60%, please use single span table.

\* member must have a minimum 65mm bearing at internal support.

## 2.1 General Installation Notes for Floors

1. A typical layout of LIB joists is shown below
2. Except for cutting to length, LIB flanges must never be cut, drilled or notched when being used as floor joists.
3. LIB joists must be protected from the weather prior to installation.
4. Do not use LIB joists in situations where they will be permanently exposed to weather. They must not be installed where they remain in direct contact with concrete or masonry.
5. End bearing length must be at least 45mm. For continuous span LIB joists intermediate bearing must be a minimum of 63mm.
6. LIB joists installed beneath bearing walls perpendicular to the joist shall have equal depth LIB blocking panels or squash blocks to transfer gravity loads from above the floor system to the wall or foundation below.
7. LIB joists are treated to H1.2 and can be placed in all protected areas, including wet areas and sub-floors.
8. All fasteners used to fix LIB joists must be selected to ensure they meet the durability requirements of the NZ Building Code.
9. To avoid splitting the LIB flange, nails shall not be spaced closer than 200mm using 90 x 3.15 power driven nails.
10. When using metal joist hangers fit in accordance with manufacturers instructions.
11. Midspan blocking is not required with LIB floor joists.
12. Openings in floors are best framed or trimmed out with LVL or LSL.
13. Ends of LIB joists must be restrained to prevent roll-over. A suitable Engineered Wood Product is preferred for this purpose. The use of dimensional lumber is not recommended due to the greater shrinkage likely with dimensional lumber causing height differences. LIB blocking panels may also be used as restraints - see detail F3.
14. The top and bottom flange must be restrained at each bearing support. Design is based on continuous lateral support being provided to the top flange by the floor material.
15. When connections are to be nailed to an LIB; a web stiffener is to be fitted in accordance with detail F23.  
- This does not apply to proprietary joist hangers when the top flange is supported by the hanger.
16. Selected ceiling linings (NZS 3604:2011 - Section 13) may be installed directly to the underside of LIB joists without the need for ceiling battens.
17. Follow the flooring manufacturers recommendations when fixing the floor, or alternatively, fix in accordance with NZS 3604:2011. The use of adhesive with screwing is recommended for sheet flooring. With strip flooring it is recommended that nails are driven in a staggered formation along the length of the I-Beam to minimise the risk of splitting the flange.
18. Floor vibrations are minimised when ceiling battens are direct fixed to the underside of the LIB's. When fixing a suspended ceiling, consider fixing battens to the underside of LIB's.

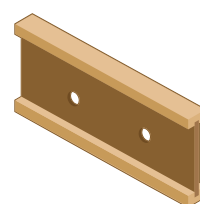


## 2.2 LIB Web Holes

Holes may be cut in the LIB webs to accommodate electrical wiring, plumbing lines and other utilities.

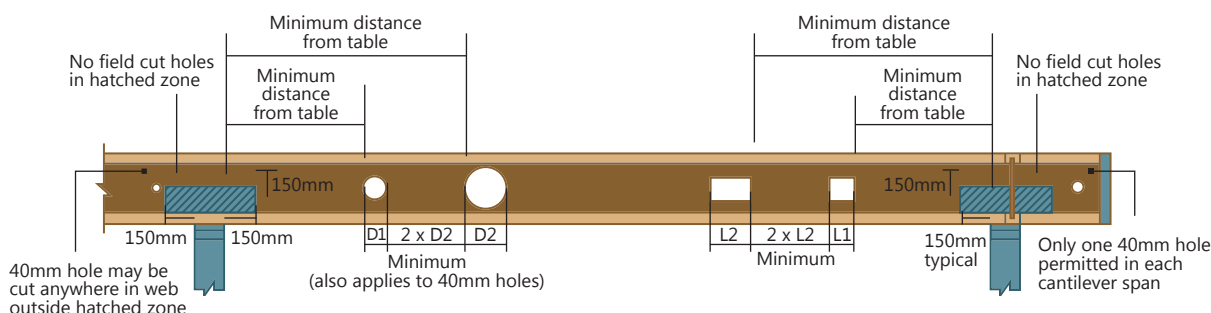
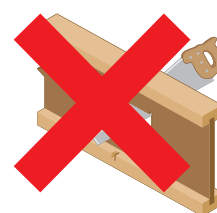
- **NEVER** cut, notch or bore through LIB flanges except for docking to length
- **NEVER** cut holes larger than 40mm in a cantilever span
- **NEVER** cut any holes within 150mm of the edge of a support
- **All holes** should be centred on the centre line of the beam
- **All holes** shall be cut in a tradesman like manner and not over cut

**CAN DO** ✓



**DO NOT** ✗

Cut or notch flange



## 2.3 Web Hole Selection Tables

1. Identify the column that meets or exceeds the required hole size.
2. Identify the LIB joist being used.
3. Scan horizontally until you intersect the column that contains the hole size required. This value is the required minimum distance from the edge of the hole to the inside face of the nearest support.
4. Multiple holes require spacing of twice the length/diameter of the largest hole.
5. A MAXIMUM of three holes per span except diameters 60mm or less, or squares 50mm or less.
6. Data applies for joists not supporting offset load bearing and with a maximum of 1.8kN concentrated live load.
7. Distances are based on the maximum span of each joist.
8. Nelson Pine Design can be used to calculate allowable web hole sizes for each situation.

**TABLE 4 - ROUND HOLES**

LIB Size	Min. distance from edge of hole to inside face of nearest support								
	Round Hole Size (mm)								
	40	60	80	110	125	150	175	200	250
<b>200.88s</b>	150	300	750	1300	NA	NA	NA	NA	NA
<b>240.88s</b>	150	300	600	750	1300	1650	NA	NA	NA
<b>300.88s</b>	150	300	575	850	1050	1350	1800	2300	NA
<b>360.88s</b>	150	300	300	450	650	900	1200	1450	2000

**TABLE 5 - SQUARE OR RECTANGULAR HOLES**

LIB Size	Min. distance from edge of hole to inside face of nearest support								
	Square or Rectangular* Hole Size (mm)								
	35	50	70	100	110	130	150	175	220
<b>200.88s</b>	150	300	750	1300	NA	NA	NA	NA	NA
<b>240.88s</b>	150	300	600	750	1300	NA	NA	NA	NA
<b>300.88s</b>	150	300	575	850	1050	1350	1800	2300	NA
<b>360.88s</b>	150	300	300	450	650	900	1200	1450	2000

\*Rectangular holes are based on the measurement of the longest side.

## 2.4 Floor Dynamics

Floor vibration is caused by people walking or running over a floor. How this vibration is felt is a matter of personal sensitivity and as a result there is no clear distinction between acceptable and unacceptable floor vibration levels.

NZS1170.0 does not specify limits for floor vibration and includes suggested serviceability criteria only.

Nelson Pine Design provides the designer with 3 floor options.

- 1. No dynamic control.** We do not recommend this option as it can lead to floor bounce and may not meet the suggested serviceability criteria in NZS1170.0.
- 2. Dynamics as recommended in NZS1170.0.** When measuring the deflection of a floor joist under a 1kN point load applied at the centre span, the resulting deflection is limited to 2mm maximum, no matter what the span of the floor member is. This is expected to result in satisfactory residential floor performance for typical New Zealand conditions. The maximum permissible floor spans in this document are based on this option.
- 3. Exceptional Dynamic Response.** This option is based on the Canadian model of strict dynamic performance. This model applies the same 1kN point load referred in 2 above, but the allowable deflection reduces as the span increases. This option will be overly restrictive for the average New Zealand residence.

## 2.5 The LumberworX Approach

LumberworX adopts good practice when designing mid floor systems. This approach is based on Floor Dynamics - Option 2 - as recommended in NZS1170.0, but modified to keep static deflection under 1kn point load to a maximum of 1.5mm.

## 2.6 Special Situations

This document caters for construction methods typically aligned to NZS3604:2011. There will be other circumstances where special design consideration is required, such as,

1. Added floor mass; it is recognised that adding floor mass will slow down the frequency of vibrations which makes the vibration more noticeable to human senses. This can occur when placing AAC (lightweight concrete) panels over the floor joists. The solution is to stiffen the floor by closing the joist spacing or selecting deeper joists.
2. Steel frames; floor systems completely supported within steel frames with few anchor points require design by specialists. The harmonics of steel and timber can be very different and need to be synchronised.

## 2.7 MBIE Timber-framed Floor Guidance Notes

The Ministry of Business, Innovation and Employment released a guide to tolerances, materials and workmanship in new residential construction in 2015. 2.4 Timber-framed floors (page 20) includes the following notes:

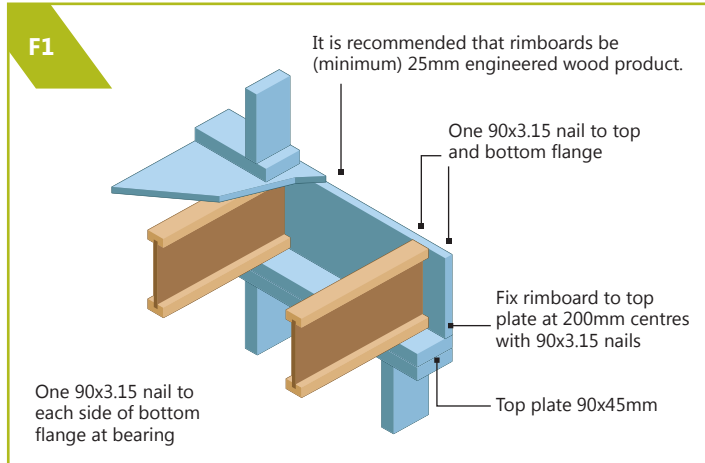
- All timber floors and decks move to some degree and some springiness should be expected.
- Springiness is acceptable provided that, unless otherwise specified, floors are built to the criteria in AS/NZS 1170.0:2002 - Structural design actions - Part 0: General principals or NZS3604:2011 - Timber-framed buildings. Where more conservative deflection ratios are specified (e.g for some tiled floors), less movement can be expected.

Table 6 Floor Joist Span Tables 1.5 kPa		Single Span Two Supports - LWX Good Practice			
		Floor Joist Single Spans in mm at spacing of:			
Beam Size	Flooring Load kPa	300 [mm]	400 [mm]	450 [mm]	600 [mm]
LIB 200.88s	0.50	4400	4000	3800	3700
LIB 240.88s	0.50	5200	4700	4500	4300
LIB 300.88s	0.50	6300	5600	5400	5200
LIB 360.88s	0.50	7200	6500	6300	6000

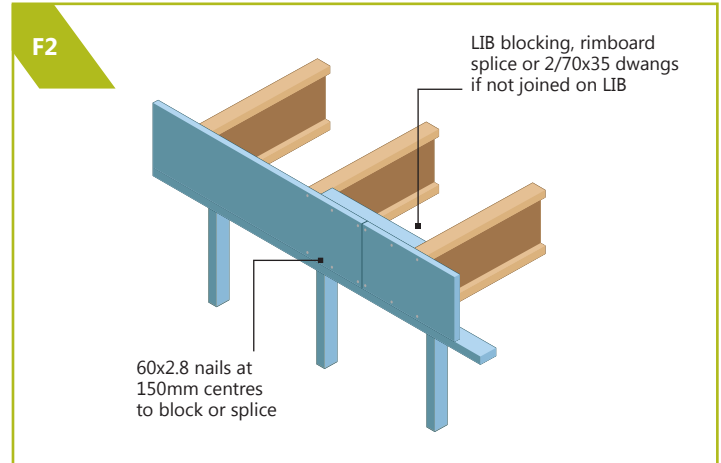
# Detailed Flooring Applications

## 2.8 Floor Construction Details

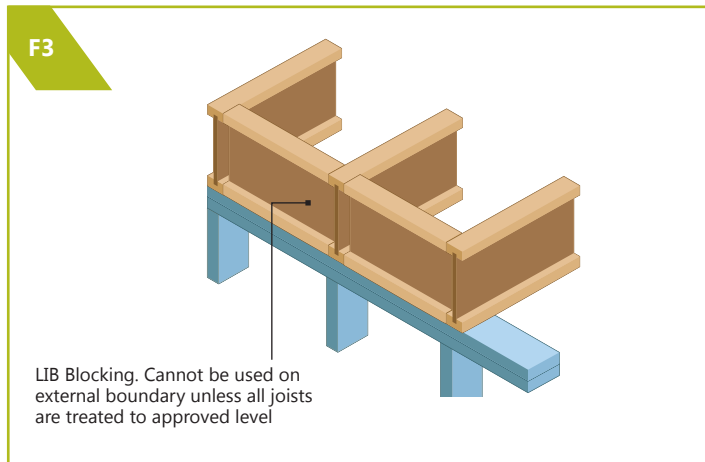
### Fixing rimboard/boundary joist to ends



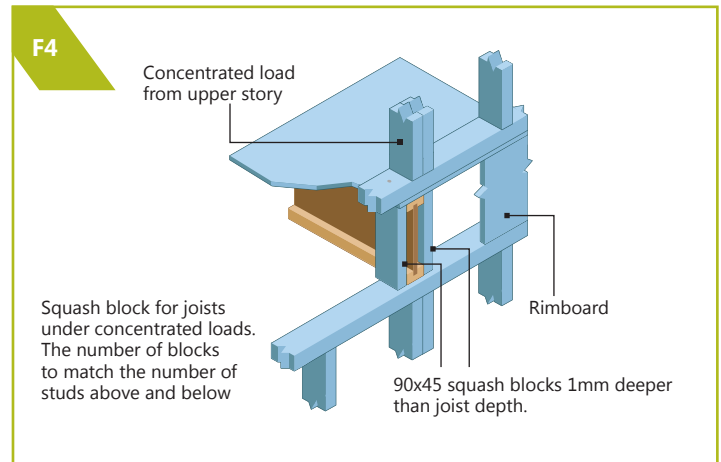
### Joining at rimboard/boundary joist



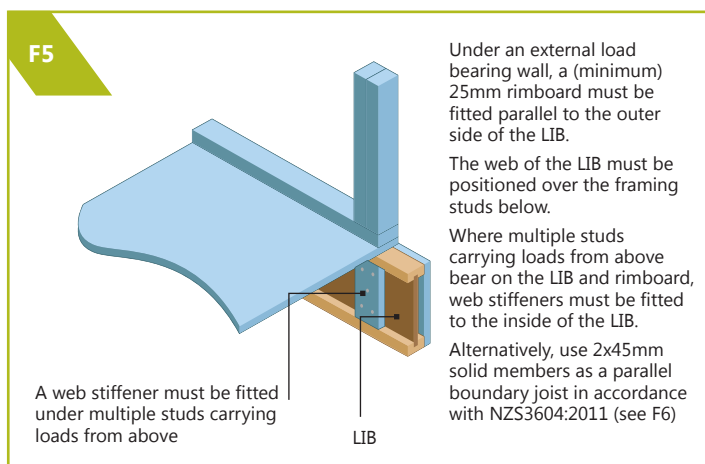
### Blocking option for lateral support



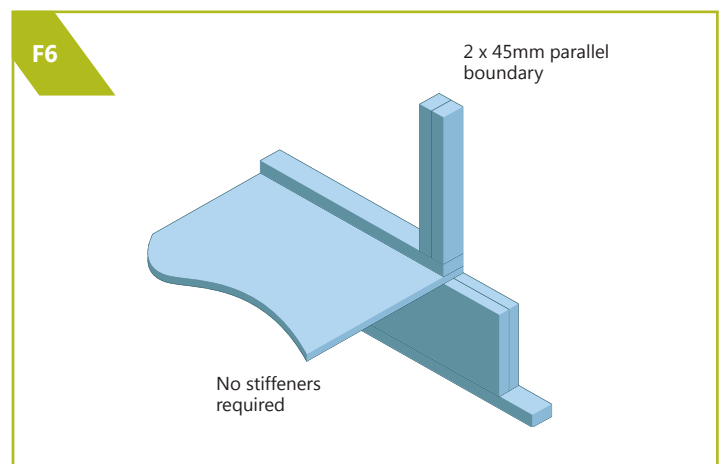
### Using squash blocks



### Web Stiffeners under concentrated loads



### No web stiffener

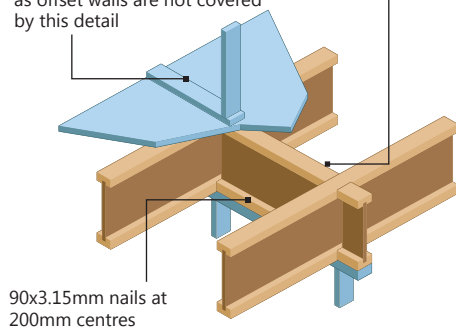


## Blocking between LIB's

F7

A load bearing wall above shall align vertically with the wall below. Other conditions such as offset walls are not covered by this detail

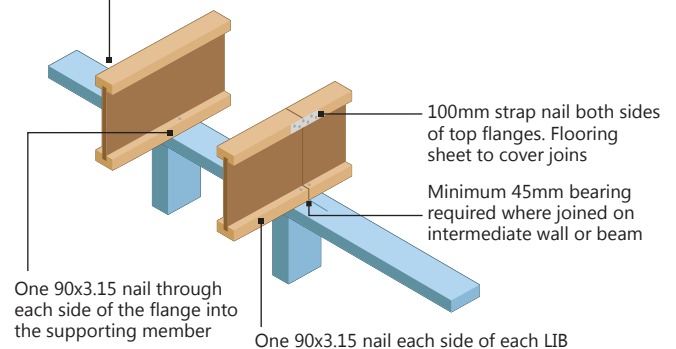
LIB blocking is required between LIB's under load bearing walls



## Joists bearing on intermediate wall

F8

Minimum bearing surface of wall or beam to be 63mm

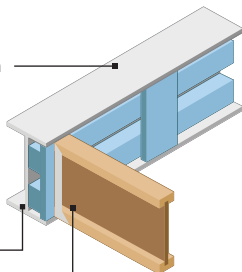


## LIB steel beam connection - Face Mount

F9

Steel or timber beam

Timber packers bolted or shot fastened to steel web as specified by engineer

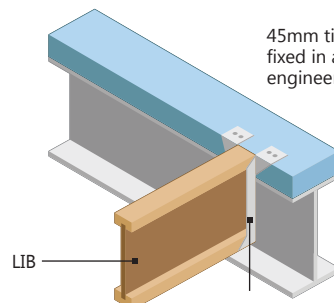


Face mounted I-Joist hanger. Fix in accordance with manufacturers instructions. Web stiffeners only required for partial hangers

## LIB beam connection - Top Mount

F10

45mm timber top plate fixed in accordance with engineers instructions



Top mount hanger to suit LIB depth fitted in accordance with manufacturers instructions

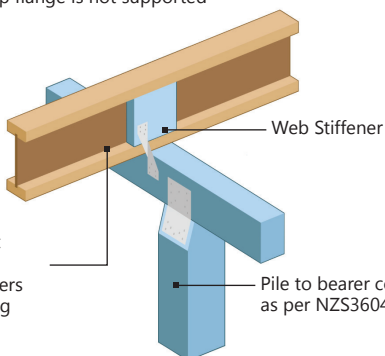
## LIB bearer tie down

F11

Fix web stiffeners whenever connections are fitted to LIB and the top flange is not supported

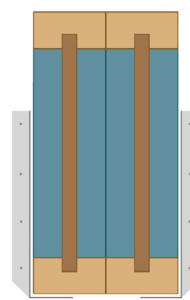
Fix web stiffener and nail-on cleats to joist each side of pile to bearer tie down

2 nailon cleats per joist (one each side). Please refer fixing manufacturers specifications for nailing instructions

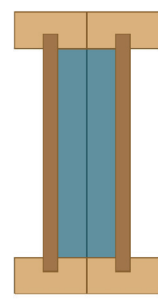


## Double LIB joist hanger

F12

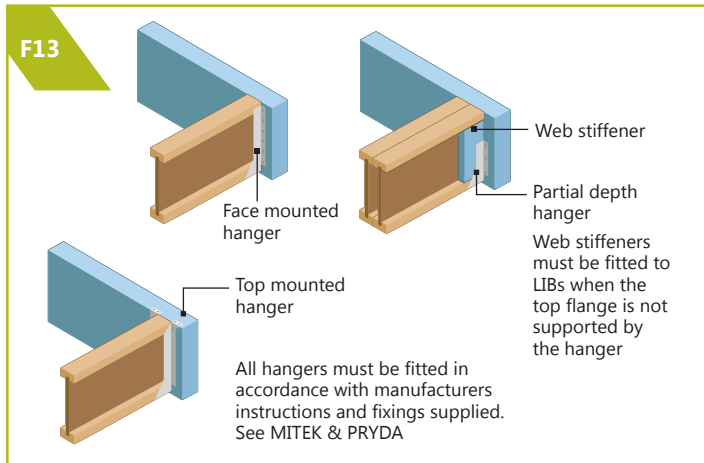


Split hangers at ends. 90mm web stiffeners both sides, both joists

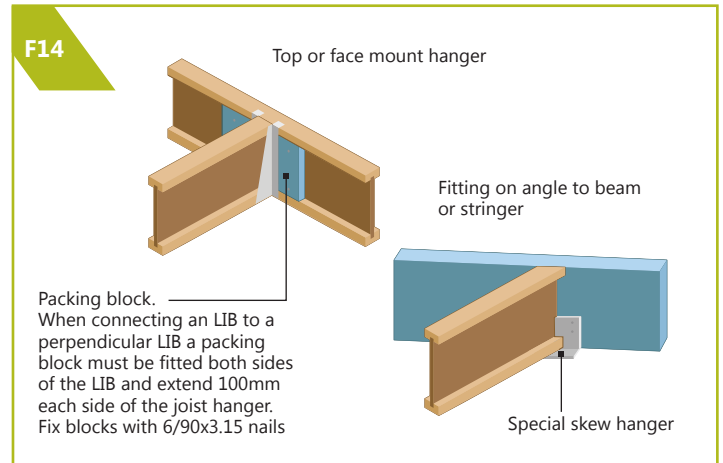


90mm web stiffeners inside of both joists at every 1/3 of span

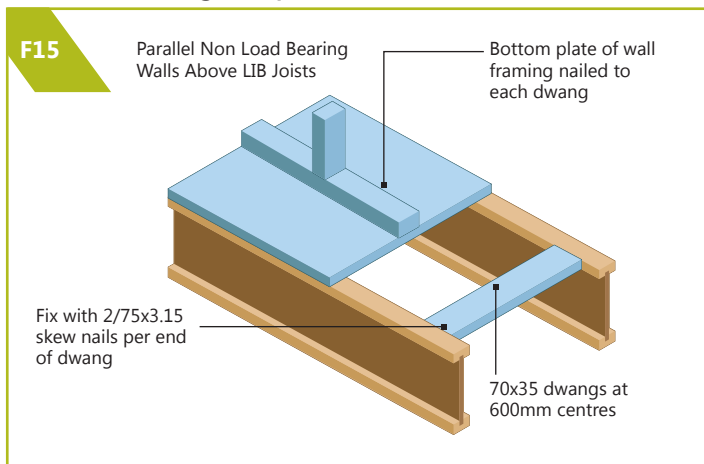
## Typical joist hanger connections



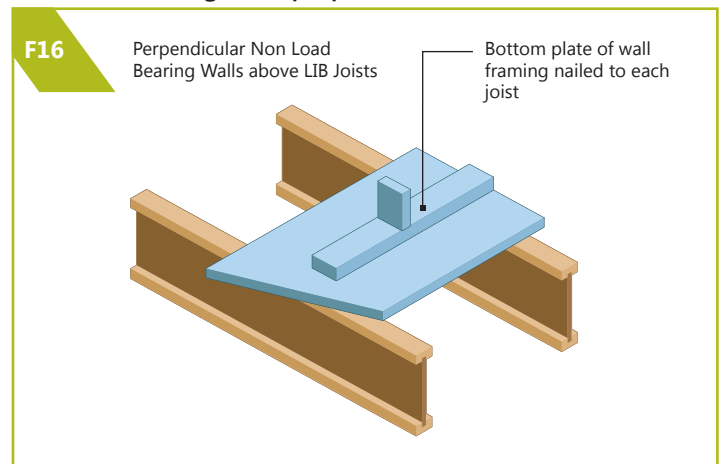
## Special joist hanger connections



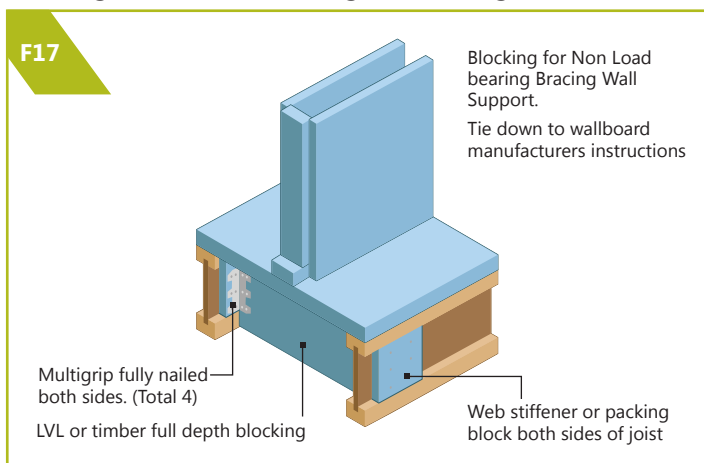
## Non load bearing wall parallel to LIBs



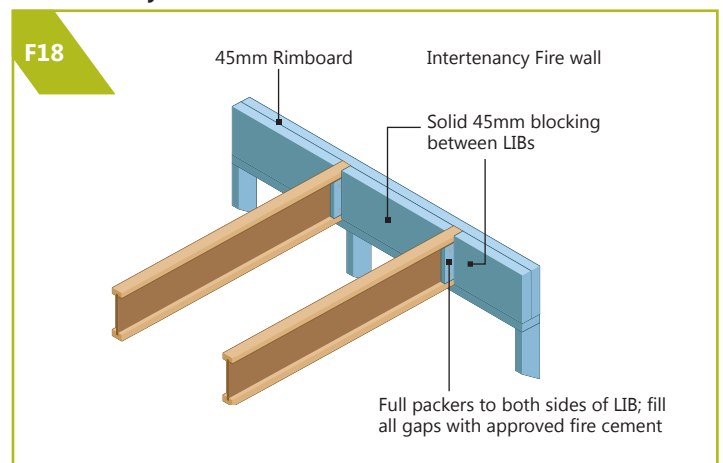
## Non load bearing walls perpendicular to LIBs



## Blocking for non load bearing wall bracing

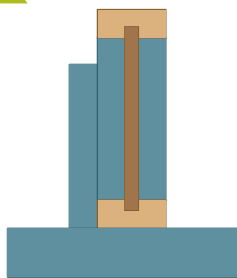


## Intertenancy fire wall



## Outrigger detail

F19



Cross section showing LIB, packing block and outrigger on top plate

Step down balcony platforms can be created with outriggers fixed to LIBs.

Fit 90mm wide packing blocks both sides of LIB with 3/90x3.15 nails to the LIB web to outer edge of flange at 900mm centres from supports.

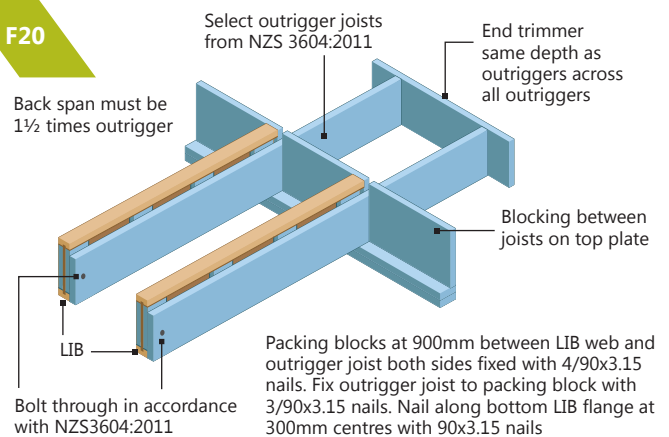
Select required outrigger material from NZS3604:2011 and fix to each packing block with 3/90x3.15 nails.

The LIB span must be a minimum of 3 x cantilever distance.

The cantilever back span must be a minimum of 1.5 x the cantilever distance.

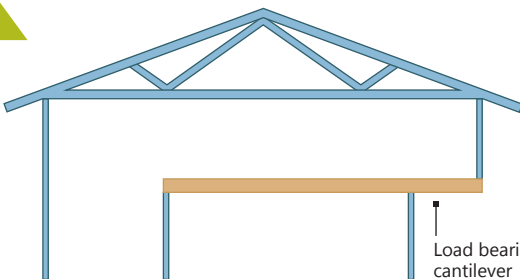
## Fixing outrigger joists to LIB

F20



## Load bearing cantilevers

F21



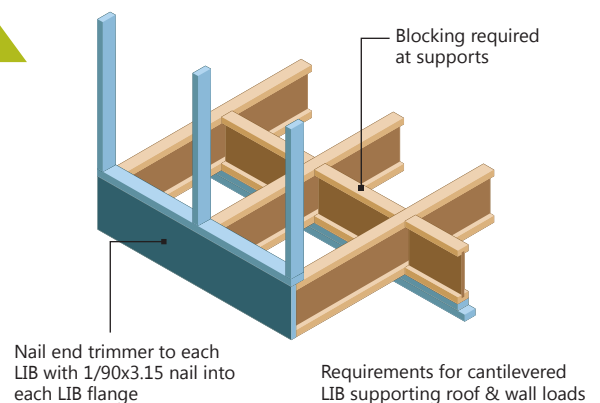
Load bearing cantilever

LIB's may be used in cantilever applications supporting a concentrated load applied to the end of the cantilever such as a vertical building offset.

Use Nelson Pine Design to determine cantilever under each load condition.

## Fixing load bearing cantilevers

F22

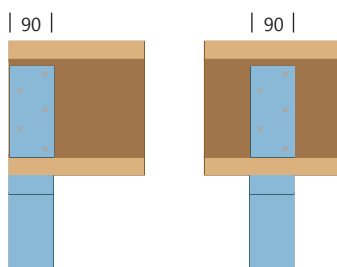


## Web stiffeners

F23

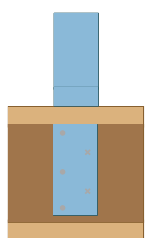
### Bearing web Stiffeners

3—6mm gap to top.  
Fit tight to bottom



Fix web stiffeners with 5/90x3.15 nails fully penetrating the three members (2 stiffeners plus LIB web)

### Web stiffener Concentrated Load



3—6mm gap to bottom. Fit tight to top under load

### Web Stiffeners

Web stiffeners are blocks of plywood added to the sides of an LIB web for additional support under concentrated or bearing loads.

LIB's used in accordance with the span tables in this guide do not require stiffeners unless:

1. The sides of joist hangers (eg partial face hangers) do not support the top flange of the I-beam to prevent torsional buckling, or
2. Connections through the web area are necessary, or
3. There are concentrated loads from girder trusses or lintels above.

Stiffeners can be supplied with LIB joists or field cut on the job. The minimum web stiffener size for all LIB's is **25mm thick x 90mm** minimum width.

# Roof Applications



## 3.0 Recommended Rafter Spans

Spans for roof rafters have been engineered for each LIB at various spacings and are included in Table 7 and 8.

These spans define the maximum allowable spans in mm. These spans are suitable for the loads specified in AS/NZS 1170.0, AS/NZS 1170.2 and AS/NZS 1170.3 within the limits stated herein and meet the deflection recommendations of AS/NZS 1170.1 table C.1.

The calculation of spans in table 7 and 8 **include:**

- A light roof and ceiling load of 40kg/m<sup>2</sup>
- A heavy roof load and ceiling of 90kg/m<sup>2</sup>
- A design deflection limit of span/300 or 20mm whichever is less

- Table 7: All snow regions to a maximum altitude of 100 metres or 0.9kPa sg. Table 8: No snow loads
- All wind speeds to extra high (\*excluding lee zones & escarpments)
- Roof pitch to 35°
- Overhang limit of 600mm or 33% supported rafter span whichever is less
- A ceiling or soffit fitted to the underside of the rafters, or to battens that are direct fixed to the rafters.

Spans for other loadings can be calculated using Nelson Pine Design.

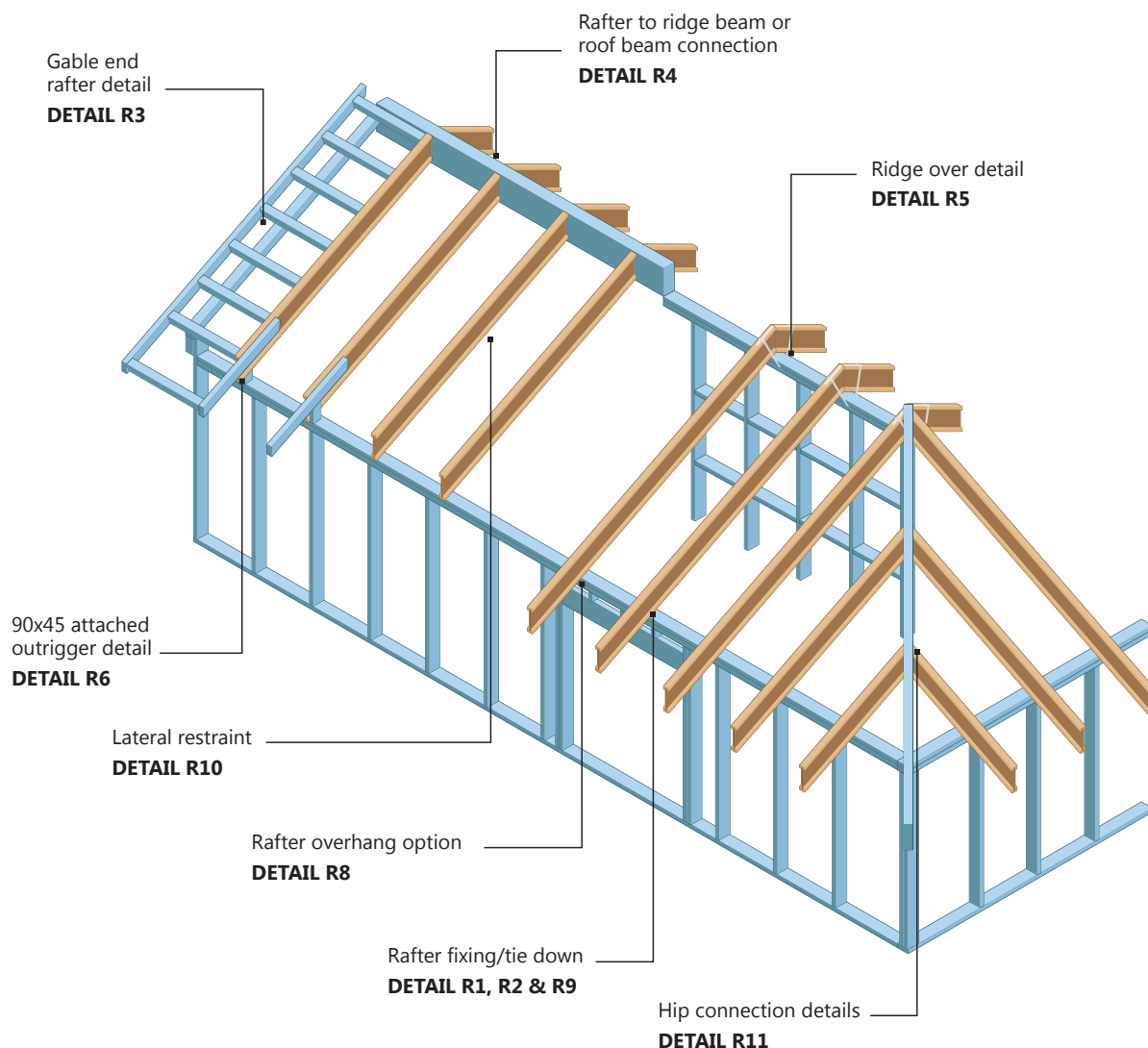
Table 7 Single Rafter Spans			Snow Loads Applied Maximum [Single] Rafter Spans in mm at spacings shown below			
Roof Weight	Wind Zone [*]	LIB Size	450[mm]	600[mm]	900[mm]	1200[mm]
Light	To EH	200.88	5500	5100	4500	4100
Light	To EH	240.88	6100	5800	5200	4700
Light	To EH	300.88	6900	6500	5900	5600
Light	To EH	360.88	7600	7100	6500	6100
Heavy	To EH	200.88	4600	4200	3600	3300
Heavy	To EH	240.88	5300	4800	4200	3800
Heavy	To EH	300.88	6000	5600	5000	4500
Heavy	To EH	360.88	6600	6200	5600	5100*

Table 8 Single Rafter Spans			No Snow Loads Applied Maximum [Single] Rafter Spans in mm at spacings shown below			
Roof Weight	Wind Zone [*]	LIB Size	450[mm]	600[mm]	900[mm]	1200[mm]
Light	To EH	200.88	5500	5200	4700	4300
Light	To EH	240.88	6100	5800	5300	4900
Light	To EH	300.88	6900	6500	5900	5600
Light	To EH	360.88	7600	7100	6500	6100
Heavy	To EH	200.88	4700	4300	3700	3400
Heavy	To EH	240.88	5300	4900	4300	3900
Heavy	To EH	300.88	6000	5600	5100	4600
Heavy	To EH	360.88	6600	6200	5600	5300*

\* member must have a minimum 45mm bearing at both supports.

### 3.1 General Installation Notes for Rafters

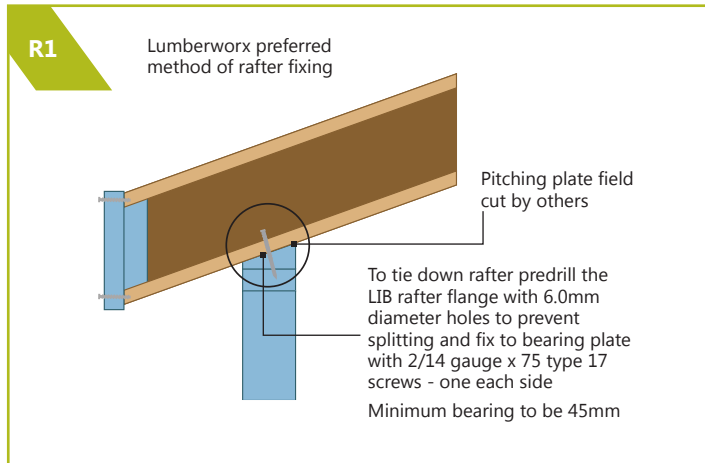
1. A typical layout of LIB rafters is shown above.
2. Except for cutting to length, LIB flanges must never be cut, drilled or notched.
3. LIB rafters must be protected from the weather prior to installation.
4. Do not use LIB rafters in situations where they will be permanently exposed to weather.
5. LIB rafters must not be installed where they remain in direct contact with concrete or masonry.
6. All fixings must comply with the relevant wind loading.
7. End bearing length must be a minimum of 45mm. For continuous span LIB rafters intermediate bearing must be a minimum of 63mm.
8. All fasteners used to fix LIB rafters must be selected to ensure they meet the durability requirements of the NZ Building Code.
9. LIB joists are treated to H1.2 and can be placed in all protected areas, including flat roofs.
10. LIB rafters which do not have a ceiling installed to the underside or are on a clip system, require lateral restraint mid span. This can be achieved using either a metal strap around the rafter to the purlin or solid blocking between rafters.



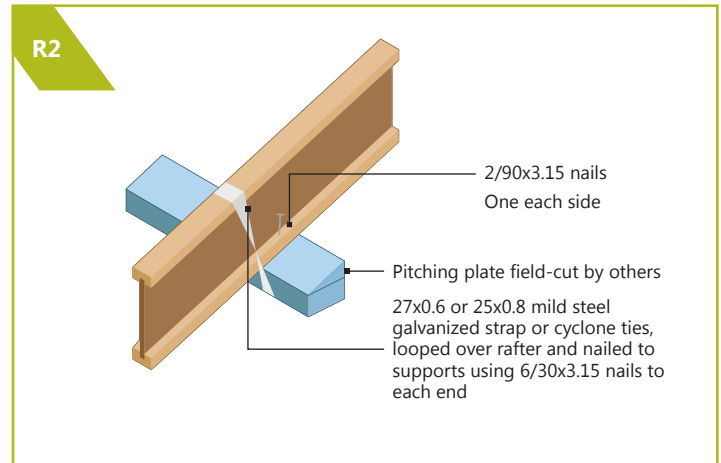
# Detailed Roof Applications

## 3.2 Rafter Construction Details

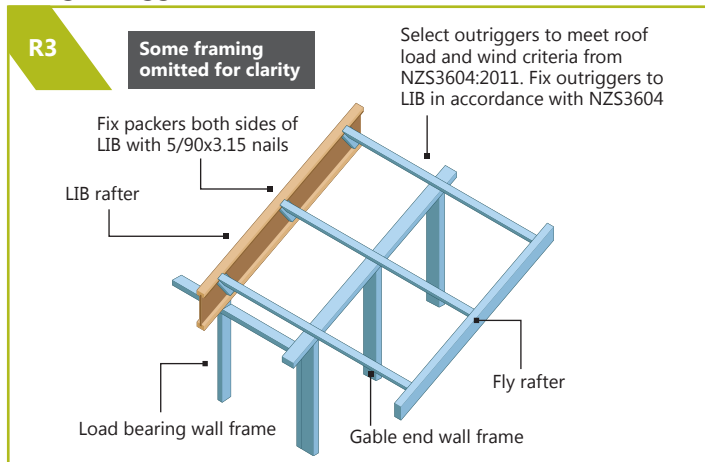
### Fixing rafters to top plate with screws



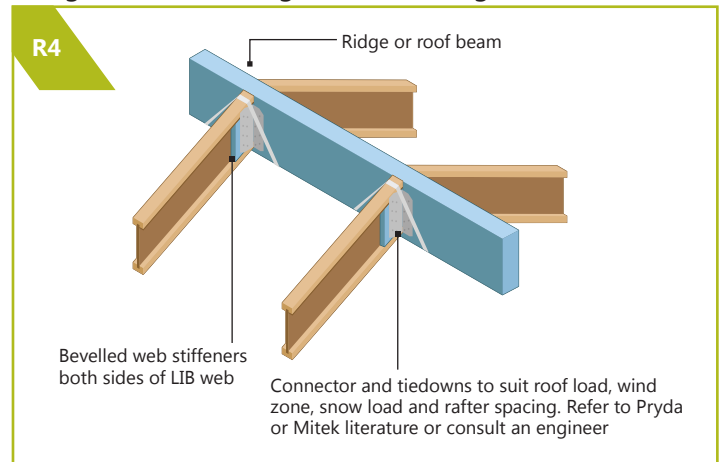
### Fixing rafters to top plate with strap and nail



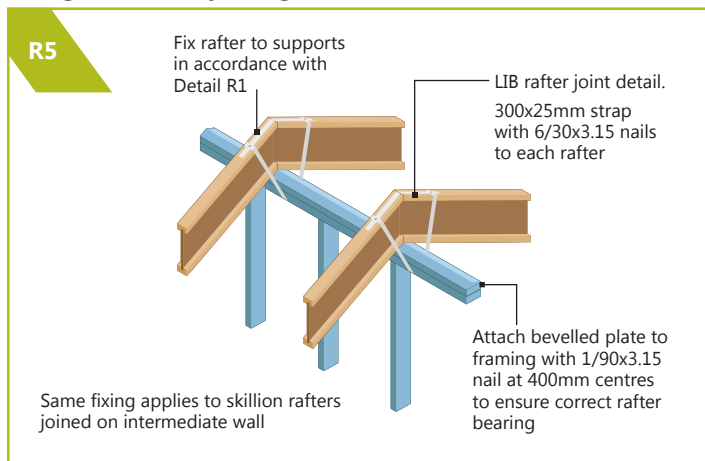
### Fixing outriggers to LIB rafters



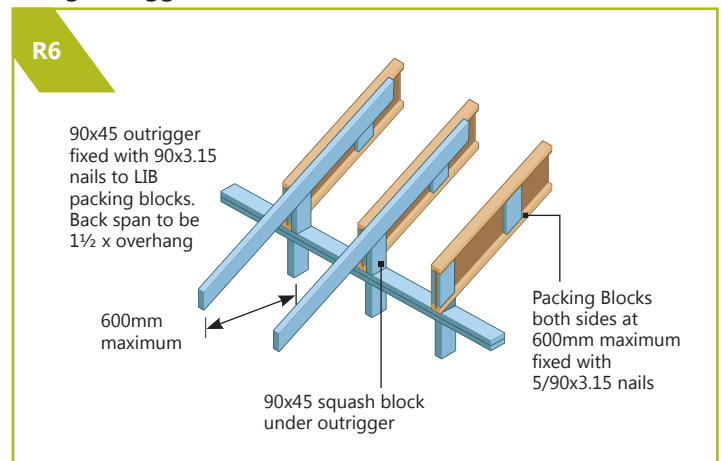
### Fixing LIB rafters to ridge beam or stringer



### Fixing LIB rafters joining over wall

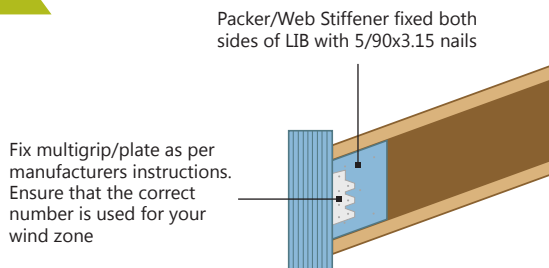


### Fixing outriggers to LIB rafter ends



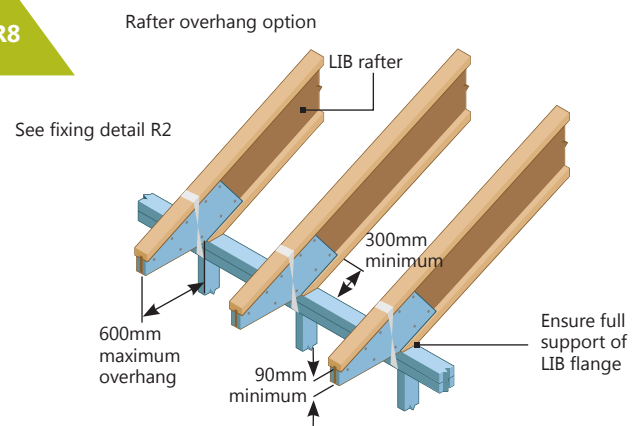
## Fixing LIB rafters to beam with Multigrip/Plate

R7



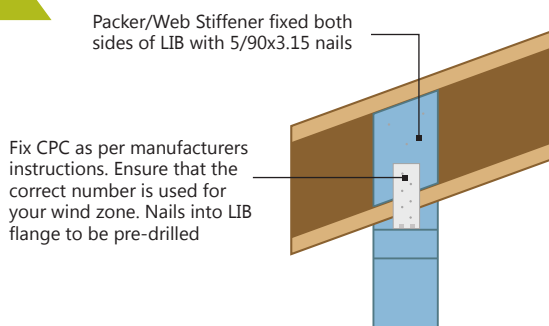
## LIB rafter overhang option

R8



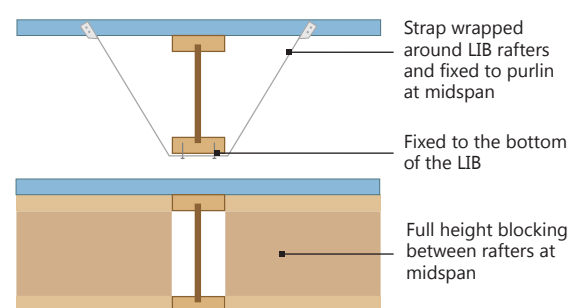
## Fixing LIB rafters to support with Purlin Cleat

R9



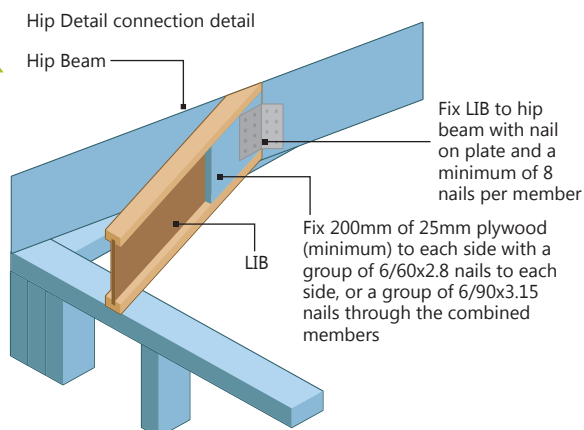
## LIB lateral restraint options where required under 3.1.10

R10



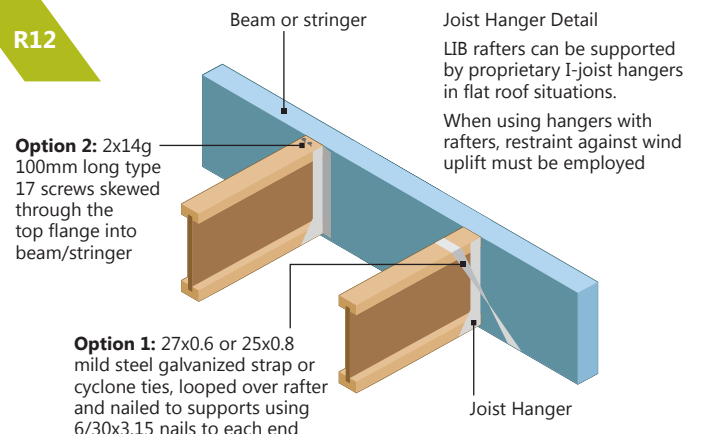
## LIB hip rafter connection to hip beam

R11



## Joist hanger uplift restraint options

R12

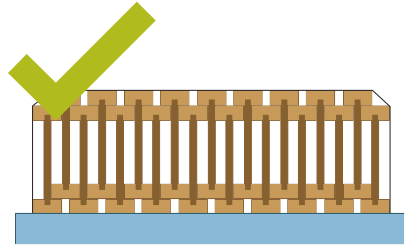


# Storage, Handling & Warnings

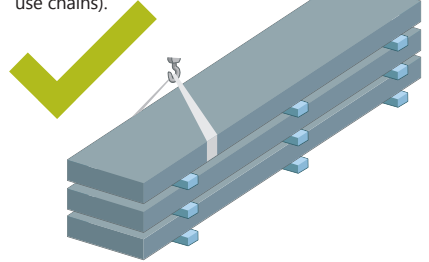
## 4.0 Storage Details

- Store LIBs vertically and level on bearers
- Never store LIBs on their side
- Protect LIBs from the weather until installed
- Keep LIB bundled units intact until installation
- Never store LIBs in direct contact with the ground

**DO** store LIBs vertically and on bearers.



**DO** use soft straps to lift packs (don't use chains).

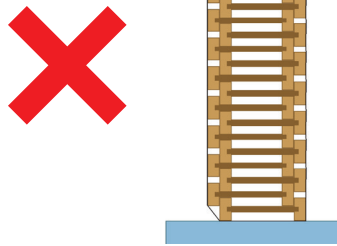


## 4.1 Handling Details

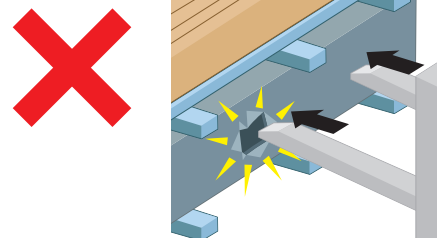
Take care not to damage LIBs with forklifts and cranes.

- Do not flip packs using forklift under top flange
- Do not push wrapped packs with forklift tines
- Do not carry LIBs on their side with forklift
- Use soft straps (not chains) to hoist LIB packs

**DON'T** store LIBs on their side.



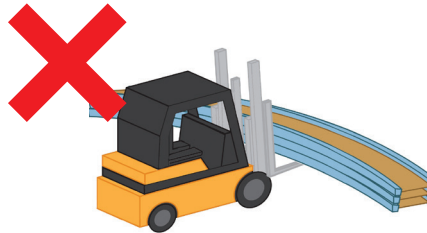
**DON'T** push wrapped packs with forklift tines.



Take care when manhandling LIBs.

- Always lift LIBs vertically; never on the side
- Lift LIBs under the bottom flange; never under the top flange
- Do not drop LIB's from a height

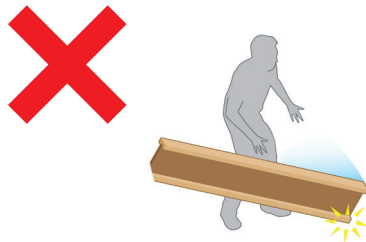
**DON'T** carry LIBs on their side with forklift.



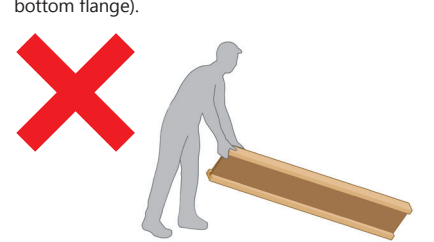
**DON'T** flip packs using forklift under top flange.



**DON'T** drop LIBs from a height.



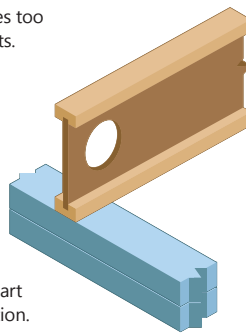
**DON'T** pick up LIBs under top flange (lift under bottom flange).



## 4.2 General Warning

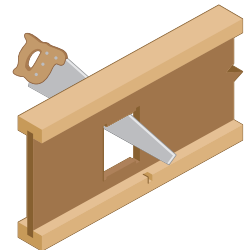
The following practices are not permitted during installation.

**DON'T** put holes too close to supports.

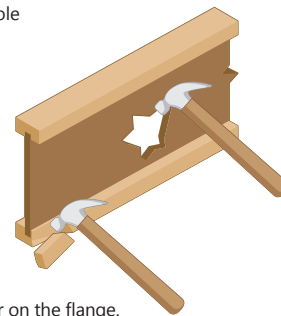


Refer to hole chart for correct location.

**DON'T** overcut hole or cut flange.

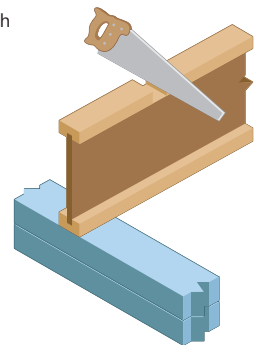


**DON'T** make hole with hammer.

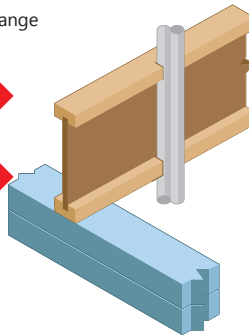


**DON'T** hammer on the flange.

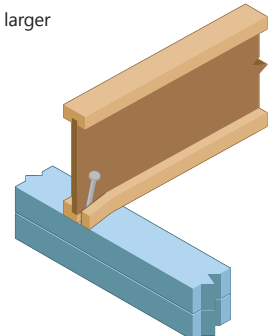
**DON'T** cut, notch or drill flange.



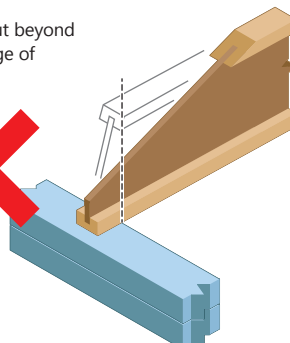
**DON'T** cut flange for pipes.



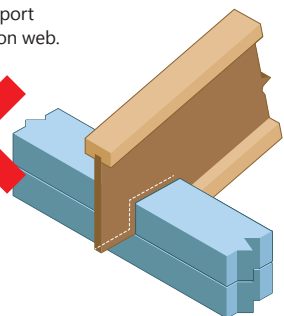
**DON'T** use nails larger than 3.15.



**DON'T** cut beyond inside edge of bearing.



**DON'T** support joist/rafter on web.





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