

FUTUREBUILD[®] STRUCTURAL LVL

hy JOIST

DESIGN & INSTALLATION
GUIDE: 2.1

DECEMBER 2013

hy JOIST

Contents

1.0	hyJOIST® Options Range	3
1.1	More options for more economical floor joist layouts.....	3
1.2	hyJOIST Selection Guide.....	4
1.3	Bearing Support.....	5
1.4	Support.....	6
1.5	Typical Floor Layout.....	7
1.6	Transfer of wind and earthquake forces between floors.....	8
1.7	Web holes for hyJOIST	8
1.8	Cantilevers for balconies.....	10
1.9	Joists supporting parallel load bearing walls.....	11
2.0	hyJOIST Installation.....	12
2.1	Basic Installation Requirements.....	12
2.2	Joist Placement	12
2.3	Fixing to Supports	12
2.4	Supports.....	12
2.5	Blocking and Bearing at Supports (for support of gravity loads).....	12
2.6	Lateral Restraint.....	13
2.7	Intermediate Restraint (between supports).....	13
2.8	Notching/Cut Backs/Holes with hyJOIST.....	14
2.9	Method for Framing Cantilevers Supporting Load Bearing Walls.....	15
2.10	Tie Down and Transfer of Lateral Forces Through The Floor	15
3.0	Installation Details requiring Design & Specification	17
4.0	hyJOIST Rafters.....	25
4.1	Rafter Span Tables	26
5.0	Compliance with the New Zealand Building Code (NZBC).....	27
5.1	For more efficient floor design use designIT®.....	27
5.2	Disclaimer	27

1.0 hyJOIST® OPTIONS RANGE

1.1 MORE OPTIONS FOR MORE ECONOMICAL FLOOR JOIST LAYOUTS

Select the economy section (HJ240 63, HJ300 63 & HJ360 63) of appropriate depth to accommodate the spans of the main area of the floor. Cater for any larger spans in the floor area using the wider flange options of corresponding depth.

Quality and performance

- Product quality – Engineered Wood Products Association of Australasia 'Product Certified' for peace of mind
- Technical support – experienced engineering support, simply call 0800 808 131
 - 'on-the-ground' specialist technical representatives, willing and able to help
- Responsible conservative design – 'maintaining the standard for consistency of performance'
- 'Off the shelf' convenience – readily available, ex stock via a building merchant, simply cut to length and install
- Treated – Optional LOSP treatment to H3 (equivalent to H3.1) as defined in AS/NZS 1604.4 (refer to treatment technical note on www.chhwoodproducts.co.nz)

Design

Consider the 'hyJOIST® SELECTION GUIDE' on page 3, summarising key parameters involved in selection of the appropriate joist sections. Information contained in this publication applies for floor joists used in houses. For more information refer either to this publication or designIT® software as set out in the following table. Use of designIT will provide a wider range of options and allow more optimum design.

For specific design of hyJOIST members, refer to the Limit State Design Information in the Specific Design Guide available from www.chhwoodproducts.co.nz



The information contained in this manual relates specifically to hyJOIST LVL products manufactured by Carter Holt Harvey® Woodproducts and cannot be used with any other manufacturer's LVL product no matter how similar they may appear.














Alternative LVL products can differ in a number of ways which may not be immediately obvious and substituting them for products is not appropriate and could in extreme cases lead to premature failure and/or buildings which do not meet the requirements of the New Zealand Building Code.

TABLE 1: hyJOIST®

Design information	Literature	designIT
Spanning capabilities	✓	✓
Bearing requirements	✓	✓
Blocking for lateral support	✓	✓
Transfer of wind / earthquake forces through the floor depth	✓	
Web holes – permitted locations related to size, shape and span	✓	✓
Details for limited notching of flanges (at end supports only)	✓	
Hangers, brackets and fixing requirements for support of joists	✓	✓
Framing for stair voids		✓
Cantilevers for balconies	✓	✓
Joists supporting parallel load bearing walls	✓	✓
Joists supporting perpendicular load bearing walls (including cantilevers)		✓
Continuous hyJOIST® blocking for support of load bearing walls	✓	✓
Joists supporting alternative floor mass & floor live loads		✓

1.2 hyJOIST® SELECTION GUIDE

TABLE 2:

Dimensions for Detailing					Span — Floor joists for Houses								
Overall Depth	Clear Distance Between Flanges	Flange Width (mm)			hyJOIST® Section Code	Weight of 5 metre length	Maximum Hole Size For Services 2	Single Span		Continuous Span		Balcony Cantilever 3	
		45	63	90				Joist Spacing (mm)					
		Flange Outstand (mm)						450	600	450	600	450	600
		18	27	39				Recommended Span Range (m)				Maximum (m)	
200	119				HJ200 45	14.8kg		3.5 to 3.8	3.1 to 3.6	4.0 to 4.5	3.7 to 4.2	1.0	0.9
					HJ240 63	20.5kg		4.4 to 4.9	4.0 to 4.5	5.0 to 5.5	4.5 to 5.1	1.3	1.2
240	159				HJ240 90	28.8kg		4.9 to 5.4	5.4 to 5.0	5.6 to 6.1	5.1 to 5.6	1.5	1.4
					HJ300 63	22.0kg		5.0 to 5.5	4.6 to 5.1	5.6 to 6.3	5.2 to 5.8	1.5	1.4
300	219				HJ300 90	30.9kg		5.6 to 6.1	5.2 to 5.7	6.4 to 7.0	5.9 to 6.4	1.7	1.6
					HJ360 63	23.6kg		5.6 to 6.2	5.2 to 5.7	6.3 to 6.8	5.6 to 6.8	1.7	1.6
360	279				HJ360 90	33.0kg		6.3 to 6.8	5.8 to 6.3	7.2 to 7.8	6.7 to 7.1	1.9	1.8
								6.8 to 7.2	6.3 to 6.7	7.6 to 7.9	6.7 to 7.1	2.0	1.9
400	319				HJ400 90	34.4kg							

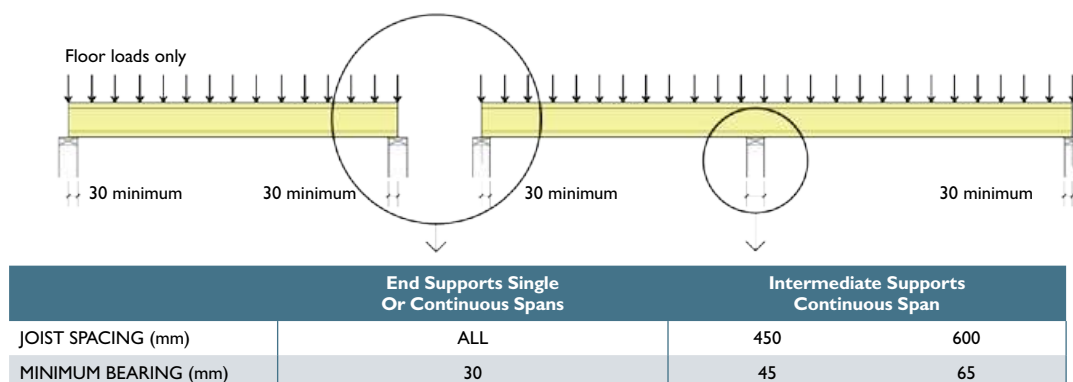
1. Used to determine the thickness of packing to pack web flush with flanges

2. Refer to page 9 / designIT® for permitted hole locations and limitations 3. Refer to page 10 / designIT for further design information

1.3 BEARING SUPPORT

FOR JOISTS NOT TRANSFERRING LOAD FROM UPPER WALLS

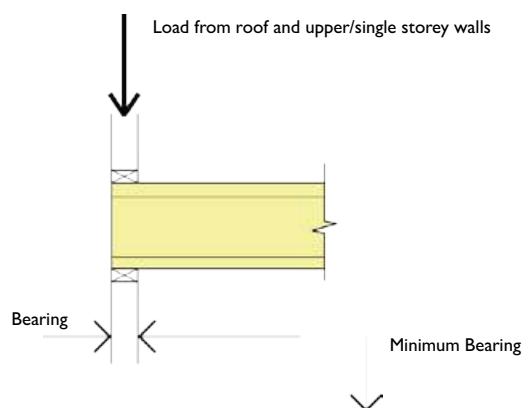
FIGURE 1



designIT® may give reduced bearing requirements for specific cases.

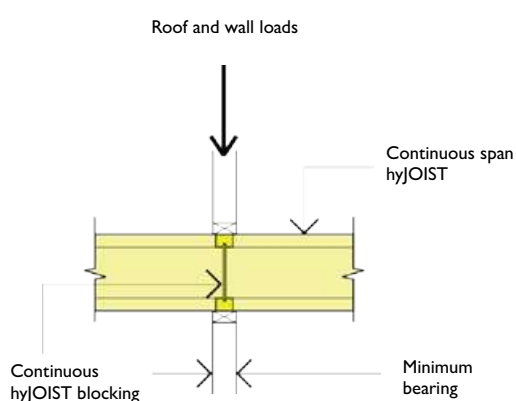
FOR JOISTS TRANSFERRING UPPER STOREY WALL AND ROOF LOADS AT SUPPORTS

FIGURE 2 End supports — single or continuous spans



For joists supporting load bearing walls at end supports, provide bearing as specified in the table below or alternatively install continuous hyJOIST® blocking/rimboard/boundary joist.

FIGURE 3 Intermediate supports — continuous spans



Minimum bearing to be as for joists supporting floor loads only. Load bearing wall to be supported by continuous full depth hyJOIST® blocking.

TABLE 3:

LOAD TYPE	JOIST SPACING (mm)	
	450	600
	MINIMUM BEARING (mm)	
LIGHT ROOF	45	65
HEAVY ROOF	65	90

1. If web stiffeners installed bearing may be reduced to 45 mm
2. If web stiffeners installed bearing may be reduced to 65 mm
3. For all cases bearing may be reduced to 30 mm if continuous full depth blocking or compression blocks are installed
4. Web stiffener installation as per Detail F6
5. designIT may give a reduced bearing requirement

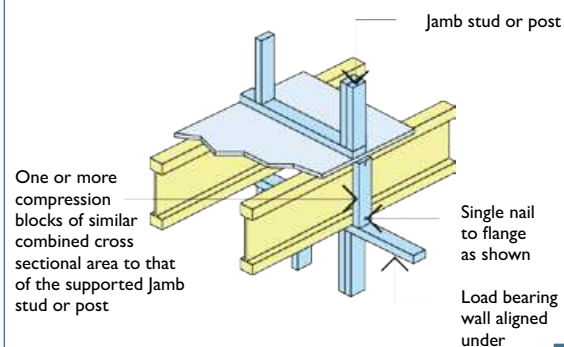
Concentrated loads from jamb studs/posts

Use compression blocks to transfer loads through to supports as shown. Refer to Detail F18.

For lower storey of 2 storey construction

Continuous full depth hyJOIST® blocking should be installed to transfer compression loads from load bearing walls to the supports. In most cases continuous hyJOIST blocking will be adequate to support the roof, wall and floor loads. Refer to designIT for confirmation.

FIGURE 4



I.4 SUPPORT

TABLE 4: JOIST HANGERS FOR hyJOIST®

hyJOIST® Section Code	Manufacturer Or Distributor	Face Mount Hangers				Top Mount Hangers ³
		Full Depth		Partial Depth ²		
		Hanger Code	Minimum No Of Nails To Bearer	Hanger Code	Minimum No Of Nails To Bearer	Hanger Code
HJ200 45	Pryda			FB47/176	10	LT200/50
	Mitek	JH47190	8	JH47120	8	
HJ240 63	Pryda	LF235/65	8	FB 65/170	12	LT240/65
	Mitek	IBHF24065	8			IBHT 24065
HJ240 90	Pryda	LF235/90	8	FB 94/152	12	LT 240/90
	Mitek	IBHF 24090	8			IBHT 24090
HJ300 63	Pryda	LF290/65	8	FB 65/170	12	LT300/65
	Mitek	IBHF 30065	8			IBHT 30065
HJ300 90	Pryda	LF290/90	10	FB 94/152	12	LT 300/90
	Mitek	IBHF 30090	10			IBHT 30090
HJ360 63	Pryda	LF340/65	10	FB 65/170	12	LT 360/65
	Mitek	IBHF 36065	10			IBHT 36065
HJ360 90	Pryda	LF 350/90	10	LF 290/90	10	LT 360/90
	Mitek	IBHF 36090	10			IBHT 36090
HJ400 90	Pryda	LF 390/90	12	LF 350/90	12	LT 400/90
	Mitek	IBHF 40090	12			IBHT 40090

SKEW ANGLE BRACKET FOR OBLIQUE JOISTS

FIGURE 5

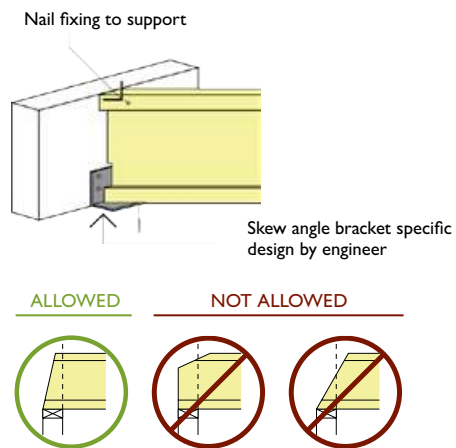
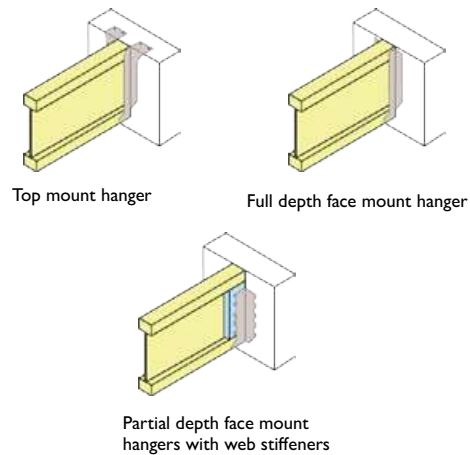


FIGURE 6



1. Nailing specified is for brackets face fixed to hySPAN®, MSG8 or VSG8, J5 (or better) timber bearer or stringer.
2. Brackets to be installed strictly in accordance with bracket manufacturers' recommendations. Note, nails for FB hangers are 35 x 3.15 flat head type; for all other hangers 40 x 3.75 flat head nails are specified.
3. Fix top mount hangers with 4, 35 x 3.75 flat head nails.

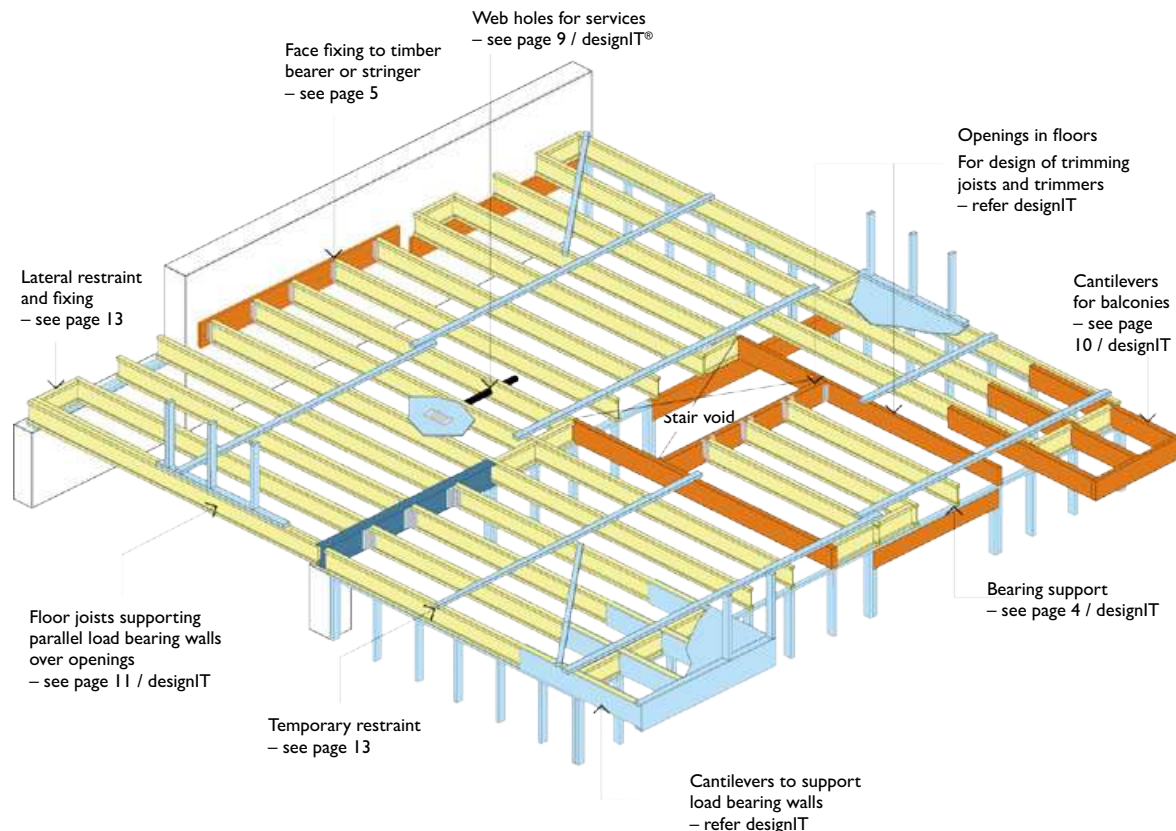
Storage

Prior to installation hyJOIST® should be stacked on level bearers, at least 150 mm clear of the ground and kept dry.



1.5 TYPICAL FLOOR LAYOUT

FIGURE 7



I.6 TRANSFER OF WIND AND EARTHQUAKE FORCES BETWEEN FLOORS

The design of houses includes quantification of lateral loads due to wind and earthquake. Racking forces determined for design of upper level bracing must be able to be transferred through the floor depth to the lower level. Racking forces in the direction of the joists are catered for by the considerable longitudinal shear capacity of the joists. For forces perpendicular to the joists, blocking and/or perimeter 'rimboard' and their associated fixings (installed to provide lateral restraint) may or may not

be adequate. In particular, the fixing of the floor diaphragm to 'rimboard'/blocking and in turn, fixing of 'rimboard'/blocking to the supports must be adequate to resist the horizontal racking force used for design of the upper floor wall bracing system.

Blocking using hyJOIST® with the required fixing is a practical and easy to install solution.

FIGURE 8

Racking loads need to be transferred through floors to the lower storey wall bracing system

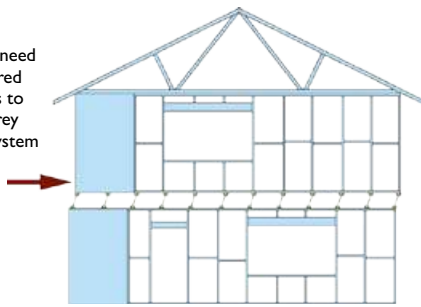


FIGURE 9: Using plywood closures – at external walls

Nail spacing as required for the upper storey wall bracing

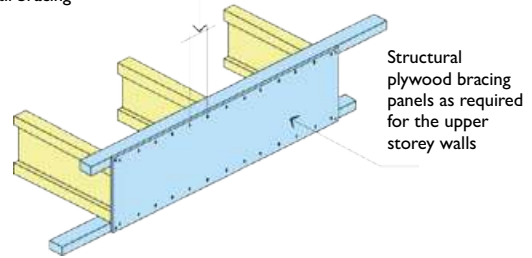
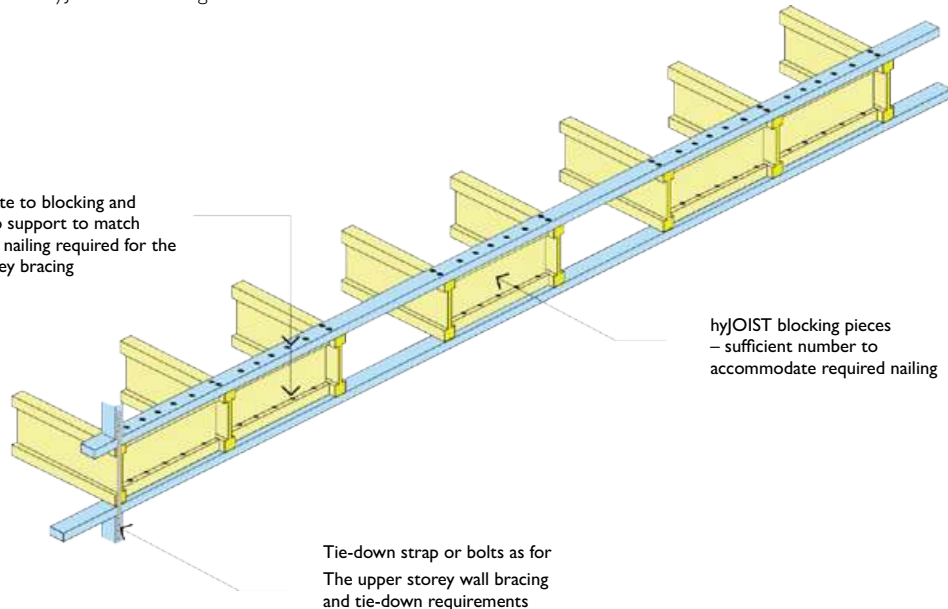


FIGURE 10: Using hyJOIST® blocking – external and internal walls

At external walls, 'rimboard' may be used in conjunction with hyJOIST® blocking.

Nail fix plate to blocking and blocking to support to match capacity of nailing required for the upper storey bracing



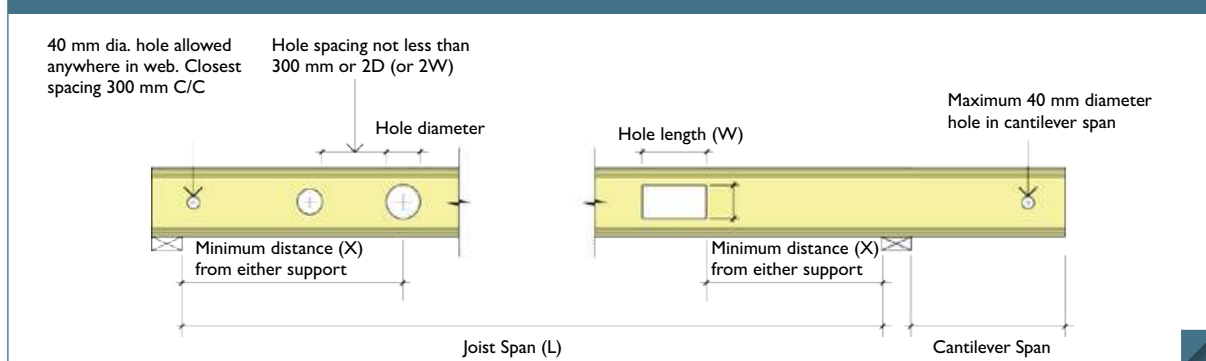
hyJOIST blocking pieces – sufficient number to accommodate required nailing

Tie-down strap or bolts as for The upper storey wall bracing and tie-down requirements

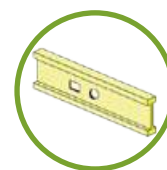
I.7 WEB HOLES FOR hyJOIST®

Holes may be cut through the web of hyJOIST provided they are located within the central part of the span as specified below. For hole sizes other than those included below refer to the web hole calculator in designIT®. For cases involving non-uniform

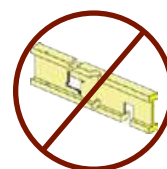
loading or where the possibility of locating the hole closer to supports needs to be assessed, use the web hole option in the floor joist calculator in designIT.

FIGURE 11: Circular & Rectangular Holes

TABLE 5:

hyJOIST® section code	Maximum hole diameter (mm)	Minimum distance from support 'x'	Hole diameter (mm)			
			Ø80	Ø110	Ø125	Ø150
			Circular holes – minimum distance 'x' from support – (m)			
HJ200 45	Ø118	0.34L ¹	0.16L	0.28L	N/A	N/A
HJ240 63	Ø158	0.38L	0.12L	0.21L	0.26L	0.33L
HJ240 90	Ø158	0.38L	0.12L	0.21L	0.26L	0.33L
HJ300 63	Ø218	0.41L	0.10L*	0.15L	0.18L	0.24L
HJ300 90	Ø218	0.41L	0.10L*	0.10L*	0.14L	0.20L
HJ360 63	Ø278	0.42L	0.3 m*	0.08L*	0.11L	0.16L
HJ360 90	Ø278	0.40L	0.3 m*	0.3 m*	0.3 m*	0.05L*
HJ400 90	Ø318	0.40L	0.3 m*	0.3 m*	0.3 m*	0.08L*



Do cut in web area
as specified



Do not cut, notch or
bore through flange

* Minimum distance from any support is 0.3 metres.

Example, if actual span 'L' = 4.0m then minimum distance 'X' from hole to support (see diagram) is $0.34 \times 4.0 = 1.36\text{m}$

TABLE 6:

hyJOIST® section code	Hole size		Permitted locations for rectangular holes							
	Height (mm)	Length (mm)	L X	Actual Span 'L' in metres						
				Minimum distance from the side of the hole to any support – (m)						
HJ200 45	118	250	L	≤ 3.8	4.0	4.2	4.4	4.5		
			X	0.34L	1.38	1.59	1.80	1.90		
HJ240 63	158	330	L	≤ 3.5	5.5					
			X	0.38L	2.13					
HJ240 90	158	330	L	≤ 5.8	6.0	6.1				
			X	0.38L	2.36	2.45				
HJ300 63	218	400	L	≤ 5.2	5.4	5.6	5.8	6.0	6.2	6.3
			X	0.41L	2.25	2.39	2.54	2.69	2.83	2.91
HJ300 90	218	400	L	≤ 6.4	6.6	6.8	7.0			
			X	0.40L	2.73	2.88	3.04			
HJ360 63	278	500	L	≤ 5.4	5.6	5.8	6.0	6.2	6.4	6.6
			X	0.42L	2.37	2.49	2.62	2.75	2.88	3.02
HJ360 90	278	500	L	≤ 7.2	7.4	7.6	7.7			
			X	0.40L	2.97	3.10	3.17			
HJ400 90	318	600	L	≤ 8.0						
			X	0.40L						

Interpolate to obtain values of 'X' for spans intermediate between the values given

Notes:

1. Data applies for floor joists supporting uniform loads (and concentrated live load not exceeding 1.8 kN).
2. Hole locations closer to supports may be possible for some load and support conditions; refer to the 'floor joist calculator' in designIT software or contact Carter Holt Harvey.

3. Spacing between holes to be not less than 300 mm or twice the width (or twice the diameter) of the larger hole.
4. Not more than three holes with width or diameter greater than 80 mm in any span.
5. For cantilever spans holes greater than 40 mm diameter are not permitted.
6. Not more than one rectangular (or square) hole per span.

I.8 CANTILEVERS FOR BALCONIES

Balcony cantilevers, subject to external weather exposure can be provided using H3.2 preservative treated and protected outriggers as per Details F11 and F12. For weather proofed applications H3.1 treated hyJOIST® can be cantilevered to provide balcony support as per Detail F13.

Outriggers can be dry stress-graded timber or hySPAN®, either nested against the hyJOIST web and bearing on the top of the bottom flange or placed adjacent to the hyJOIST bearing directly on the support. Diagrams illustrating these configurations are shown below.

Some options for outriggers are included in the following table. These have all been determined for 2 kPa balcony floor load. For other floor loads and to consider other options refer to designIT®.

hySPAN outriggers are not recommended for use in weather exposed applications. MSG Pine may be treated to H3.2 level for weather exposed balconies.

TABLE 7:

hyJOIST® section code	Joist spacing (mm)	Maximum balcony cantilever (m)	Outrigger options	
			Nested outrigger	Adjacent outrigger
HJ200 45	450	1.0	No Suitable Depth Option	150 x 45 hySPAN 190 X 45 MSG8
	600	0.9		150 x 45 hySPAN 190 X 45 MSG8
HJ240 63	450	1.3	2/150 x 45 hySPAN®	200 x 45 hySPAN 240x 45 MSG8
	600	1.2	2/150 x 45 hySPAN	200 x 45 hySPAN 240 x 45 MSG8
HJ240 90	450	1.4	2/150 x 45 hySPAN	Not Recommended
	600	1.3	2/150 x 45 hySPAN	
HJ300 63	450	1.5	200 x 45 hySPAN	200 x 45 hySPAN 240 x 45 MSG8
	600	1.4	200 x 45 hySPAN	200 x 45 hySPAN 240 x 45 MSG8
HJ300 90	450	1.7	2/200 x 45 hySPAN	Not Recommended
	600	1.6	2/200 x 45 hySPAN	
HJ360 63	450	1.7	240 x 45 hySPAN	240 x 45 hySPAN 290 x 45 MSG8
	600	1.6	240 x 45 hySPAN	240 x 45 hySPAN 290 x 45 MSG8
HJ360 90	450	1.9	240 x 63 hySPAN	Not Recommended
	600	1.8	2/240 x 45 hySPAN	
HJ400 90	450	2.0	300 x 45 hySPAN	Not Recommended
	600	1.9	300 x 45 hySPAN	

I. Cut from larger hySPAN section with clearance between flanges

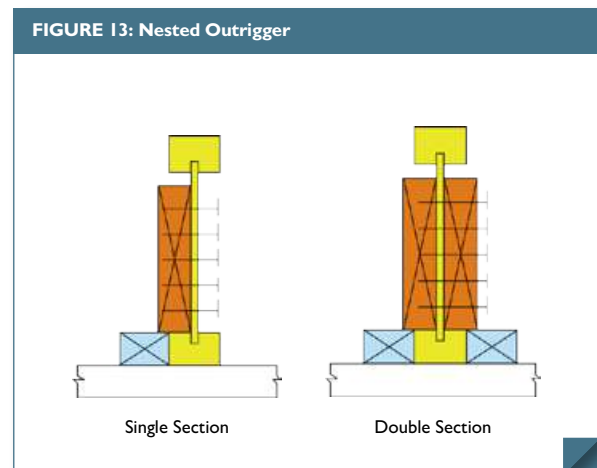
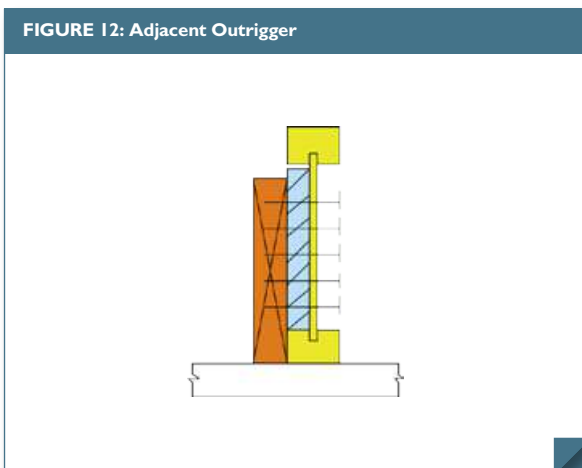
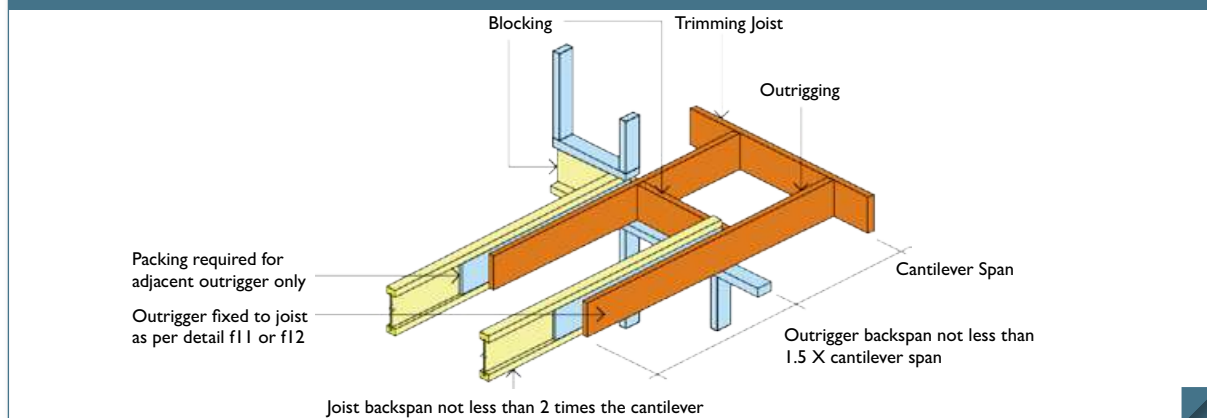


FIGURE 14



1.9 JOISTS SUPPORTING PARALLEL LOAD BEARING WALLS

TABLE 8:

hyJOIST® section code	Light roof & ceiling											
	Roof load width (m)						Roof load width (m)					
	1.8	2.4	3.6	4.8	6.0	7.2	1.8	2.4	3.6	4.8	6.0	7.2
	Maximum single span (m)						Maximum continuous span (m)					
HJ200 45	2.7	2.5	2.2	2.0	1.7	1.5	2.9	2.5	2.0	1.6	1.3	1.2
2/HJ200 45	3.5	3.3	3.0	2.8	2.6	2.4	4.1	3.9	3.4	3.1	2.7	2.3
HJ240 63	3.5	3.2	2.9	2.6	2.2	1.9	3.8	3.3	2.5	2.1	1.8	1.5
2/HJ240 63	4.5	4.3	3.9	3.6	3.3	3.1	5.4	5.2	4.5	4.1	3.5	3.0
HJ240 90	4.0	3.8	3.4	3.1	2.945	2.545	4.970	4.380	3.480	2.880	2.380	2.080
HJ300 63	4.2	3.9	3.5	3.245	2.945	2.545	5.080	4.490	3.490	2.890	2.390	2.090
2/HJ300 63	5.1	4.9	4.6	4.3	4.0	3.8	6.1	5.8	5.1	4.6	4.270	3.980
HJ300 90	4.7	4.5	4.145	3.865	3.465	2.965	5.6	5.0###	3.9###	3.2###	2.7###	2.4###
HJ360 63	4.7	4.545	4.145	3.765	3.465	3.065	5.5###	5.1###	3.9###	3.2###	2.7###	2.4###
2/HJ360 63	5.7	5.5	5.1	4.8	4.6	4.445	6.1	6.0	5.5	5.290	4.8###	4.4###
HJ360 90	5.2	5.045	4.765	4.065	3.465	2.965	5.9###	5.0###	3.9###	3.2###	2.7###	2.4###
HJ400 90	5.645	5.345	4.965	4.065	3.465	2.965	5.8###	5.0###	3.9###	3.2###	2.7###	2.4###

TABLE 9:

hyJOIST® section code	Heavy roof & ceiling											
	Roof load width (m)						Roof load width (m)					
	1.8	2.4	3.6	4.8	6.0	7.2	1.8	2.4	3.6	4.8	6.0	7.2
	Maximum single span (m)						Maximum continuous span (m)					
HJ200 45	2.2	1.8	1.3	NS	NS	NS	1.8	1.5	NS	NS	NS	NS
2/HJ200 45	2.9	2.7	2.3	2.1	1.7	NS	3.3	2.9	2.1	1.7	1.4	1.2
HJ240 63	2.8	2.4	1.7	1.4	NS	NS	2.3	1.9	1.4	NS	NS	NS
2/HJ240 63	3.7	3.4	3.0	2.7	2.2	1.9	4.4	3.8	2.7	2.2	1.8	1.5
HJ240 90	3.3	3.045	2.345	1.845	1.545	1.345	3.180	2.580	1.880	1.480	1.280	NS
HJ300 63	3.445	3.145	2.345	1.845	1.545	1.345	3.190	2.590	1.890	1.490	1.290	NS
2/HJ300 63	4.5	4.1	3.6	3.245	3.045	2.545	4.965	4.570	3.790	2.990	2.490	2.090
HJ300 90	4.045	3.665	2.765	2.165	1.765	1.565	3.6###	2.9###	2.1###	1.7###	1.4###	1.2###
HJ360 63	3.965	3.665	2.765	2.165	1.765	1.565	3.6###	3.0###	2.2###	1.7###	1.4###	1.2###
2/HJ360 63	5.0	4.7	4.245	3.865	3.565	2.965	5.470	4.990	4.2###	3.4###	2.8###	2.4###
HJ360 90	4.565	3.765	2.765	2.165	1.765	1.565	3.6###	2.9###	2.1###	1.7###	1.4###	1.2###
HJ400 90	4.565	3.765	2.765	2.165	1.765	1.565	3.6###	2.9###	2.1###	1.7###	1.4###	1.2###

Notes:

1. NS signifies the calculated span is less than 1.2 m.
2. Bearing for single span joists or the end supports of continuous joists, provide at least 30 mm bearing unless signified otherwise by a subscript value adjacent to the quoted maximum span. For the intermediate supports of continuous

span joists, provide at least 65 mm bearing unless signified otherwise by a subscript value adjacent to the quoted span - ##, signifies that web stiffeners are required together with a bearing of 90 mm.

2.0 hyJOIST® INSTALLATION

By separating design considerations from installation requirements the intention is to help builders and designers sort out 'who does what' and minimise the potential for critical matters to 'slip between the cracks'.

There are some aspects of installation that can be regarded by designers and builders as 'basic requirements' to be adopted for installation in the absence of other or additional requirements specified in the design documentation. Requirements that fit into this category are defined and detailed under 'Basic Installation Requirements'.

Other aspects, are categorised as 'Installation details requiring design and specification' because they need selection and individual specification in the design documentation to ensure the design intent is communicated to the builder.

This guide provides a variety of details specific to the use of hyJOIST® floor systems for houses and similar buildings. Details contained in this publication have been appropriately engineer designed and/or tested to determine their suitability. In addition, many details in NZS 3604 and other industry publications are equally applicable to hyJOIST as for conventional timber joisted floors – use them. We do however, caution against any assumption that details published for other I-Joist products are suitable or sufficiently complete for use with hyJOIST.

In all cases it is assumed that installation will be carried out in accordance with a joist layout drawing showing the location, size (section code) and maximum spacings of joists together with reference to any special requirements not included in this guide as 'basic requirements'.

2.1 BASIC INSTALLATION REQUIREMENTS

Installation requirements specified in this section should be assumed to apply as minimum requirements in the absence

of additional or other requirements specified in the design documentation.

2.2 JOIST PLACEMENT

Joists should be accurately placed at not more than the nominated maximum centre to centre spacing so as to provide

the support required for flooring and load bearing walls or posts.

2.3 FIXING TO SUPPORTS

Joists are to be fixed accurately in position at supports using nails or screws as per Detail F5.

2.4 SUPPORTS

Supports shall be level, dry and have at least the rigidity implied by good framing practice and/or the design criteria specified for supporting components in NZS 3604. (A moisture barrier

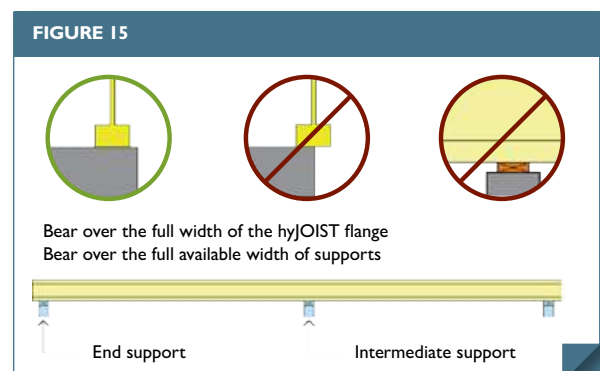
is recommended where support is directly to masonry or brickwork). Brackets available for use with hyJOIST are listed on page 5.

2.5 BLOCKING AND BEARING AT SUPPORTS (FOR SUPPORT OF GRAVITY LOADS)

General

- Bearing should be provided to the full width of the hyJOIST bottom flange
- It is good practice to bear over the maximum available width of supports
- Use of web stiffeners can reduce the required bearing however this needs to be specified in the design documentation
- Continuous blocking provides support for load bearing walls directly aligned above supports. At end supports, 'rimboard' or boundary joists can be used as an alternative to continuous blocking to support a load bearing wall

In the absence of any alternative specification in the design documentation bearing support details can be referred on page 4



2.6 LATERAL RESTRAINT

Intermittent blocking (or equivalent) at supports

The fundamental requirement is to install joists plumb and hold them upright at supports.

The simplest and most effective way of achieving this is to install square cut hyJOIST® blocking but alternative methods such as the use of 'rimboard', boundary joists, metal strap/brace or plywood closures are acceptable.

For installation of blocking, 'rimboard', boundary joist, metal strap/brace or plywood enclosures refer to Details F1, F2, F3 and F17.

FIGURE 16

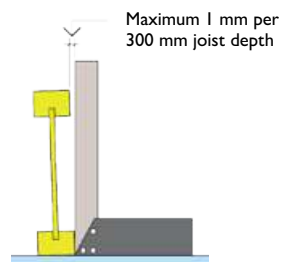
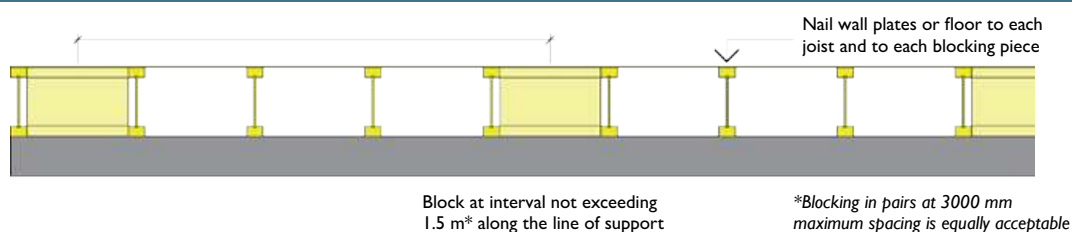


FIGURE 17



2.7 INTERMEDIATE RESTRAINT (BETWEEN SUPPORTS)

For best performance, the top flange of hyJOIST should be held straight between supports – (no more than 1 mm per metre of span deviation from straight).

Before loading joists and attachment of flooring:

- Install blocking (or equivalent) at supports as described above, and

- between supports, install temporary battens braced back to a point of rigidity (no more than 2.5 metres apart) to hold the top flange of each joist straight between supports
- For installation of flooring, progressively work across the floor removing battens as required

Note: Intermediate blocking is not required and can be a source of annoying nail creaks in the finished structure

FIGURE 18

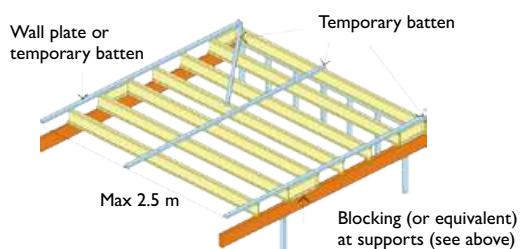
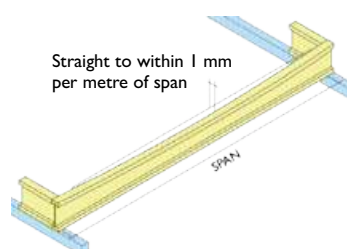


FIGURE 19



Fixing of Flooring

Flooring may be nailed to joists and to blocking using either 2.8 mm diameter nails, hand driven or 2.5 mm diameter nails, machine driven. Alternatively, for sheet flooring self-drilling Type 17 screws may be used. Fastener lengths should not exceed the lengths given in Table 1. Nail or screw spacing should be at centres recommended for the particular flooring type. Where nail centres are less than 50 mm it is good practice to stagger their location so as to avoid the possibility of splitting. It is strongly recommended that flooring adhesive is used in conjunction with nailing.

TABLE 7:

Flooring Thickness	15-21 mm	25 mm
Maximum Nail/Screw Lengths	50 mm	57 mm

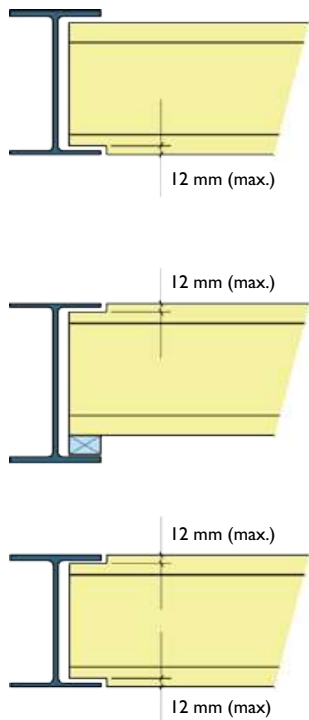
2.8 NOTCHING/CUT BACKS/HOLES WITH hyJOIST®

Notches or holes in flanges

Flanges may not be notched, planed or bored except as noted below

1. At end supports only, one or both flanges may be notched to a maximum depth of 12 mm (per flange) as shown in Detail F7
2. At end supports flanges may be chamfer cut but not beyond the line of the support
3. Do not bore holes through flanges. Holes up to 6 mm for installation of nails or screws at supports allowed

FIGURE 20



Notches or holes in webs

1. At end supports webs may be notched to accommodate the flange of a steel supporting beam within the limitations specified
2. Holes may be cut through the web of hyJOIST® for the installation of service pipes and ducts but there are limitations on the placement, size and shape of holes. In general, larger holes must be located closer to midspan. Guidance on the positioning of web holes is given on page 9. Alternative locations may be specified in the design documentation for specific load and support cases.

FIGURE 21

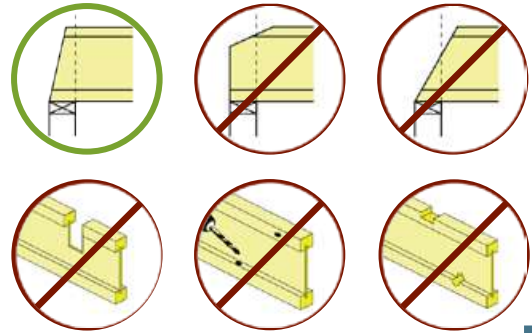


FIGURE 22

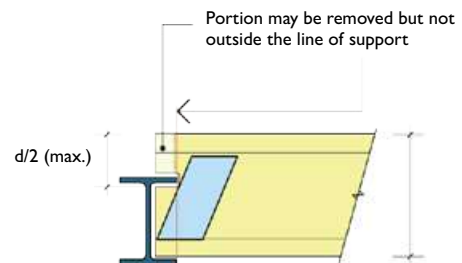
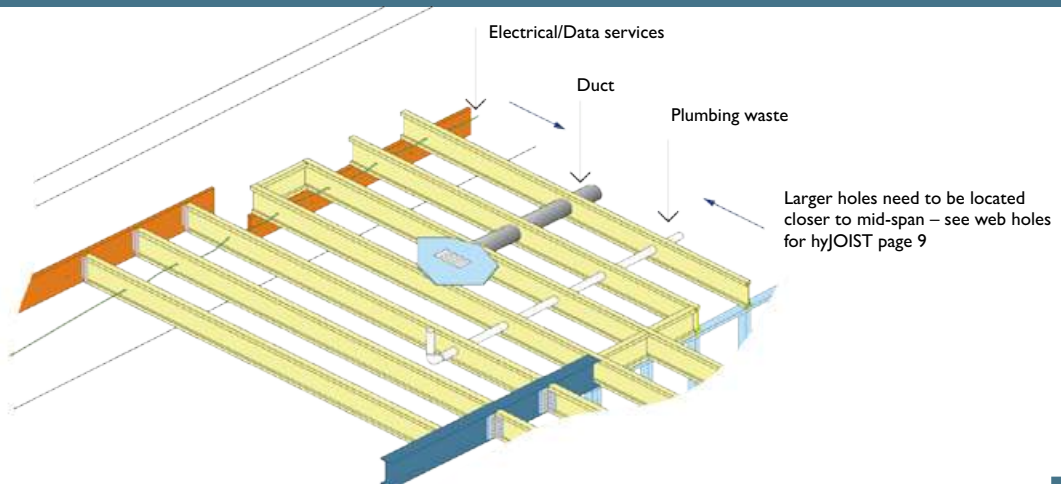


FIGURE 23



2.9 METHOD FOR FRAMING CANTILEVERS SUPPORTING LOAD BEARING WALLS

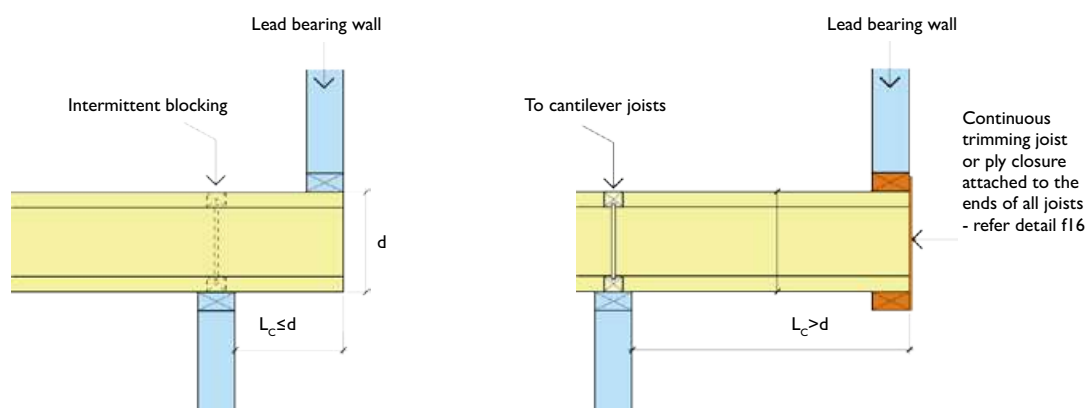
Some or all of hyJOIST® cantilevered to support a load bearing wall may require reinforcement. This requirement needs to be considered in design and specified in the design documentation. Details for reinforcement are given in Details F21 and F22.

Regardless of whether reinforcement is required or not, cantilevers with span greater than the joist depth are to be installed with continuous blocking at the cantilever support and

a trimming joist (or equivalent) providing load distribution at the ends of the cantilevered joists. The use of a trimming detail helps to both stiffen the balcony and limit long term differential deflections. For installation see Detail F15.

Short cantilevers ($L_c \leq d$) may need reinforcement but intermittent blocking only is needed at the cantilever support and the trimming joist need not be included – see Detail F14.

FIGURE 24



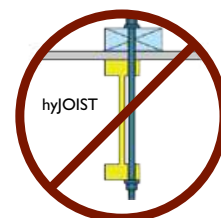
2.10 TIE DOWN AND TRANSFER OF LATERAL FORCES THROUGH THE FLOOR

Requirements for tie down and bracing should be specified in the design documentation.

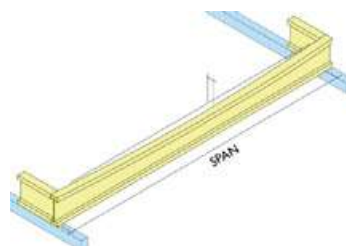
Tie Down

In general, tie down details applicable for solid timber joists as specified in NZS 3604 can also be used with hyJOIST except that bolting through the flanges of hyJOIST is not permitted.

Detail F9 and TD1 – TD5 show how bracing walls may be tied down to a hyJOIST floor system.



Do not bolt through joists



Transfer of lateral forces through the floor

Lateral wind and earthquake forces determined for the upper storey must be transferred through the floor to the top plate (and the bracing system) of the lower storey. Where these forces are perpendicular to the direction of joists, intermittent blocking or the fixings to 'rimboard' or boundary joists are not likely to be adequate to transfer the full extent of the forces. For most external walls the simplest answer is to just continue the upper storey bracing (and associated tie-down) through the floor to the top plate of the lower storey wall.

Alternatively, or where continuation of bracing is not possible, such as where joists or outrigger joists are cantilevered (or for internal walls) it is recommended that sufficient blocking is provided to accommodate the nailing attachment of the upper storey wall bottom plate to the blocking and the blocking bottom flange to the top plate of the lower storey wall to match the capacity of the nailing of the upper storey bracing to the bottom wall plate. Tie-downs using metal strap or tie rods at the beginning and end of each braced portion of the wall should be carried through the floor to lower storey wall.

FIGURE 25

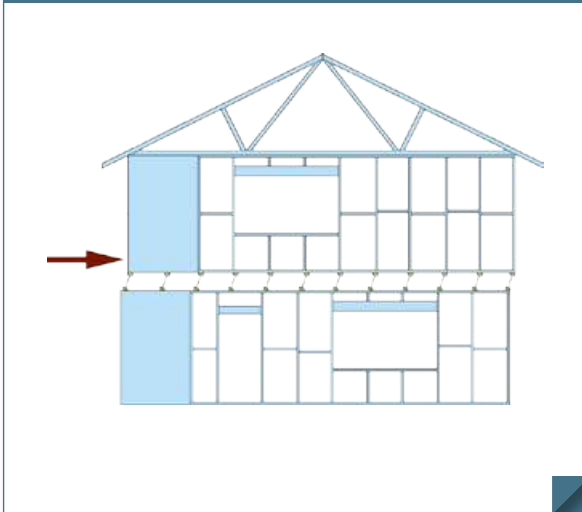


FIGURE 26

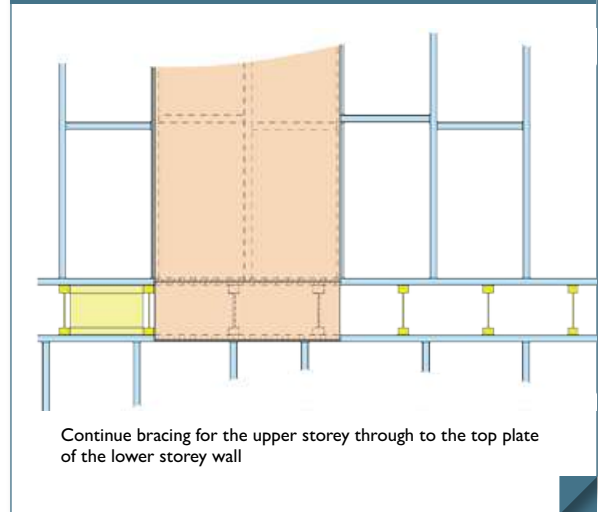
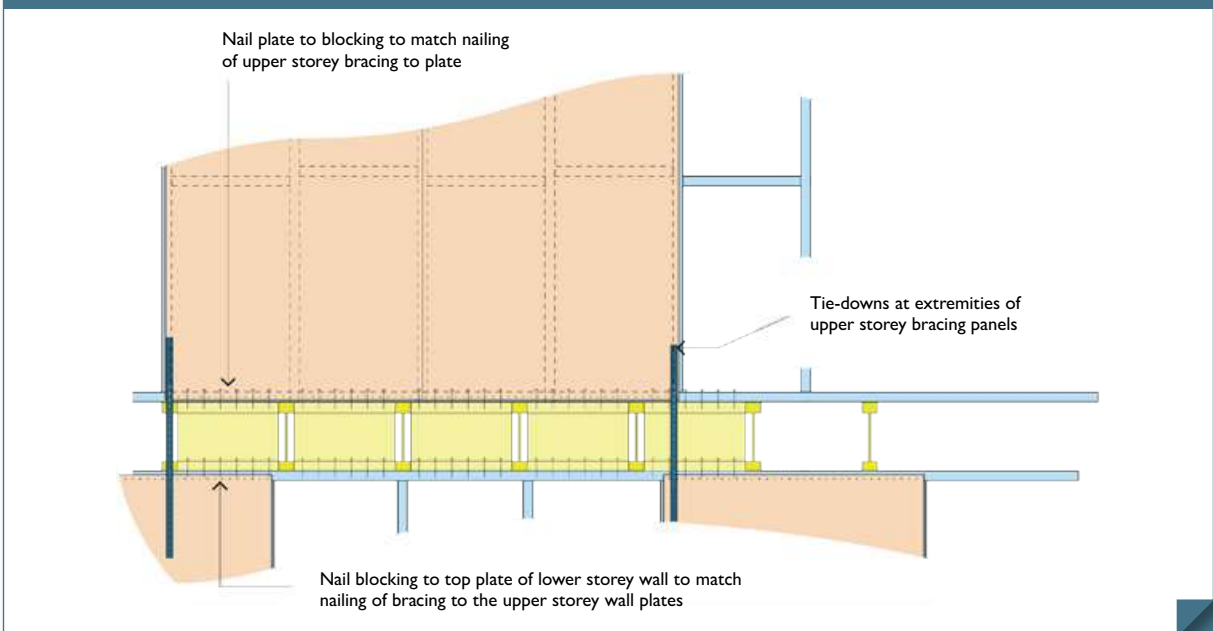


FIGURE 27



Product faults

Faults in manufacture do sometimes occur and faulty product may from time to time reach the market despite even the most stringent controls of the manufacturing process and quality. Please let us know if you receive any product that you have

concerns with – call 0800 808 131 even if you have solved the problem and a claim 'is not worth the hassle'. We want to know so that we can do better.

3.0 INSTALLATION DETAILS REQUIRING DESIGN & SPECIFICATION

The following items need design and specification in the design documentation to communicate the requirements for installation.

- Joist sizes and spacing for span, loading and flooring
- Method of framing around openings in floors (eg stair voids)
- Method of framing balcony cantilevers
- Reinforcement requirements for cantilevers supporting load bearing walls
- Bearing and support requirements differing from that specified under basic requirements for installation
- Details for tie-down and transfer of lateral forces through the floor beyond that specified in the basic requirements
- Specification of web holes and permitted locations (not within the scope of tables on page 9)

Framing around floor openings

The size of members needed to frame around floor openings needs to be determined in design and specified in the design documentation for installation.

For convenience the depth of the trimmers and trimming joists are usually chosen to be the same as the depth of the floor joists. The ease of connecting and the greater strength and stiffness of hySPAN® relative to depth in comparison with hyJOIST® makes hySPAN the ideal material for framing both the trimmers and the trimming joists.

Trimmers and the supporting trimming joists may in some cases be hyJOIST, where structurally adequate. These can be connected using top mount hangers see Joist Hangers for hyJOIST on page 5 and Detail F10.

Methods of framing balcony cantilevers

Balcony cantilevers are frequently exposed to wetting and in this circumstance there is a high risk of decay with subsequent loss of strength of the balcony structure. hyJOIST and hySPAN are not suitable for use in fully weather exposed applications but can be treated to a H3.1 level for protection against low level rot and decay and are ideal for use in weather protected balconies. For fully exposed balconies H3.2 treated outriggers can be specified and installed with confidence.

Design should include specification of either the 'adjacent' or 'nested' outrigger detail and the specification of the outrigger material. Outrigger length and quantities can be determined and the installation performed in accordance with the specified detail.

For weather protected or internal balcony cantilevers Detail F13 may be used.

FIGURE 28

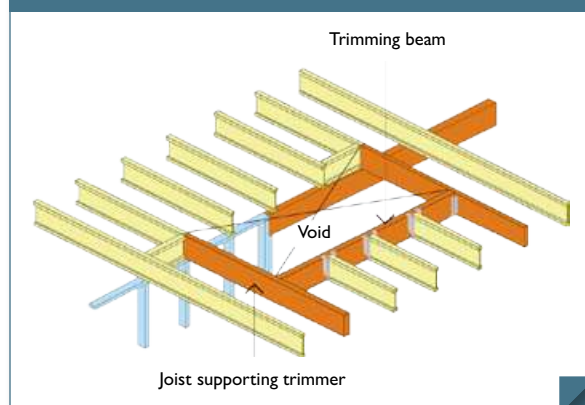


FIGURE 29: Balcony cantilevers using outriggers

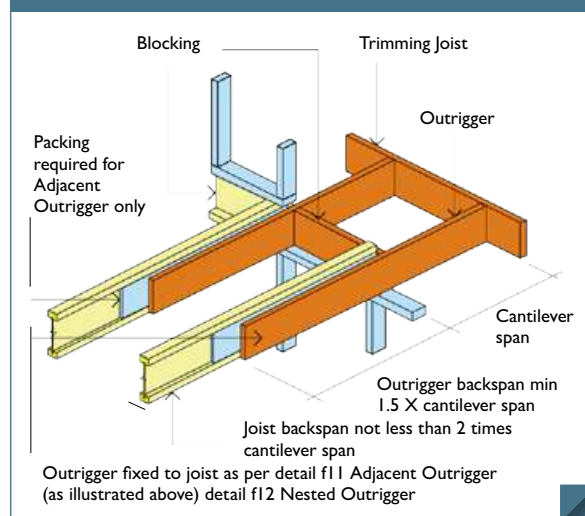
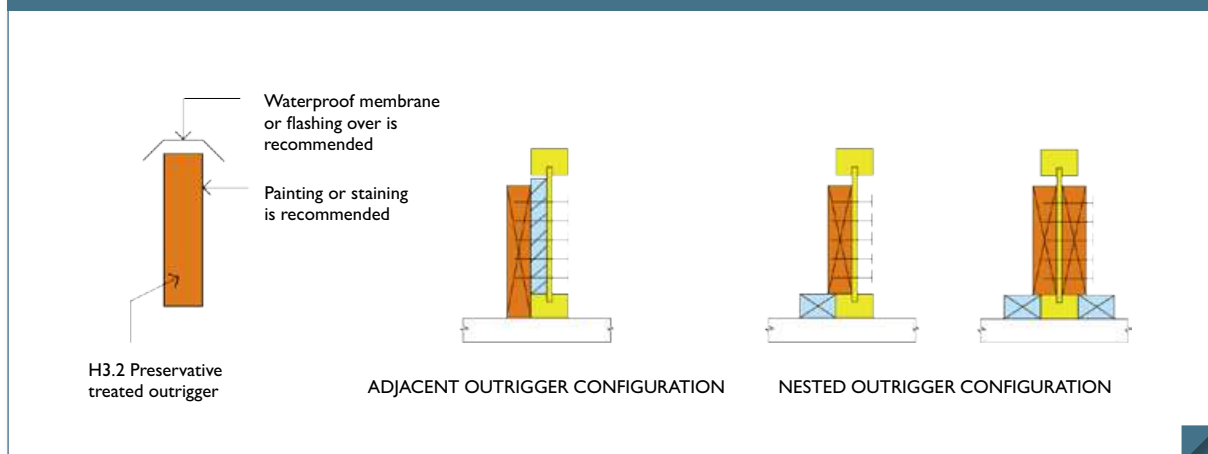
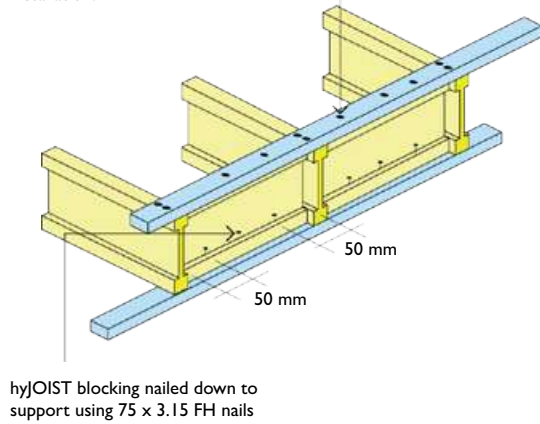


FIGURE 30

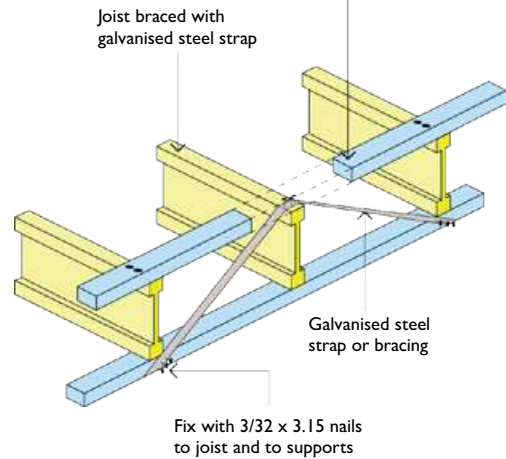


DETAIL F1: End restraint – blocking with hyJOIST®

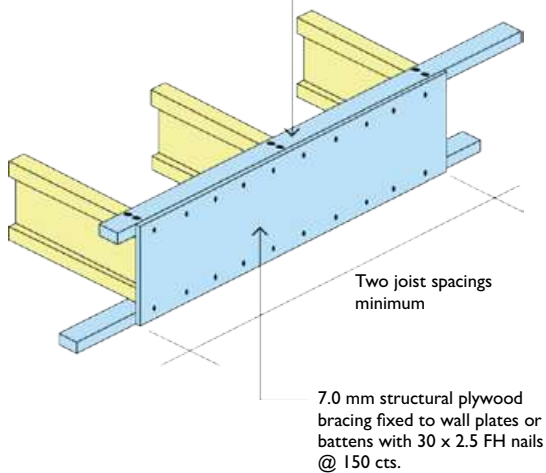
Wall plate/flooring or temporary batten, nailed to hyJOIST joists. Nail through flooring or wall plate into blocking for permanent installation.


DETAIL F2: End restraint – using steel strap or bracing

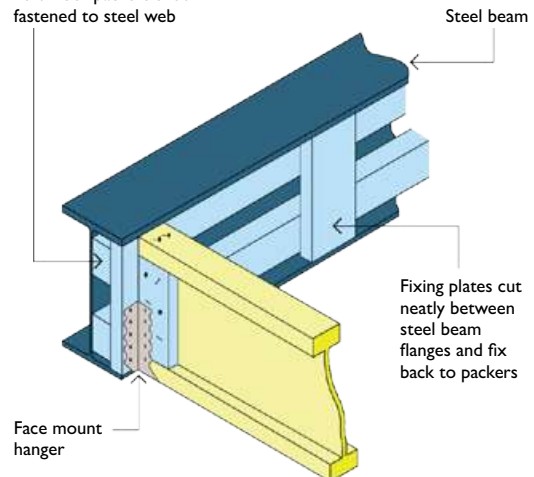
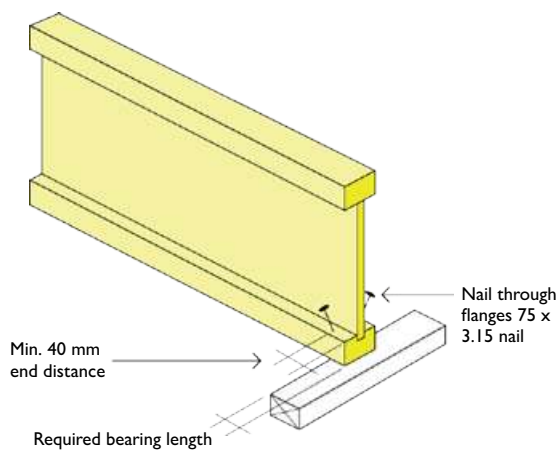
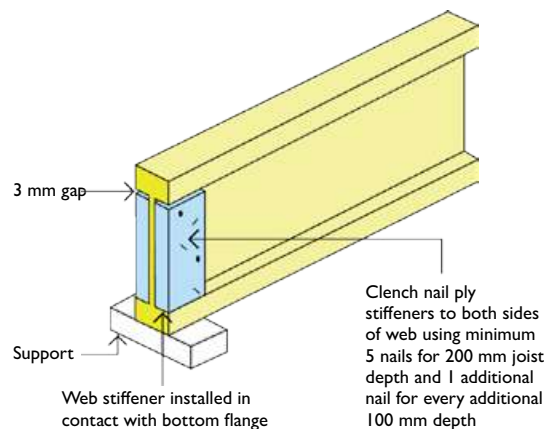
Wall plate/flooring or temporary batten, nailed to hyJOIST


DETAIL F3: End restraint – using ply or hardboard bracing

Wall plate or batten


DETAIL F4: Fixing hyJOIST® to steel beams – using face mount hangers

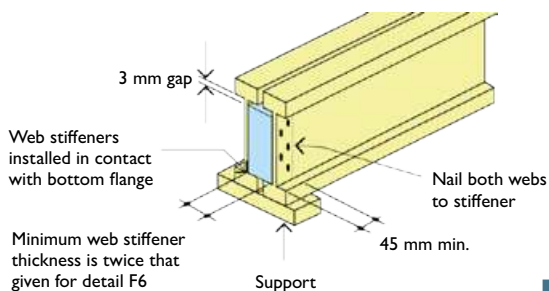
Packers 70 x 35 or 70 x 45 timber packers shot fastened to steel web


DETAIL F5: Nailing down to supports

DETAIL F6: Installation of web stiffeners


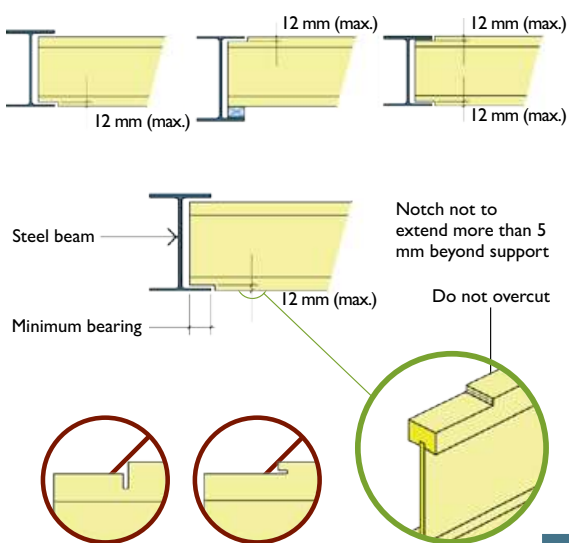
	45 mm flange	63 mm flange	90 mm flange
Stiffener/packer thicknesses*	18 mm	27 mm	39 mm
Nail length	50 mm	75 mm	100 mm

*Plywood of appropriate thickness is available as an accessory product

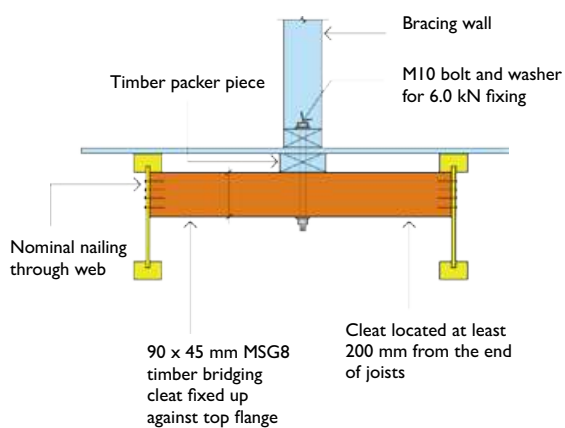
DETAIL F6A: Web stiffeners for double joists



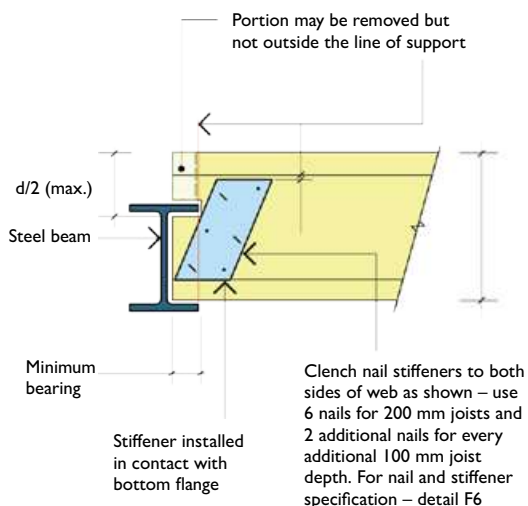
DETAIL F7: Notching of flanges at end supports



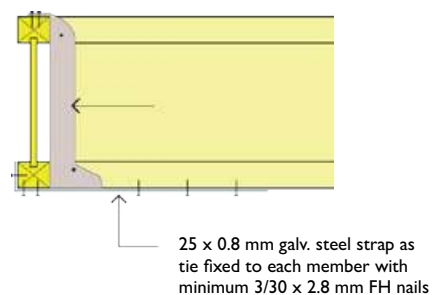
DETAIL F9: Tie-down to internal bracing wall



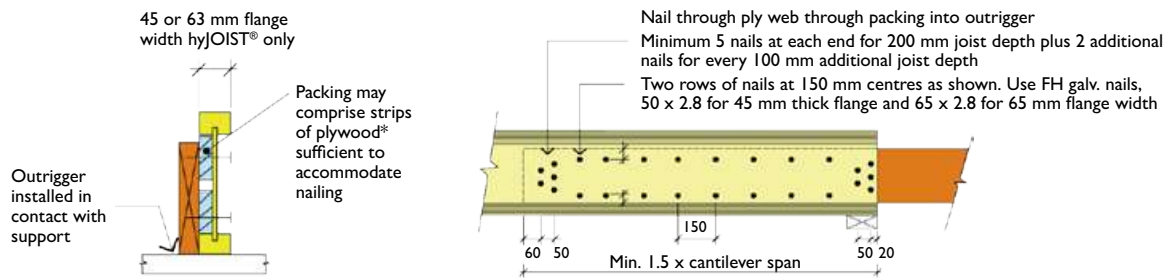
DETAIL F8: Notching of webs for steel beam flange



DETAIL F10: hyJOIST®/ hyJOIST connection

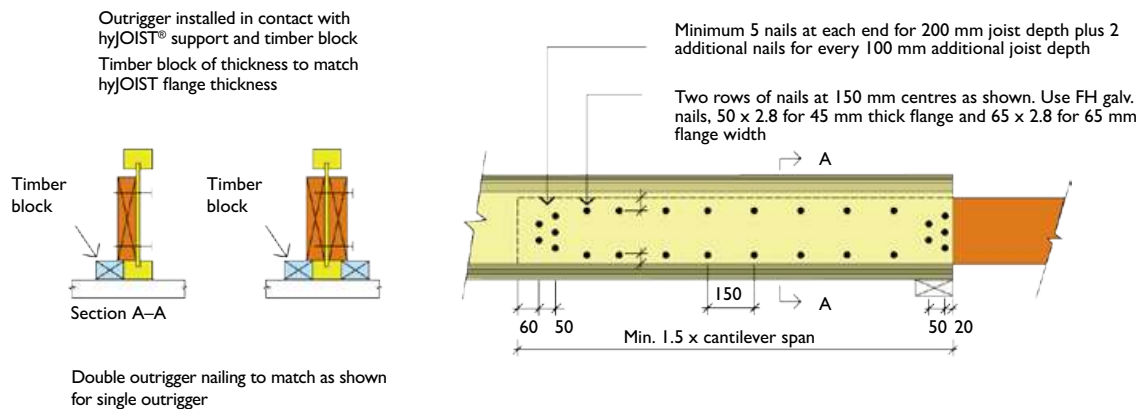


DETAIL F11: Adjacent outrigger

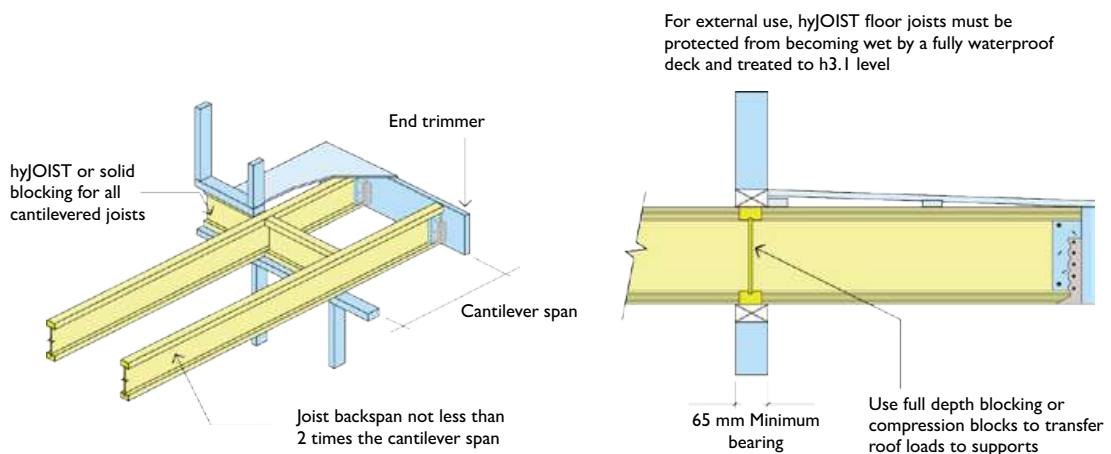


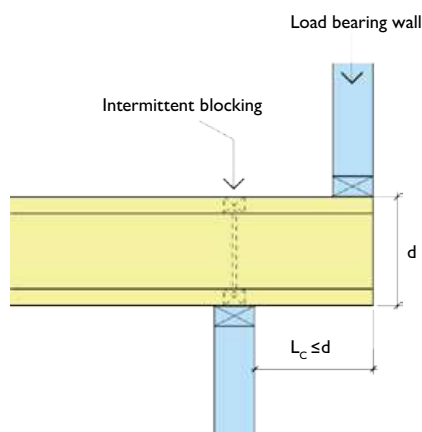
Plywood strips suitable thickness available as accessory product

DETAIL F12: Nested outrigger installation



DETAIL F13: hyJOIST® cantilever for internal or weather proofed balcony applications

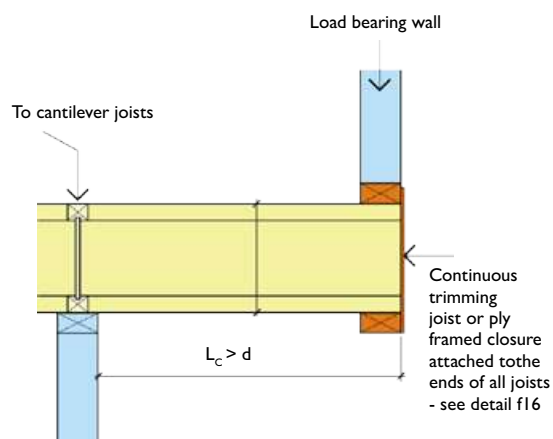


DETAIL F14: Short cantilever supporting load bearing wall


Where specified

Install type 1 reinforcement in accordance with detail F21

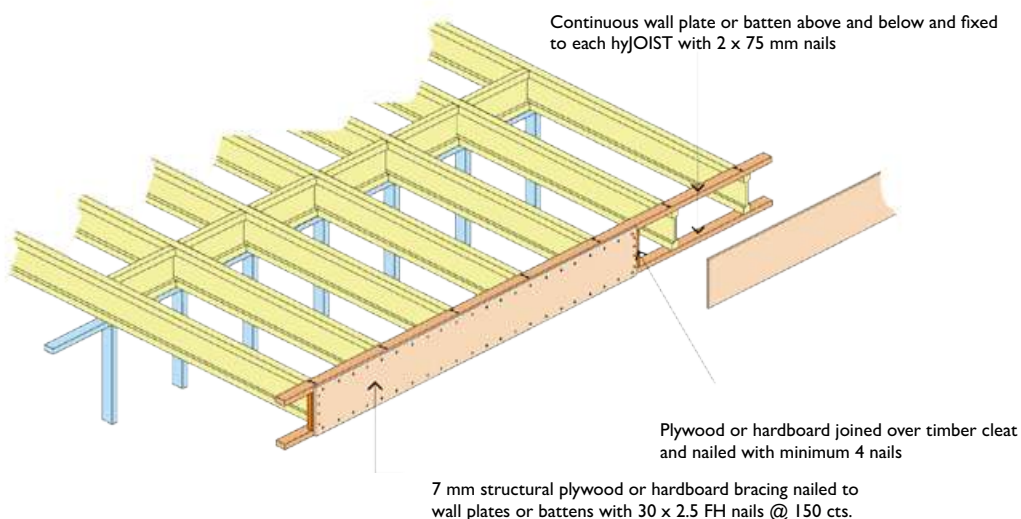
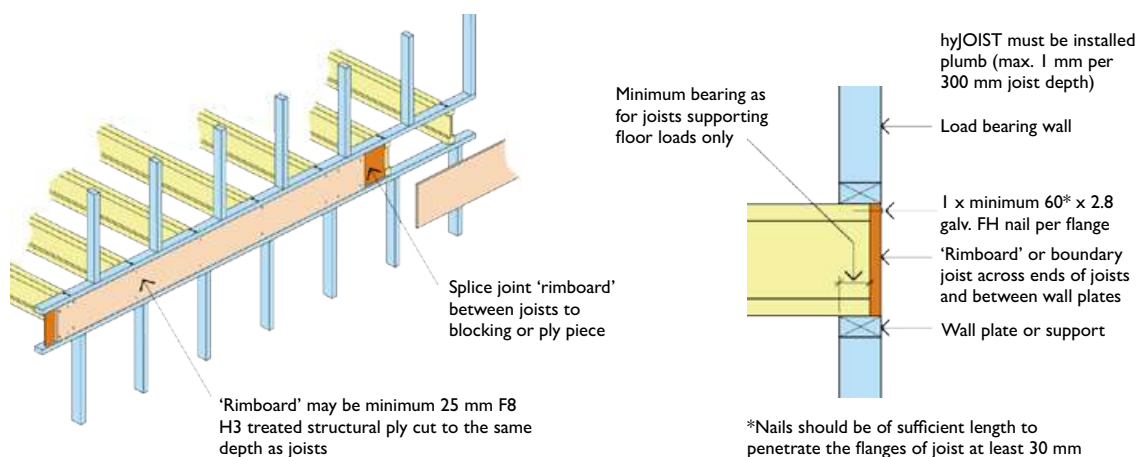
Install type 2 reinforcement in accordance with detail F22

DETAIL F15: Cantilever supporting load bearing wall


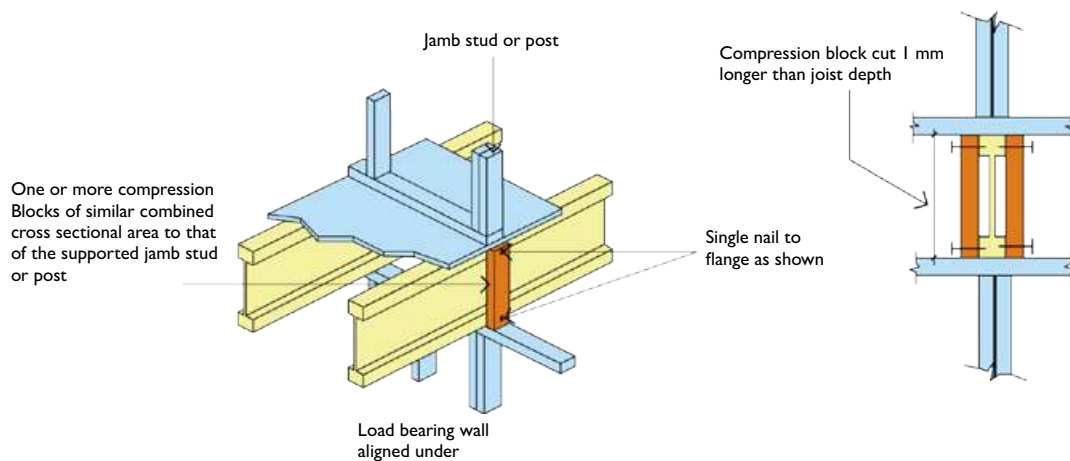
Where specified

Install type 1 reinforcement in accordance with detail F21

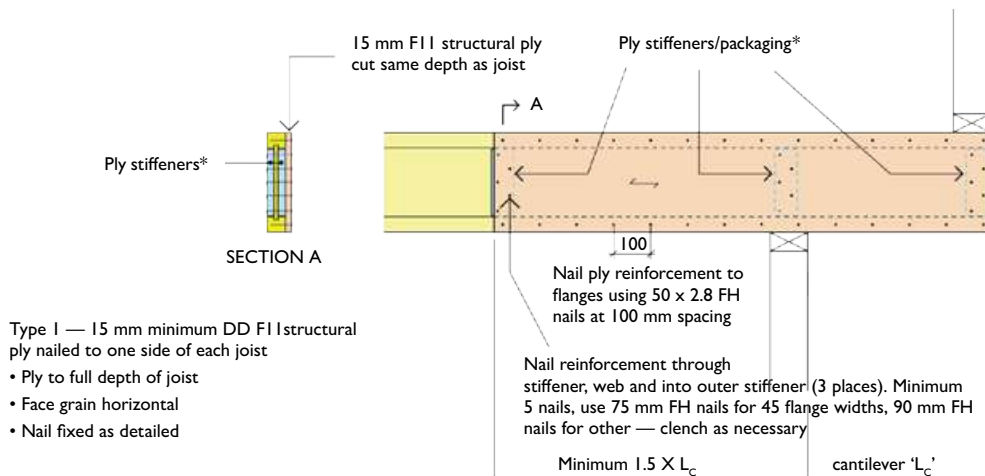
Install type 2 reinforcement in accordance with detail F22

DETAIL F16: Cantilevers supporting load bearing walls — installation of end trimmer

DETAIL F17: End restraint – using 'rimboard' or boundary joist


DETAIL F18: Installation of compression blocks

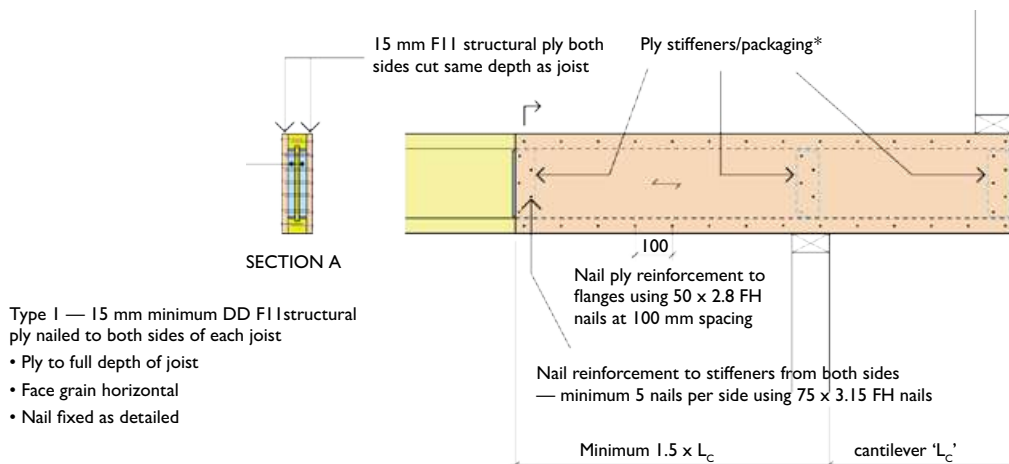


DETAIL F21: Cantilever supporting load bearing walls — Type 1 reinforcement



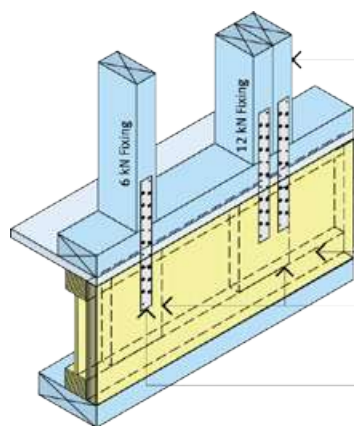
* Plywood strips of suitable thickness available as accessory product

DETAIL F22: Cantilever supporting load bearing walls — Type 2 reinforcement



* Plywood strips of suitable thickness available as accessory product

DETAIL TD1: Tie-down for external bracing wall using Rimboard



Block up to first nog fixed to stud with 3/100 x 3.75 nails to accommodate double strap

25 mm F8 plywood rimboard

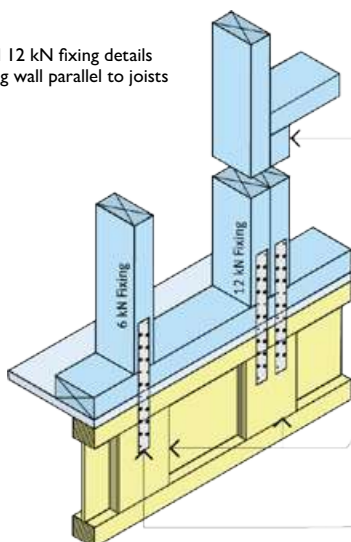
hyJOIST web stiffener each side of joist – fix as per detail F6

Sheet brace strap 300mm x 25mm x 0.9mm fixed with 6/30 x 3.15 nails to each end

6 kN and 12 kN fixing details using rimboard

DETAIL TD2: Tie-down for external bracing walls

6 kN and 12 kN fixing details
— bracing wall parallel to joists



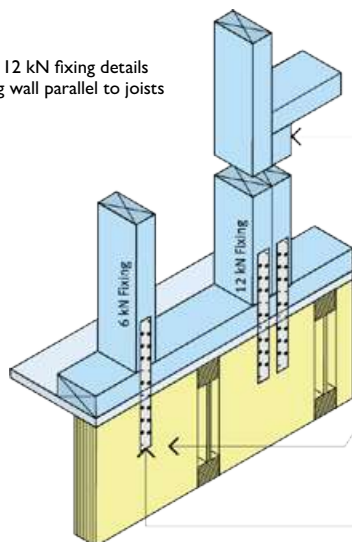
Block up to first nog fixed to stud with 3/100 x 3.75 nails to accommodate double strap

hyJOIST® web stiffener each side of joist — fix as per detail F6

Sheet brace strap
300Mm x 25mm x 0.9Mm fixed with 6/30x3.15 nails to each end

DETAIL TD3: Tie-down for external bracing walls

6 kN and 12 kN fixing details
— bracing wall parallel to joists

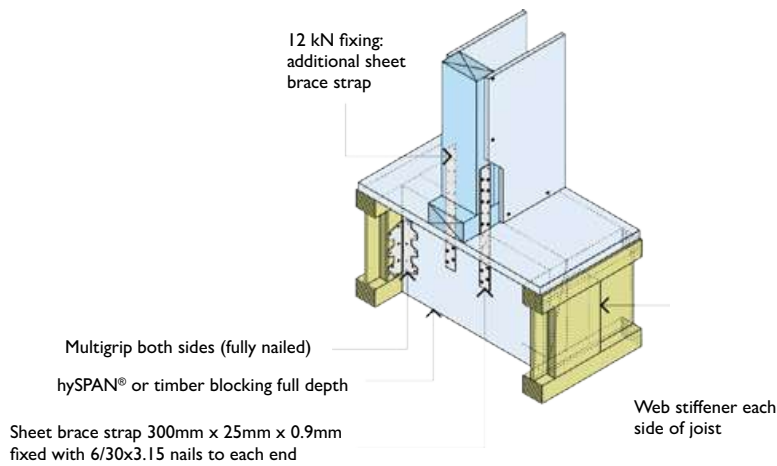


Block up to first nog fixed to stud with 3/100 x 3.75 nails to accommodate double strap

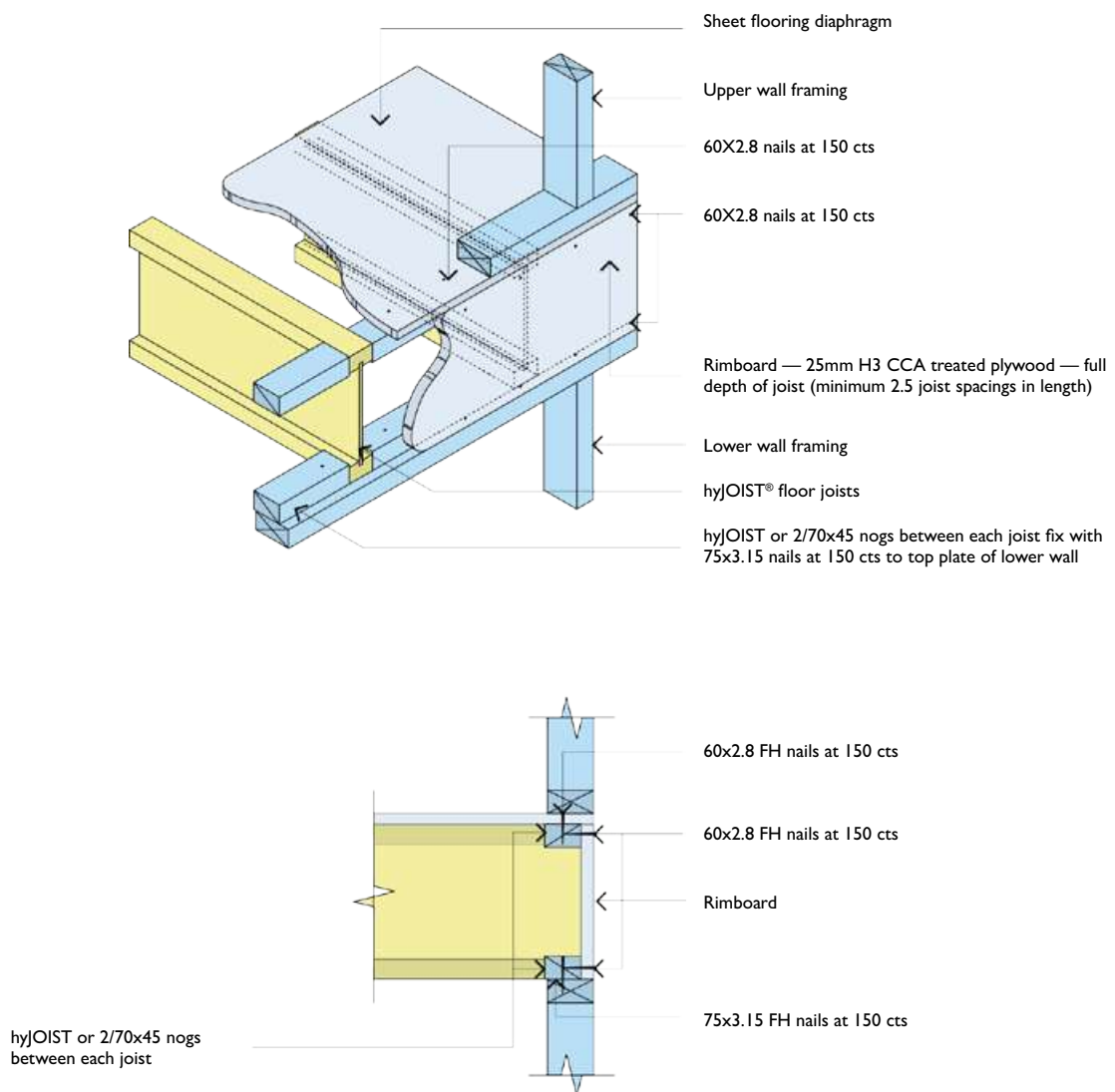
hyJOIST® or timber nog between joists

Sheet brace strap
300Mm x 25mm x 0.9Mm fixed with 6/30x3.15 nails to each end

DETAIL TD4: Tie-down for internal bracing walls



DETAIL TD5: Bracing transfer through diaphragm floors



4.0 hyJOIST® RAFTERS

hyJOIST® may also become part of a very effective and economical roof system, particularly where low pitch roofs with ceiling directly attached to the underside are being designed. hyJOIST rafters allow the flexibility of having provision for the installation of ducting and electrical services through the web, whilst offering ample room to include insulation.

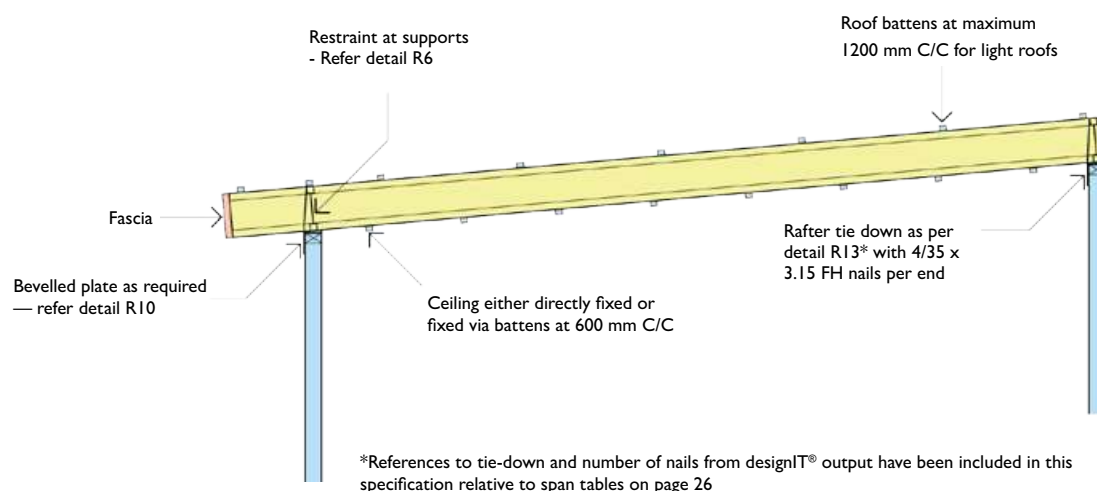
hyJOIST may also be used for pitched roofs up to 35 degrees where special attention is paid to connection and tie-down. It is

important that the connection of rafters includes for the effects of wind loading as well as dead, live and snow loads where applicable.

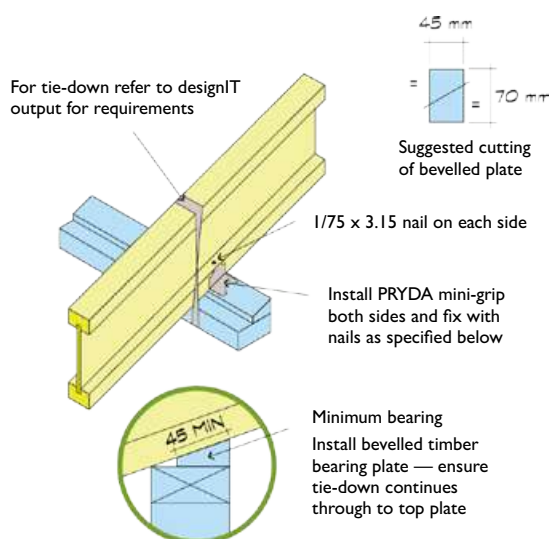
Rafter tie-down using looped over strap is recommended whilst bracing requirements do not differ with the use of a hyJOIST roof system.

TYPICAL INSTALLATION FOR LOW PITCHED ROOFS

FIGURE 31



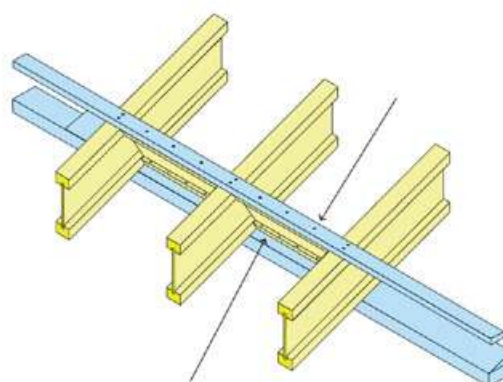
DETAIL R10: Fixing and support using bevelled plate



Roof pitch	Rafter spacing	Installation of mini-grips or similar
≤10°	≤1200	Not required
	≥1200	Fix with 2/35 x 3.15 FH nails per tab
10° to 35°	≤1200	Fix with 4/35 x 3.15 FH nails per tab
	≥1200	Fix with 5/35 x 3.15 FH nails per tab

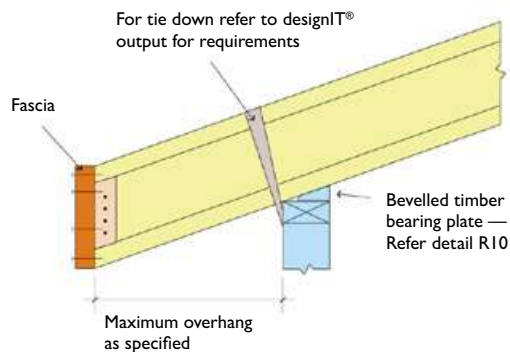
For roof pitches greater than 35° seek engineering advice

DETAIL R6: Restraint at supports — using blocking

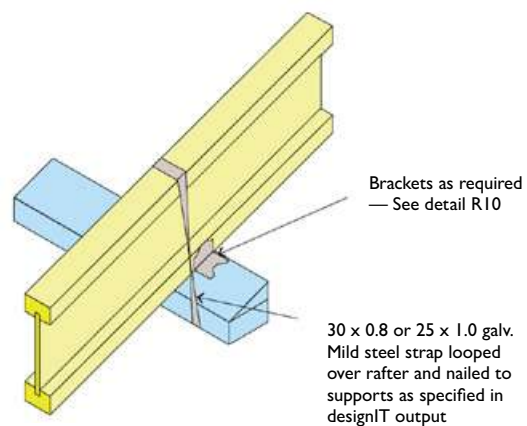


hyJOIST blocking nailed down to supports individual blocking pieces may be spaced up to 1.8m centres or 3 rafter spacings, whichever is greater

DETAIL R7: Rafter overhang — sloping soffit with bevelled plate supports



DETAIL R13: Rafter tie-down — using looped steel strap



4.1 RAFTER SPAN TABLES

The following span tables have been prepared in accordance with AS 1684.1: 1999 and are based on the following design criteria:

- Rafters are for a house.
- The bottom flange is restrained by ceiling or ceiling battens at maximum 600c/c.
- Roof mass does not exceed 40 kg/m², i.e. light roof and ceiling.
- Wind Zones up to Very High.
- Snow loads up to 0.5 kPa (Snow loads for 1.0 kPa may be designed using modification factors from Section 15 of NZS 3604:1999).
- Permanent load serviceability design limit: span/300 or 20 mm.

TABLE 10:

hyJOIST® section code	Single span							
	Rafter spacing (mm)							
	450		600		900		1200	
	Span (m)	O/h (m) ²	Span (m)	O/h (m) ²	Span (m)	O/h (m) ²	Span (m)	O/h (m) ²
HJ200 45	5.5	1.4	5.0	1.4	4.4	1.3	4.0	1.3
HJ240 63	6.8	1.9	6.3	1.8	5.6	1.7	5.1	1.7
HJ240 90	7.3	2.3	6.9	2.1	6.3	2.0	5.8	1.9
HJ300 63	7.7	2.4	7.3	2.2	6.5	2.1	5.7	2.1
HJ300 90	8.3	2.8	7.9	2.6	7.1	2.4	6.7	2.3v
HJ360 63	8.5	2.8	7.8	2.6	6.4	2.6	5.6	2.4
HJ360 90	9.2	3.3	8.6	3.1	8.0	2.8	7.4	2.8
HJ400 90	9.8	3.6	9.2	3.4	8.5	3.1	7.8	3.0

Note:

1. Limited by strength

2. Overhang should not exceed half the length of the backspan

designIT allows for the design and specification of hyJOIST® rafters for other applications including:

- Roof mass from 10 kg/m² to 90 kg/m²
- Low, medium and high wind zones
- Rafters where continuous restraint is not provided to the bottom flange
- Overhangs with horizontal soffits
- Face fixing to ridge beams and details for birdsmouthing over supports
- Alternate fixing details

5.0 COMPLIANCE WITH THE NEW ZEALAND BUILDING CODE (NZBC)

This guide provides technical information for the design and installation of hyJOIST® engineered I-joists as floor joists and rafters in domestic and residential buildings. Further design guidance can also be obtained from the designIT NZ software available from futurebuild. This guide is intended to be used by designers or builders to select appropriate sizes of hyJOIST members and their connections in the framing of houses and similar buildings.

Manufacture

hyJOIST is an engineered I-joist. The flanges are Laminated Veneer Lumber (LVL) intended for structural use and conforming with the requirements of AS/NZS 4357:2005 Structural Laminated Veneer Lumber. The webs are structural plywood conforming to AS/NZS 2269:2004 Plywood - Structural. hyJOIST is Product Certified by the Engineered Wood Products Association of Australasia (EWPA) as being manufactured in accordance with AS/NZS 4357 and AS/NZS 2269. The EWPA is accredited for product certification by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Design

The design methodology used in the preparation of this guide complies with the requirements of the following design standards:

- AS/NZS 1170:2002/3 Structural Design Actions
- AS 1720.1:1997 Timber Structures, Part 1: Design methods.

The design properties and methodologies of hyJOIST used to

calculate the span tables in this brochure were determined in agreement with NZS 3603:1993 Timber Structures Standard, an Acceptable Solution to NZBC Clause 1 Structure.

Guidance has been taken from AS 1684.1:1999, Residential timber-framed construction, Part 1: Design criteria, and reviewed to ensure agreement with NZS 3604:1999 Timber Framed Buildings, an Acceptable Solution to NZBC Clause 1 Structure. When selected and installed in accordance with the specifications, details and limitations in this guide, hyJOIST floor joists and rafters will comply with the requirements of the New Zealand Building Code.

Durability

The expected service life of hyJOIST members is in excess of 50 years in dry protected areas, where moisture content is maintained below levels specified in NZS 3602:2003. Designers and building owners must ensure that a building remains weather-tight and hyJOIST remains protected from both external and internal moisture. Exposure to weather during normal construction periods is not a cause for concern. hyJOIST is not recommended for fully weather exposed applications.

Treatment

For weather-protected applications noted in NZS 3602:2003 hyJOIST can be LOSP (solvent) treated to H3 in accordance with AS/NZS 1604.4:2004. This treatment provides the efficacy intended by both H1.2 and H3.1 in NZBC B2/AS1 and NZS 3640:2003

5.1 FOR MORE EFFICIENT FLOOR DESIGN USE

Free designIT® software

Simple to use yet deceptively powerful, designIT® brings efficient and appropriate engineering design solutions within everyone's grasp.

Contact Carter Holt Harvey for your free copy.



designIT®

New designIT uses the same simple system for specifying hySPAN®, hyJOIST® and other selected materials using the data input you're used to. But it now incorporates options for calculating designs with stress graded timber and more complex designs including a range of floor live loads needed for the design of decks, balconies and residential apartment buildings.

designIT® updates

Keeping your designIT up-to-date is easy using the 'Check for Updates' feature contained in the Help Menu. To ensure you always have the latest version regularly select this feature and designIT will automatically check the web. If updates are available simply select 'YES' in the prompt and they will be automatically installed. designIT updated version includes the following additional features:

- New hyJOIST Options Range for more economical floor designs
- Floor joist and bearer calculators, allowing for specification of structural members with point loads, cantilevers and variable spans
- hy90® included as an option for lintels
- hyCHORD® included as an option for floor joists, lintels and rafters
- hyONE for bearers and lintels

5.2 DISCLAIMER

The information contained in this document is current as of December 2013 and is based on data available to CHH Woodproducts at the time of going to print. CHH Woodproducts reserves the right to change the information contained in this literature without prior notice. It is important that you call 0800 808 131 to confirm that you have the most up to date information available or refer to www.chhwoodproducts.co.nz

CHH Woodproducts has used all reasonable endeavors to ensure the accuracy and reliability of the information contained in this document. This information does not replace professional advice and we recommend that professional advice should be obtained specific to your circumstances. To the extent permitted by law, CHH Woodproducts will not be liable for any inaccuracies, omissions or errors in this information nor for any actions taken in reliance on this information.



Private Bag 92-106
Victoria Street West
Auckland 1142
New Zealand

Freephone: 0800 808 131
Freefax: 0800 808 132

www.chhwoodproducts.co.nz
www.chhsoftware.com

December 2013

