Masonite Beams Technical Guide for Floor Applications

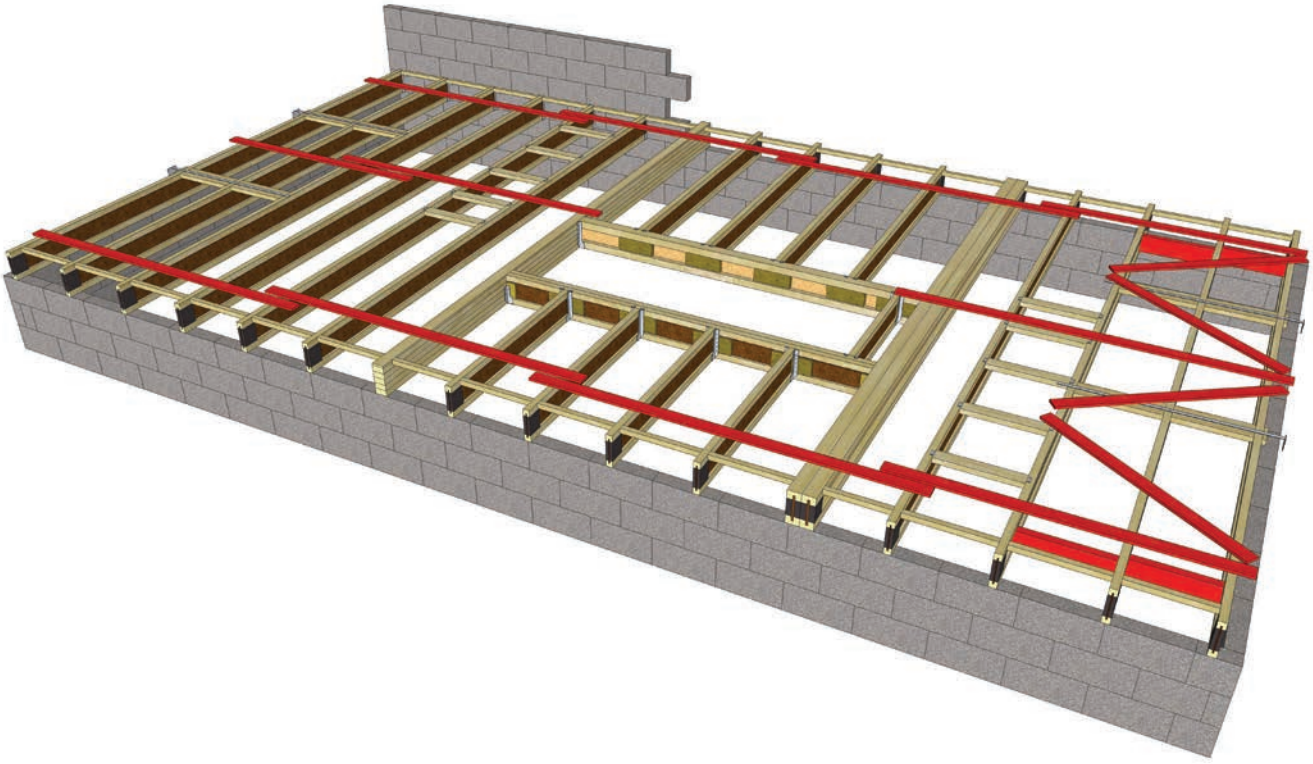
SÖDRA

About Masonite Beams

Masonite Beams AB has been a pioneer of European based I-Joist manufacturing since 1974 and operates from its original location in Rundvik, Sweden.

In 2006 the company was bought by the Byggma Group, a Norwegian building products manufacturing group as part of a strategic move to strengthen its structural products portfolio. The group is comprised of 6 brands.

Its commitment to manufacturing was further underlined in 2008. After 4 years of research and development and an investment programme of £8m, the company opened a new 'state-of-the-art' I-Joist manufacturing plant with a production capacity of 24 million linear metres per year.



Lifetime Guaranteed Quality and Performance

Masonite Beams products are manufactured to precise tolerances in order to meet their published performance characteristics. These products are warranted to be free of defects in materials and workmanship, and to meet the expected design performance, if installed and used in accordance with the information provided in the Installation Guide, for the lifetime of the structure. Should you experience a problem which you believe may have been caused by these products then please contact our representatives who will help to resolve the issue.

Environmental Credentials

In today's construction industry, the issue of sustainability and minimising the impact on the environment are becoming increasingly important. Masonite operates a comprehensive environmental policy, which covers both the manufacture of its products and the sourcing of the raw materials used.

Manufactured in accordance with the environmental management system ISO 14001, Masonite I-Joists utilise wood fibre certified under PEFC with full chain of custody processes. The high efficiency of the 'wood to I-Joist' conversion process means that for a specific volume of Masonite I-Joists, far fewer trees are harvested than those required to produce an equivalent volume of solid sawn timber joists.

Masonite I-Joists

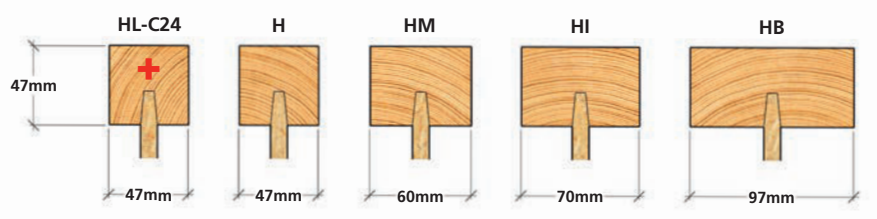
I-Joists are used as structural components in engineered timber floor, wall and roof systems. The majority of Masonite I-Joists are used as part of the Masonite Floor System.

The manufacturing facility in Sweden is supported by Södra in the UK with a first class, dedicated, experienced team handling sales, engineering and design, together with a comprehensive software package covering layout, engineering and cut optimisation.

Masonite I-Joists are a lightweight alternative to conventional timber members, offering time-saving and cost-saving solutions for floor, roof and wall construction to a wide range of private and public sector applications. Unlike traditional timber, which can warp, twist and shrink, Masonite I-Joists have a superior dimensional stability resulting in fewer costly site call-backs.

Masonite engineered timber I-Joists are comprised of slow-grown, high grade white wood flanges combined with OSB or particleboard for the web. Masonite I-Joists carry the ETA certification and CE marking, together with PEFC chain of custody certification. Masonite I-Joists are manufactured in accordance with the requirements of ISO 9001 and the environmental standard ISO 14001. Masonite I-Joists are manufactured to a wide range of lengths to meet all structural requirements and are available in the following depths: 220mm, 240mm, 300mm, 350mm and 400mm.

NOTE:
The HL-C24 Joist is identified by a RED + along the side of the flange.



STANDARD DEPTHS mm	HL-C24	H	HM	HI	HB
220	✓	✓	✓	✓	✓
240	✓	✓	✓	✓	✓
300	✓	✓	✓	✓	✓
350			✓		✓
400			✓		✓

PRODUCT APPROVALS

DOMESTIC FLOORS – CHARACTERISTIC VALUES FOR DESIGNS TO BS EN1995-1-1 FROM ETA12-0018

	DEPTH	SERIES	MOMENT RESISTANCE MR	BENDING STIFFNESS EI	SHEAR RESISTANCE V	SHEAR STIFFNESS GA	BEARING RESISTANCE		
							45MM END BEARING		95MM INTERMEDIATE
	mm		kNm	kNm²	kN	kN	No Reinf.	With Reinf.	No Reinf.
PB	220s	HL-C24	7.20	366	15.1	1453	8.5	8.5	18.9
		H	8.8	432	17.9	1453	9.0	11.9	20.3
		HM	11.3	553	17.9	1453	9.5	12.5	21.8
		HI	13.2	647	17.9	1453	10.5	14.1	24.7
		HB	18.4	900	17.9	1453	12.0	15.8	30.5
	240s	HL-C24	8.01	454	16.5	1645	8.5	8.5	18.9
		H	9.8	535	19.2	1645	9.0	12.0	20.3
		HM	12.6	686	19.2	1645	9.5	12.7	21.8
		HI	14.7	802	19.2	1645	10.5	14.0	24.7
		HB	20.4	1115	19.2	1645	12.0	16.0	30.5
	300s	HL-C24	10.4	779	20.5	2221	8.5	8.5	18.9
		H	12.7	916	23.1	2221	9.0	12.5	20.3
		HM	16.2	1173	23.1	2221	9.5	13.2	21.8
		HI	19.0	1371	23.1	2221	10.5	14.6	24.7
		HB	26.4	1905	23.1	2221	12.0	16.0	30.5
OSB	350	HM	19.3	1707	23.9	3039	9.5	13.6	19.9
		HB	31.4	2753	23.9	3039	12.0	17.2	27.8
	400	HM	22.3	2329	27.3	3579	9.5	14.0	19.2
		HB	36.2	3745	27.3	3579	12.0	18.2	26.9

Reinforcement details can be found on Page 16

VALUES OF k_{mod} FOR MASONITE BEAMS

k_{mod} is a strength modification factor for duration of load and moisture content

LOAD DURATION	BEARING & AXIAL STRENGTH		SHEAR RESISTANCE		BEARING RESISTANCE h<500mm		BEARING RESISTANCE h≥500MM	
	SC 1	SC 2	SC 1	SC 2	SC 1	SC 2	SC 1	SC 2
PERMANENT	0.60	0.60	0.40	0.30	0.60	0.60	0.40	0.30
LONG TERM	0.70	0.70	0.50	0.40	0.70	0.70	0.50	0.40
MEDIUM TERM	0.80	0.80	0.70	0.55	0.80	0.80	0.70	0.55
SHORT TERM	0.90	0.90	0.90	0.70	0.90	0.90	0.90	0.70
INSTANTANEOUS	1.10	1.10	1.10	0.90	1.10	1.10	1.10	0.90

VALUES OF k_{def} FOR MASONITE BEAMS

k_{def} is a deformation factor which is dependant on duration of load and moisture content

BENDING AND AXIAL DEFORMATION		SHEAR DEFORMATION	
SHEAR DEFORMATION	SC 2	SC1	SC1
0.60	0.80	1.50 OSB 2.25 PB	2.25 OSB 3.00 PB

More information regarding the performance of these products can be found in Masonite Beams European Technical Approval; ETA 12/0018

DOMESTIC FLOORS - SPAN CHARTS TO BS EN1995-l-l FROM ETA12-0018

SERIES	SPACING		
	400	480	600
HL 220s (47x220 - C24+)	4.19	3.93	3.60
HL 240s (47x240 - C24+)	4.42	4.23	3.89
HL 300s (47x300 - C24+)	5.05	4.84	4.58
H 220s (47x220 - C30+)	4.32	4.13	3.78
H 240s (47x240 - C30+)	4.56	4.37	4.09
H 300s (47x300 - C30+)	5.21	5.00	4.76
HM 220s (60x220 - C30+)	4.57	4.38	4.08
HM 240s (60x240 - C30+)	4.82	4.62	4.39
HM 300s (60x300 - C30+)	5.51	5.28	5.04
HM 350 (60x350 - C30+)	6.07	5,82	5.57
HM 400 (60x400 - C30+)	6.56	6.29	5.89
Hi 220s (70x220 - C30+)	4.73	4.53	4.27
Hi 240s (70x240 - C30+)	4.99	4.78	4.55
Hi 300s (70x300 - C30+)	5.70	5.47	5.22
Hi 350 (70x350 - C30+)	6.29	6.03	5.76
Hi 400 (70x400 - C30+)	6.78	6.50	6.22
HB 220s (97x220 - C30+)	5.08	4.87	4.64
HB 240s (97x240 - C30+)	5.36	5.13	4.90
HB 300s (97x300 - C30+)	6.13	5.87	5.61
HB 350 (97x350 - C30+)	6.76	6.47	6.19
HB 400 (97x400 - C30+)	7.29	6.98	6.67

Joists up to and including 300mm depth have P5 particleboard webs, deeper joists have OSB webs

NOTES:

1) Spans are calculated for uniform loading of: 0.50 kN/m^2 dead load, 0.25 kN/m^2 partition load, 1.50 kN/m^2 imposed load
2) Loading allows for a 22mm chipboard deck and direct applied 15mm plasterboard ceiling
3) Local resistance has been verified under 2.0 kN imposed concentrated load in accordance with BS EN 1991-1-1, §6.2.l.3(P)
4) Deflections: w_{inst} is limited to L/333 or 12mm whichever is the lowest, $w_{net\ fin}$ is limited to L/250
5) Vibration design in accordance with UK NA to BS EN 1995-1-1 dated 2012-11
6) Bearing resistance assuming: 45mm end bearing, 89mm intermmediate bearing, no web stiffeners, no concentrated load above supports
7) Resistance assume loadsharing i.e. 4 or more joists at no more than 610 centres (k_{sys}= 1.10)
8) Spans listed are worst case between simple and continuous span situation (the latter assuming two equal clear spans)

Glulam Beams

Glulam Beams are manufactured from 40mm laminations of Nordic Spruce to GL24H standard under EN14080.

Available in 12m lengths, Glulam Beams are the perfect complement to I-Joists as part of the Masonite Floor System.

DEPTH mm	38mm	45mm	90mm	140mm
220	✓	✓	✓	
240	✓	✓	✓	✓
300	✓	✓	✓	✓
350		✓		
400		✓		

Glulam Beam Material Properties

CHARACTERISTIC VALUES AND SECTION PROPERTIES OF STANDARD GLULAM FOR USE IN DESIGNS TO BS EN1995-1-1

THICKNESS	DEPTH	AREA A	SECTION MODULUS Z	MOMENT OF INERTIA I	MOMENT RESISTANCE MR	MAX SHEAR V	FLEXURAL RIGIDITY EI	WEIGHT
mm	mm	mm^2x10^3	mm^3x10^6	mm^4x10^9	kNm	kN	Nmm^2x10^9	kg/m
38	220	8.36	0.307	0.034	8.09	19.51	387.76	3.51
45	220	9.90	0.363	0.040	9.58	23.10	459.20	4.16
90	220	19.80	0.726	0.080	19.17	46.20	918.39	8.32
38	240	9.12	0.365	0.044	9.60	21.28	503.42	3.83
45	240	10.80	0.432	0.052	11.36	25.20	596.16	4.54
90	240	21.60	0.864	0.104	22.73	50.40	1192.30	9.07
140	240	33.60	1.344	0.161	35.35	78.40	1854.70	14.11
38	300	11.40	0.570	0.086	14.66	26.60	983.25	4.79
45	300	13.50	0.675	0.101	17.36	31.50	1164.40	5.67
90	300	27.00	1.350	0.203	34.72	63.00	2328.80	11.34
140	300	42.00	2.100	0.315	54.02	98.00	3622.50	17.64
45	350	15.75	0.919	0.161	23.27	36.75	1849.00	6.62
45	400	18.00	1.200	0.240	29.99	42.00	2760.00	7.56

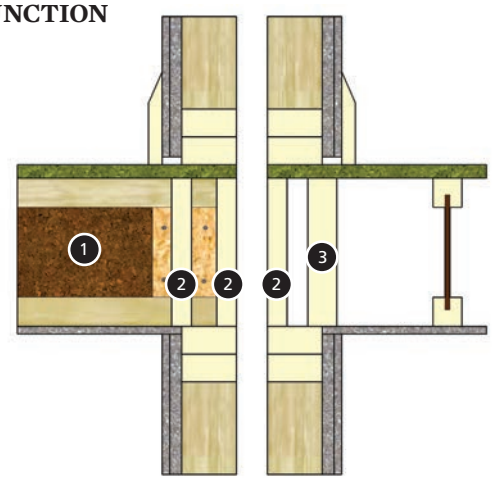
Depth factor k_h has been included in these calculations

CHARACTERISTIC STRENGTH AND STIFFNESS PROPERTIES IN N/mm^2 AND DENSITIES IN kg/m^3 FOR HOMOGENEOUS GLULAM FROM BS EN14080:2013

PROPERTY	SYMBOL	STRENGTH CLASS GL24h
BENDING STRENGTH	$f_{m,g,k}$	24
TENSILE STRENGTH	$f_{t,0,g,k}$	19.2
	$f_{t,90,g,k}$	0.5
COMPRESSION STRENGTH	$f_{c,0,g,k}$	24
	$f_{c,90,g,k}$	2.5
SHEAR STRENGTH	$f_{v,g,k}$	3.5
MODULUS OF ELASTICITY	$E_{0,g,mean}$	11500
	$E_{0,g,05}$	9600
	$E_{90,g,mean}$	300
	$E_{90,g,05}$	250
SHEAR MODULUS	$G_{g,mean}$	650
	$G_{g,05}$	540
DENSITY	$P_{g,k}$	385
	$P_{g,mean}$	420

TIMBER FRAME PARTY WALL JUNCTION

1. Plywood/OSB web filler blocks cut to fit between flanges, thickness to suit flange size, fitted both sides
2. 38mm glulam or 30mm LVL
3. 38mm or 45mm glulam to carry plasterboard

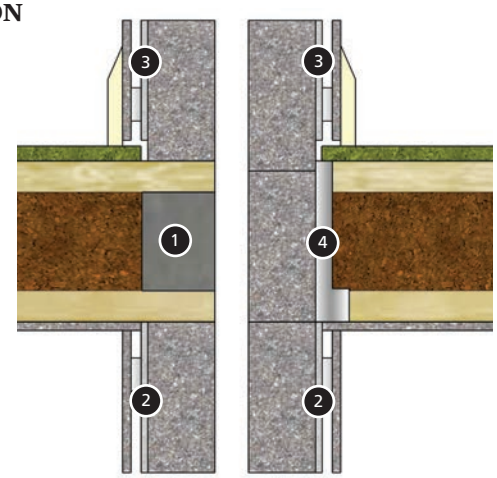


Notes:

These details meet the requirements of Robust Details E-WT-1 and E-WT-2, for timber separating walls.

MASONRY PARTY WALL JUNCTION

1. Effectively seal the joist end with web stiffeners and sealant or a proprietary cap
2. Continuous horizontal ribbon of adhesive
3. Render
4. Masonry Hanger



Notes:

Junction details meet the requirements of Robust Details E-WM-1 to 8 inclusive, for masonry separating walls.

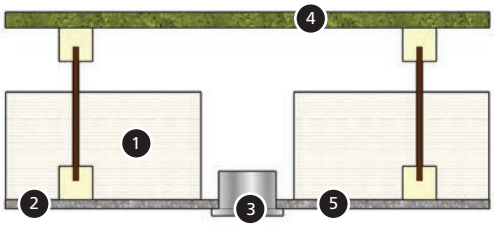
Illustration: concrete blocks, render and gypsum-based boards on dabs (E-WM-3, 4, 6 & 7).

Only use with masonry wall specifications in Part E Robust Details.

STANDARD INTERMEDIATE FLOOR

Floor specifications to provide airborne sound reduction Rw ≥ 40dB (with deck adhesive system) and fire resistance ≥ 30 minutes (EN1365 Part2/3). See page 11.

1. Optional fitment of insulation
2. Fix ceiling lining in accordance with the plasterboard manufacturer's instructions
3. Optional fitment of recessed light fittings. Specification by lighting manufacturer
4. 22mm flooring-grade chipboard
5. 15mm standard wallboard



Notes:

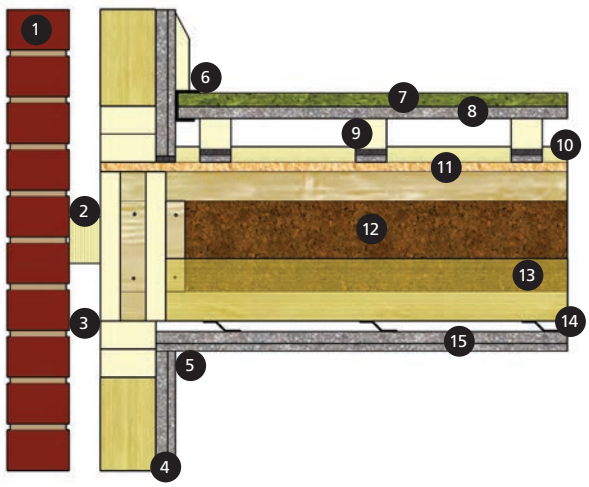
Perimeter noggings may not be required for 15mm plasterboard ceilings, refer to plasterboard manufacturer

Insulation (density 10–36 Kg/m^3) may be required for sound insulation where alternative deck and ceiling constructions are used.

Insulation may be added to improve sound resistance.

TIMBER FRAME EXTERNAL WALL JUNCTION

1. Masonry outer leaf
2. Cavity stop
3. Min. 50mm external wall cavity
4. 2 layers of platerboard lining, nominal weight of 8 kg/m² per layer
5. Seal with tape or caulk with sealant
6. Min. 5mm foamed polyethylene resilient flanking strip
7. Min. 18mm T&G flooring board
8. Gypsum based board (13.5kg/m²)
9. Resilient batten
10. Mineral wool laid between battens
11. 15mm OSB subdeck
12. Min. 240mm Masonite I-Joist
13. Min. 100mm mineral fibre cased quilt (10-36 kg/m³)
14. Resilient bar
15. 2 layers of gypsum-based board, combined weight of minimum 23.5Kg/m², all joints staggered



TIMBER SEPARATING WALL JUNCTION

This is NOT a Robust Detail and therefore will be subject to Pre-Completion Testing (PCT) in England and Wales.

Part E Robust Details E-FT-1 (timber I-Joists) and E-WT1 (twin timber frames without sheathing board or with partial sheathing). Refer to Robust Details Part E handbook for detailed specifications.

1. 22mm Chipboard flooring
2. Gypsum based board (13.5kg/m²)
3. 30mm thick mineral fibre (140 kg/m³)
4. 22mm Chipboard flooring
5. Min. 240mm Masonite I-Joist
6. Min. 100mm mineral fibre cased quilt (10-33 kg/m³)
7. Resilient bar
8. Requirements for intermediate floors, rim board, perimeter joists and blocking apply
9. Plywood/OSB web filler blocks cut to fit between flanges, thickness to suit flange size, fitted both sides
10. 2 layers of gypsum-based board, total nominal weight of 22 kg/m² both sides
11. Min. 18mm T&G flooring board
12. Gypsum based board (13.5kg/m²)
13. Resilient batten
14. Mineral wool laid between battens
15. 15mm OSB subdeck
16. Min. 240mm Masonite I-Joist
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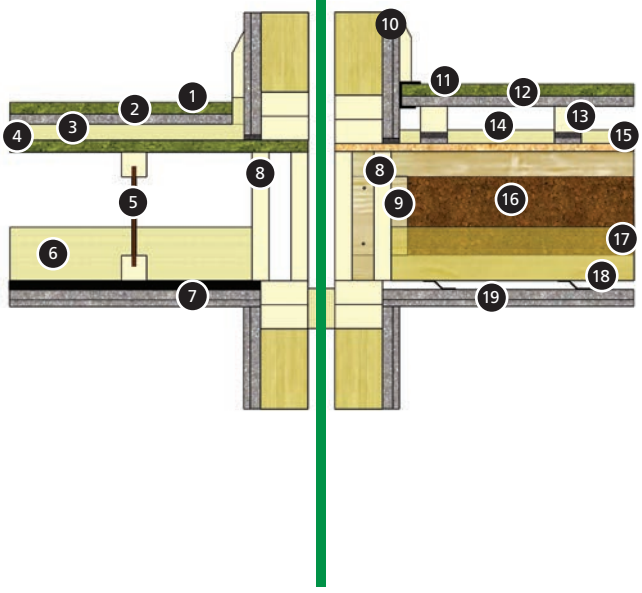
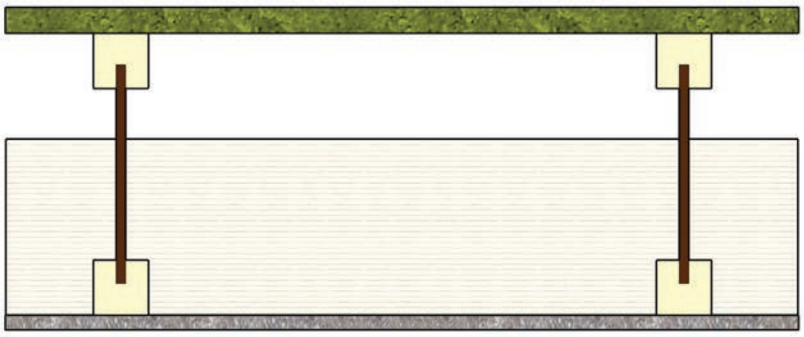
19. 2 layers of gypsum-based board, combined weight of minimum 23.5Kg/m², all joints staggered



FIRE RESISTANCE

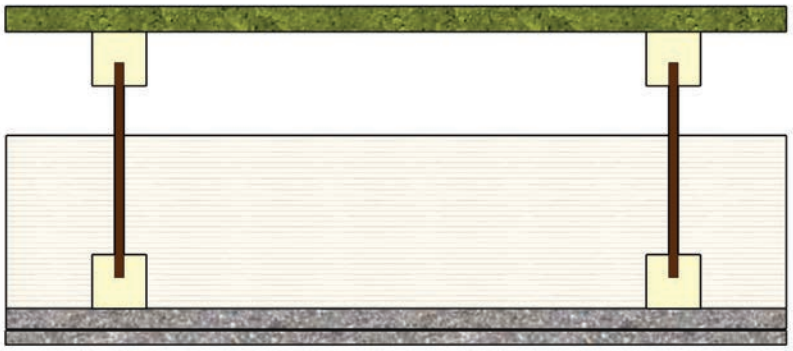
Full 30 minutes



DECKING	JOISTS	CENTRES	INSULATION	CEILING
Any wood based floor decking, e.g. OSB, particle board or plywood with min. 15mm* thickness NOTE - The method of fixing the decking boards does not influence the relevance of the fire performance of the floor.	HL-C24 220/240/300 H220/240/300 HM220/240/300/350/400 HI220/240/300 HB220/240/300/350/400	400mm 480mm 600mm	Floor void insulation is optional but if used should be mineral wool or cellulose fibre of <10.6kg/m^2	Any of the following EN520 Gypsum plasterboards: 12.5mm Type F with resilient bars at 300mm ccs 15mm Type F direct applied to joists 15mm Type A direct applied to joists Note - Plasterboards must be fixed in accordance with the manufacturers specification.

*thickness of deck should be suitable for purpose

Full 60 minutes



DECKING	JOISTS	CENTRES	INSULATION	CEILING
Any wood based floor decking, e.g. OSB, particle board or plywood with min. 15mm* thickness NOTE - The method of fixing the decking boards does not influence the relevance of the fire performance of the floor.	HL-C24 220/240/300 H220/240/300 HM220/240/300/350/400 HI220/240/300 HB220/240/300/350/400	400mm 480mm 600mm	Floor void insulation is optional but if used should be mineral wool or cellulose fibre of <10.6kg/m2	Any of the following EN520 Gypsum plasterboards: 15mm Type F and 12.5mm Type A with resilient bars at 300mm ccs 2 layers of 15mm Type F direct applied to joists NOTE - Plasterboards must be fixed in accordance with the manufacturers specification.

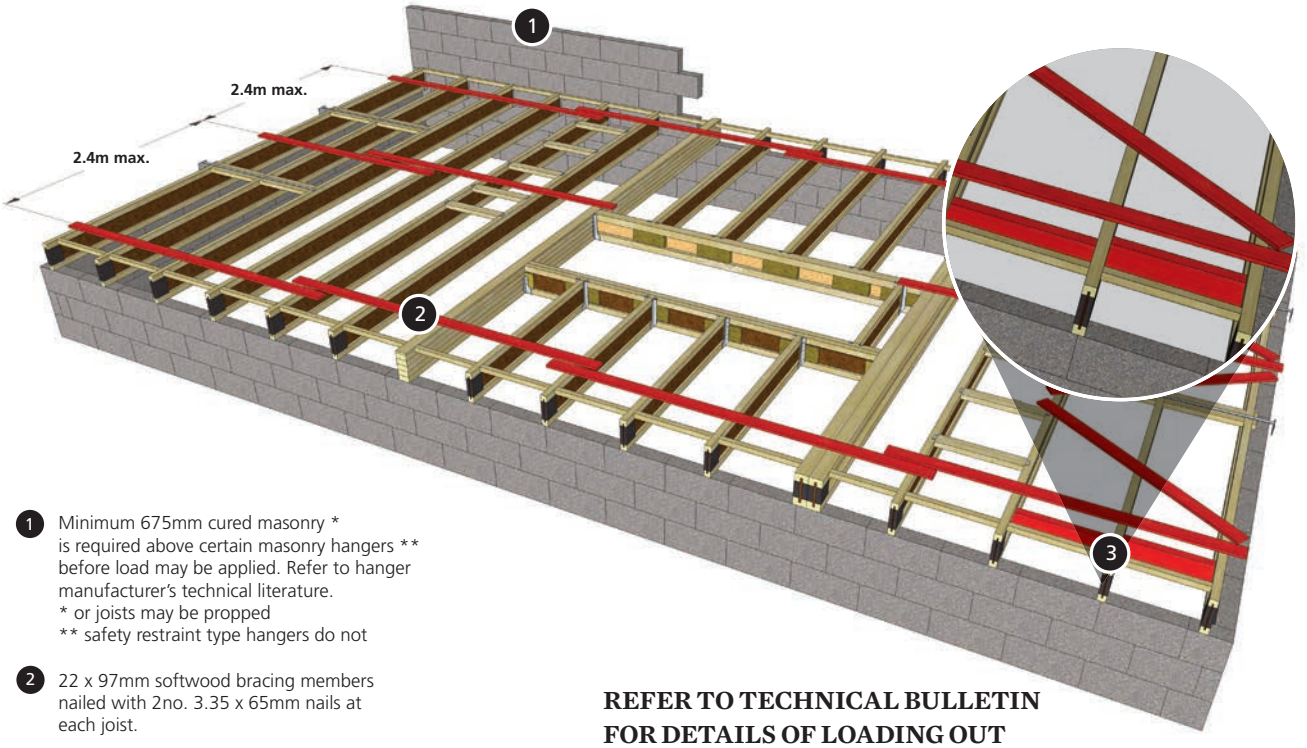
*thickness of deck should be suitable for purpose

The char rate of Glulam beams is as per table 3.1 of EN1995-1-2 (Eurocode 5. Part 1.2) at 0.65mm/min

Safety Bracing Details

UNBRACED JOISTS ARE UNSTABLE!

- Do not walk on or apply any materials to the joist area until the floor system is properly braced.
- The bracing should be removed in sequence as the decking is installed.
- The following represents a generic method of bracing a floor. Each system will be slightly different and the installer must ensure that all sections of the floor are accounted for.



1. Minimum 675mm cured masonry * is required above certain masonry hangers ** before load may be applied. Refer to hanger manufacturer's technical literature.
   * or joists may be propped
   ** safety restraint type hangers do not
2. 22 x 97mm softwood bracing members nailed with 2no. 3.35 x 65mm nails at each joist.
3. 38 x 125mm timber stability blocks to be fixed between at least 3 joists, covering at least 1.2m in length. Nail with at least 2no. 3.35 x 65mm nails each end.

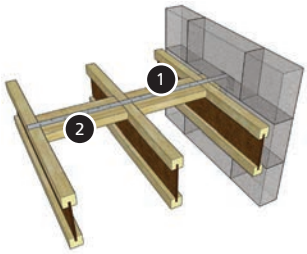
REFER TO TECHNICAL BULLETIN FOR DETAILS OF LOADING OUT DURING CONSTRUCTION

Notes:

- Full depth I-joist blocking panels may be used instead of solid timber stability blocks.
- All blocks to be cut accurately and squarely to maintain spacing of joists.
- Additional blocks and bracings are required for any areas of joists running in opposite directions and for cantilevered joists (unless permanent closure piece is installed at this stage). Install further sets of blocks and diagonals at a maximum of 12m centres in long runs of joists.

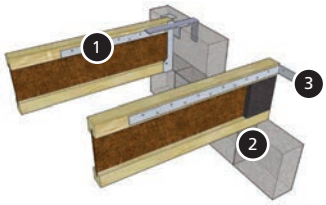
A1 MASONRY WALL RESTRAINT – PERPENDICULAR TO JOIST

1. Thin metal restraint strap installed in accordance with the manufacturer's instructions
2. Min. 38 x 97/122/147mm nogging fixed to joists by skew nails or using z clips



A2 MASONRY WALL RESTRAINT – PARALLEL TO JOIST

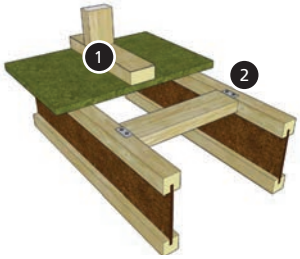
1. Restraint strap fitted to joist on non-restraint type masonry hanger
2. Parallel restraint straps may only be omitted if the joist has at least 90mm of direct bearing on the wall, provided that the height of the wall does not exceed 2 storeys
3. Restraint strap on built-in joist



A3 PARALLEL PARTITION NOGGINGS

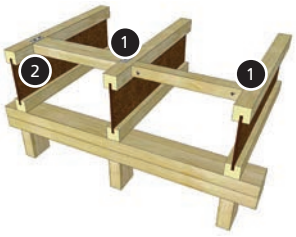
1. Non-load bearing stud partition fixed to noggings
2. 38 x 75mm partition noggings supported by metal z-clips, nailed in accordance with the manufacturer's instructions

i Noggings may also be attached with 2no. 3.35 x 65mm nails skew nailed at each end



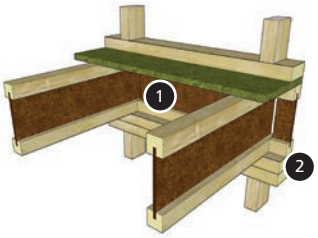
A4 PERIMETER NOGGINGS

1. Noggings may be skew nailed to joists or supported on z-clips
2. Timber noggings fitted between joists to support free edges of decking at external or internal walls. Also applicable to masonry walls



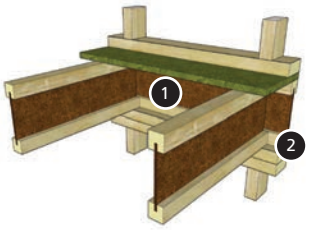
B1 I-JOIST BLOCKING PANEL

1. Masonite I-Joist blocking panel
2. Joist has full bearing on timber plate



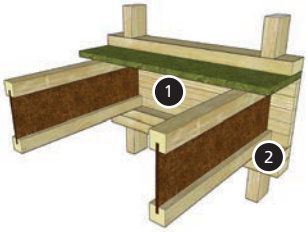
B2 RIM I-JOIST

1. Masonite I-Joist rim board
2. Joist requires 45mm minimum bearing



B3 RIM BOARD

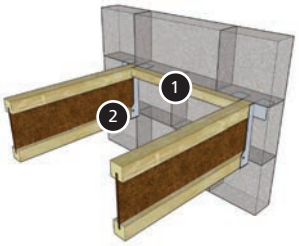
1. 38mm Glulam or 30mm LVL, or to suit wall load
2. Joist requires 45mm minimum bearing



B4 MASONRY HANGER

1. Perimeter nogging for decking support where required
2. Proprietary approved masonry joist hangers - web stiffeners may be required, see notes on page 16

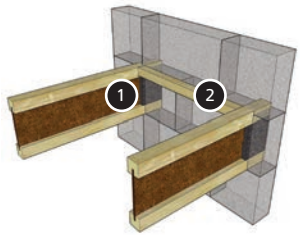
i Parallel restraint straps will be required with non-restraining hangers — see A2



B5 MASONRY WALL BEARING

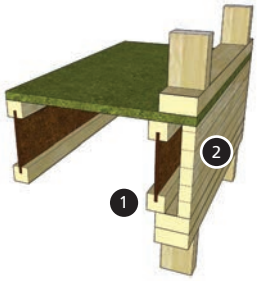
1. Joist end built into wall. Note some capping devices may require less than a full bearing to prevent fouling the cavity
2. Perimeter noggings

i The joist bearing must be sealed to prevent air leakage. This may be achieved by the use of proprietary capping devices or end blocks fitted to the joist webs with sealant around the joist ends



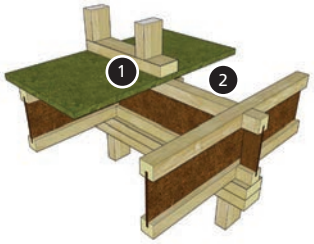
B6 PARALLEL TIMBER FRAME WALL

1. Masonite I-Joist with half bearing into wall
2. 38mm Glulam or 30mm LVL, or to suit wall load



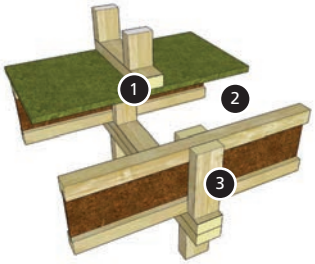
B7 INTERMEDIATE BEARING – LOAD BEARING WALL ABOVE

1. Load bearing wall directly above wall below
2. Masonite I-Joist blocking panels between joists



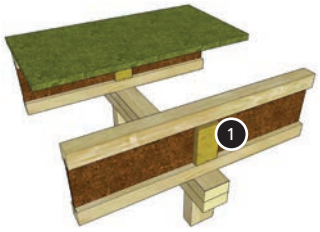
B8 INTERMEDIATE BEARING – COMPRESSION BLOCKS

1. Load bearing wall directly above wall below
2. Height of compression blocks = joist depth + 2mm
3. 38 x 89mm minimum softwood compression blocks



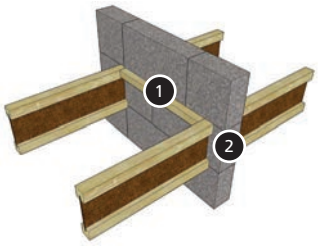
B9 INTERMEDIATE BEARING – NO LOAD BEARING WALL ABOVE

1. Web stiffeners where required



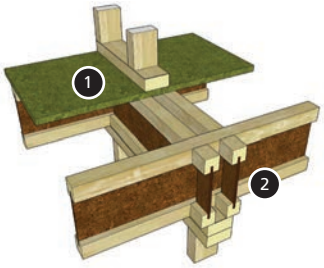
B10 INTERMEDIATE BEARING – MASONRY WALL

1. Perimeter nogging
2. Minimum 89mm bearing



B11 INTERMEDIATE BEARING – DOUBLE BLOCKING

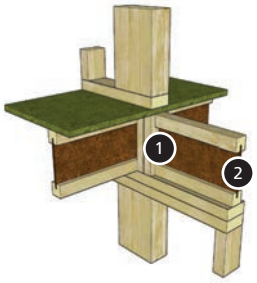
1. Load bearing wall directly above wall below
2. Webs of blocking in line with edge of stud wall above and below



B12 COLUMN WITH COMPRESSION BLOCKS

1. Softwood compression blocks, min. 38 x 89mm, height = joist depth + 2mm
2. I-Joist blocking panels

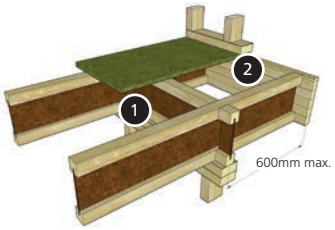
i Number of blocks to suit width of column above



B13 CANTILEVER SUPPORTING WALL

1. I-Joist Blocking
2. 38mm Glulam or 30mm LVL

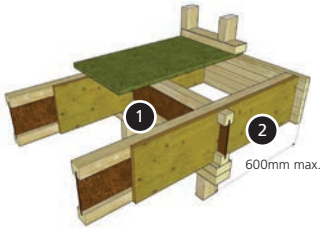
i Structural cantilever must not exceed 600mm



B14 REINFORCED CANTILEVER SUPPORTING WALL

1. I-Joist Blocking
2. 19mm ply reinforcement one or both sides of cantilevered joists, (determined by loading) nailed at 150mm centres with 3.35mm dia. nails, 65mm long. Stagger nails when fixing ply both sides

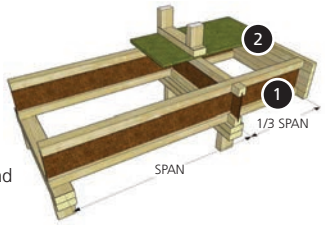
i Structural cantilever must not exceed 600mm



B15 NON LOAD BEARING CANTILEVER

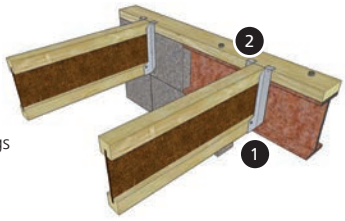
1. I-Joist Blocking
2. 38mm Glulam or 30mm LVL

i Max. cantilever length is 1200mm. No load applied on cantilever



B16 WALLPLATE CONNECTION

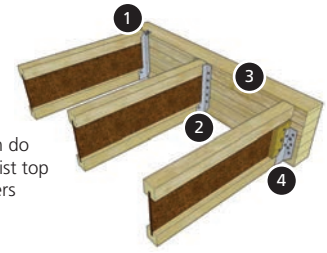
1. Top mount hangers
2. Timber bearing plate securely fixed to flange of steel beam/ masonry wall (design of fixings by Building Designer)



C1 I-JOIST TO SOLID BEAM CONNECTION

1. Top mount hanger
2. Face mount hanger
3. Glulam beam
4. Face mount hangers which do not laterally support the joist top flange require web stiffeners

i Note - all hanger fixings in accordance with hanger manufacturer details



C2 I-JOIST TO I-JOIST CONNECTION

1. Top mount hanger
2. Filler block or proprietary metal clips must be installed with multiple joists
3. Backer block on hanger face only for double joist
4. Backer block both sides of single joist
5. Face mount hanger
6. Double I-Joist

i Backer blocks nailed with 10no. 3.75mm diameter nails x 75mm long, with ends clinched if possible.

Use 10no. 4.00mm nails x 90mm long, for HB joists.

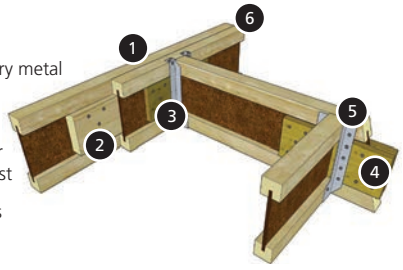
For top mount hangers, backer block tight to top flange of joist.

For face mount hangers, backer block tight to bottom flange.

Filler blocks fitted tight to top flange.

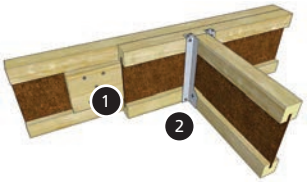
See table on page 16 for size of backer.

Note that approved hangers which eliminate the need for backer blocks are available. See detail C3.



C3 I-JOIST TO I-JOIST CONNECTION —BACKERLESS

1. Filler block or proprietary metal clips must still be installed with multiple joists
2. Approved hanger designed for usewithout backer blocks



FILLER AND BACKER BLOCK SIZES

The length of backer and filler blocks should allow fitment of nails without splitting and are typically 300-600mm long.

DEPTH mm	220				240				300				350		400	
SERIES	HL-C24/H	HM	HI	HB	HL-C24/H	HM	HI	HB	HL-C24/H	HM	HI	HB	HM	HB	HM	HB
Block Height	120	120	120	120	140	140	140	140	200	200	200	200	250	250	300	300
Backer Thickness	18	25	30	44	18	25	30	44	18	25	30	44	25	44	25	44
Filler Thickness	36	50	60	88	36	50	60	88	36	50	60	88	50	88	50	88

WEB STIFFENER SIZES

DEPTH mm	220				240				300				350		400	
SERIES	HL-C24/H	HM	HI	HB	HL-C24/H	HM	HI	HB	HL-C24/H	HM	HI	HB	HM	HB	HM	HB
Height	120	120	120	120	140	140	140	140	200	200	200	200	250	250	300	300
Thickness	18	25	30	44	18	25	30	44	18	25	30	44	25	44	25	44
Nails	3no 65mm	3no 65mm	3no 65mm	3no 90mm	3no 65mm	3no 65mm	3no 65mm	3no 90mm	3no 65mm	3no 65mm	3no 65mm	3no 90mm	3no 65mm	3no 90mm	3no 65mm	3no 90mm

WEB STIFFENERS ARE REQUIRED IN THE FOLLOWING CASES:

- When a higher reaction value is needed at an internal support, refer to Engineering Support for more information.
- If the sides of the hanger do not laterally support the I-Joist top flange.
- When a concentrated load is transferred from above, the web stiffeners should be tight to the top flange (gap at bottom flange).

MULTIPLE PLY GLULAM MEMBERS - FIXING DETAILS

Allowable uniform load applied to multiple glulam beam kN/m

FIXINGS	SPACING	NO. OF ROWS	PLY THICKNESS							
			2 PLY MEMBERS			3 PLY MEMBERS			4 PLY MEMBERS	
			38 + 38	45 + 45	90 + 90	All 38mm	All 45mm	All 90mm	All 38mm	All 45mm
			kN/m	kN/m	kN/m	kN/m	kN/m	kN/m	kN/m	kN/m
3.1mmØ x 90mm long nails (75mm nails for 38mm plies)	300mm	2	5.81	5.95	–	4.36	4.46	–	–	–
		3	8.72	8.92	–	6.54	6.69	–	–	–
	600mm	2	2.91	2.97	–	2.18	2.23	–	–	–
		3	4.36	4.46	–	3.27	3.35	–	–	–
3.75mmØ x 90mm long nails (75mm nails for 38mm plies)	300mm	2	6.88	8.00	–	5.16	6.00	–	–	–
		3	10.32	12.00	–	7.74	9.00	–	–	–
	600mm	2	3.44	4.00	–	2.58	3.00	–	–	–
		3	5.16	6.00	–	3.87	4.50	–	–	–
4.0mmØ x 90mm long nails (75mm nails for 38mm plies)	300mm	2	8.00	8.68	–	5.30	6.51	–	–	–
		3	12.00	13.02	–	7.95	9.77	–	–	–
	600mm	2	4.00	4.34	–	2.65	3.26	–	–	–
		3	6.00	6.51	–	3.98	4.88	–	–	–
M12 - 4.6 bolts	300mm	2	15.99	18.93	32.51	30.88	36.57	65.53	20.59	24.38
		3	23.98	28.40	48.77	46.32	54.85	97.55	30.88	36.57
	600mm	2	7.99	9.47	16.26	15.44	18.28	32.52	10.29	12.19
		3	11.99	14.20	24.39	23.16	27.43	48.78	15.44	18.28

Notes:
All design capacities are for medium term term loading in service class 1 & can be used for glulam & LVL members
Table shows the maximum design load which can be applied on one face of the multiple member, applied perpendicular to the grain.
For 2 ply members, nails are driven from one face, for 3 ply members the nails are driven through each of the outer timbers into the centre ply using the same pattern from each face but staggered.
M12 bolts are 4.6 grade, fitted with 36mm diameter washers, 3.6mm thick
3 ply 90mm beams should not be used loaded from one side only

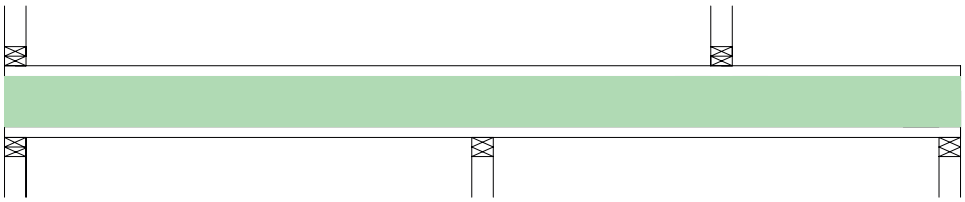
Allowable Holes (applies to OSB or PB)

MASONITE BEAMS

The following categories describe the opportunities to place holes within the web of the joists

SMALL DIAMETER HOLES – UP TO AND INCLUDING 20mm

Holes up to and including 20mm diameter can be placed anywhere in the green zone below. The distance between holes must be twice the diameter of the larger hole

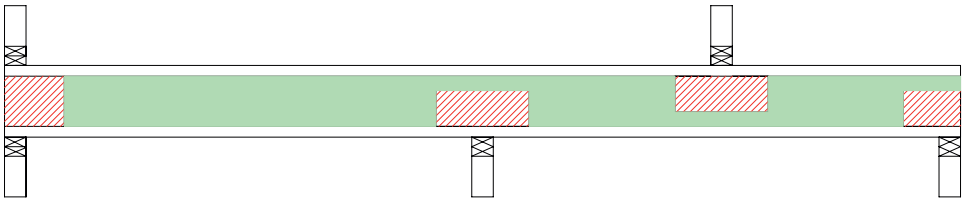


MEDIUM DIAMETER HOLES – FROM 21mm TO 40mm

Individual holes larger than 20mm and up to 40mm can be placed anywhere in the green zone below but must be outside the red hatched safety zones indicated below. These zones extend 150mm from all bearings and point loads.

The distance between holes must be twice the diameter of the larger hole

A maximum of two consecutive holes are allowed if the minimum distance apart is used, and must be placed in the same horizontal plane but don't need to be on the centreline of the web. More than two holes in the same joist reduces shear capacity by 20%



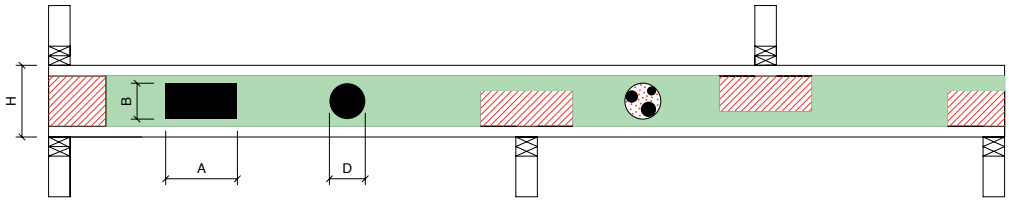
LARGE DIAMETER AND RECTANGULAR HOLES – ABOVE 40mm

Holes over 40mm diameter can be placed anywhere in the green zone below but at least 'H' away from all bearings or point loads. Holes must be placed on the centreline of the web and must not damage the joist flanges

The distance between circular holes must be 'H' or more, the distance between rectangular and other holes must be the larger of 'H' or 2x'A'

Multiple holes may be grouped together and considered to act as a single hole in accordance with the above

Maximum dimensions for rectangular holes are A=300mm and B=200m, subject to joist depth



General Notes:

- When holes of differing categories are being cut, the rules relating to the largest hole apply
- Any holes or load conditions falling outside these rules must be checked by our engineering support service.
- Information regarding the calculation of the reduction of shear capacity caused by a hole can be found in Masonite Beams European Technical Approval; ETA 12/0018.
- I-Joist flanges may not be damaged under any circumstances.

Allowable Holes

THE FOLLOWING TABLES MAY BE USED TO DETERMINE THE DISTANCE FROM BEARINGS OR POINT LOADS FOR JOIST/SPAN/HOLE COMBINATIONS:

		Circular Holes – distance in m from bearing/point load to nearest hole edge						
JOIST DEPTH	JOIST CLEAR SPAN	75	100	120	150	175	200	250
220mm Max. 126mm hole	3.0	0.22	0.22	0.44				
	3.5	0.22	0.22	0.60				
	4.0	0.22	0.22	0.75				
	4.64	0.22	0.27	0.97				
240mm Max. 146mm hole	3.5	0.24	0.24	0.27				
	4.0	0.24	0.24	0.42				
	4.5	0.24	0.24	0.60				
	4.90	0.24	0.24	0.69				
300mm Max. 206mm hole	4.0	0.30	0.30	0.30	0.30	0.62	1.05	
	4.5	0.30	0.30	0.30	0.33	0.80	1.25	
	5.0	0.30	0.30	0.30	0.51	0.98	1.45	
	5.61	0.30	0.30	0.30	0.83	1.20	1.68	
350mm Max. 256mm hole	4.5	0.35	0.35	0.35	0.35	0.35	0.35	0.66
	5.0.	0.35	0.35	0.35	0.35	0.35	0.35	0.83
	5.5	0.35	0.35	0.35	0.35	0.35	0.35	1.01
	6.160	0.35	0.35	0.35	0.35	0.35	0.35	1/33
400mm Max. 306mm hole	5.0	0.40	0.40	0.40	0.40	0.40	0.40	0.40
	5.5	0.40	0.40	0.40	0.40	0.40	0.40	0.40
	6.0	0.40	0.40	0.40	0.40	0.40	0.40	0.40
	6.45	0.40	0.40	0.40	0.40	0.40	0.40	0.50

		Rectangular Holes – distance in m from bearing/point to nearest hole edge			
JOIST DEPTH	JOIST CLEAR SPAN	100h x 100w	100h x 200w	200h x 200w	200h x 300w
220mm Max. 126mm x 252w	3.0	0.22	0.64		
	3.5	0.22	0.83		
	4.0	0.35	0.99		
	4.64	0.55	1.25		
240mm Max. 146mm x 292w	3.5	0.24	0.79		
	4.0	0.31	0.96		
	4.5	0.45	1.15		
	4.90	0.59	1.31		
300mm Max. 200mm x 300w	4.0	0.33	0.98	0.83	1.16
	4.5	0.48	1.18	1.01	1.36
	5.0	0.63	1.36	1.20	1.55
	5.61	0.82	1.61	1.43	1.80
350mm Max. 200mm x 300w	4.5	0.35	1.00	0.82	1.20
	5.0.	0.45	1.18	1.00	1.39
	5.5	0.70	1.37	1.18	1.59
	6.160	1.03	1.63	1.42	1.86
400mm Max. 200mm x 300w	5.0	0.40	1.12	0.93	1.34
	5.5	0.65	1.31	1.11	1.53
	6.0	0.90	1.50	1.29	1.73
	6.45	1.23	1.75	1.60	2.00

Notes

All values above are valid for uniformly distributed loads of normal residential magnitude; 1.5kN/m^2 Imposed Load, 0.5kN/m^2 Dead Load and 0.25kN/m^2 Partition Load.

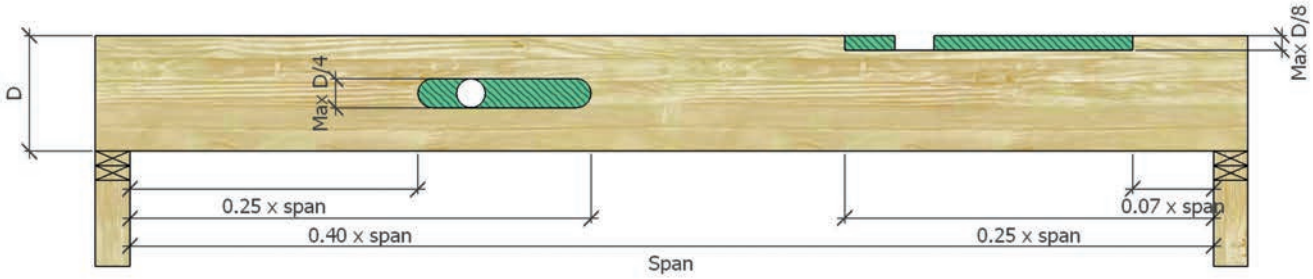
The maximum hole size allowed within each joist depth is shown in column one

The joist clear spans are indicative examples except for the last span which is the maximum achievable with the joist depth at 600mm centres

The remaining columns show the distance from a bearing or point load required for each hole diameter

Allowable Holes and Product Handling

GLULAM BEAMS



Notes:

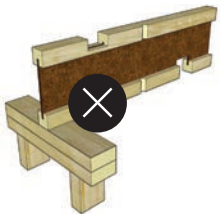
Holes must be placed along the neutral axis and spaced apart at least 3 x largest diameter hole. For holes outside these rules please contact engineering support

THESE CONDITIONS ARE NOT PERMITTED UNDER ANY CIRCUMSTANCES

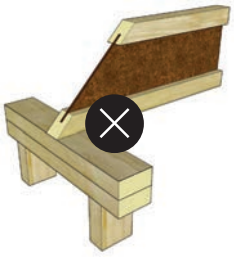
If in doubt, please ask for advice before you cut.

NO holes close to joist ends
Use hole chart for max. size & min. distance to wall.

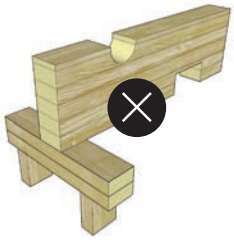
NO notches in flanges of Masonite joists



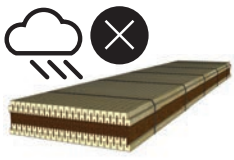
NO bevel cuts beyond the inside face of wall



NO notches or holes in Glulam
Except as advised in hole chart for the product.

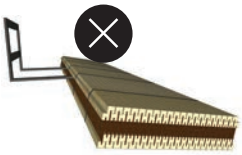


Storage
Always store joist packs flat, properly covered and above the ground.



Never store joist packs vertically.

Handling
Never lift or move the joist packs by the flanges.



Always follow the HSE guidance on manual handling.

Contractors should be aware of their health and safety responsibilities under the Construction (Design and Management) Regulations 2015.

BS EN1995-1-1 Version

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