

JJI-Joists

TECHNICAL MANUAL

FOURTH EDITION

DECEMBER 2013



**James Jones
& SONS LIMITED**
TIMBER SYSTEMS DIVISION



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Please visit our website to request a face to face seminar and find out how to take our online CPD Seminar.



Whilst every effort was made to ensure the accuracy of this publication at the time of printing James Jones & Sons cannot be held responsible for changes to Building Regulations, NHBC Standards etc.

For the most up-to-date information please visit our web site:
www.jamesjones.co.uk

INTRODUCTION TO JAMES JONES & SONS

James Jones & Sons is the UK's leading manufacturer of I-Joists based at its Timber Systems Division in Forres, Morayshire. The Timber Systems Division prides itself on building strong partnerships throughout the supply chain, concentrating on its core values of quality and service.

JJI-Joists are manufactured under the strictest quality and environmental standards, and this new edition of the Technical Manual outlines the applications and versatility of JJI-Joists. The range is manufactured to UK sizes and specifications, and is available on a Just-In-Time basis from a comprehensive stock holding. The entire production and distribution process has been audited by third party accreditation systems, and a Carbon Footprint assessment using a Life Cycle Assessment approach has been carried out to ensure full sustainability and environmental compliance.

Through the use of our bespoke, dedicated software programmes, JJI-Joists can be specified and engineered to exacting standards, for floor, wall and roof applications of both domestic and commercial buildings.

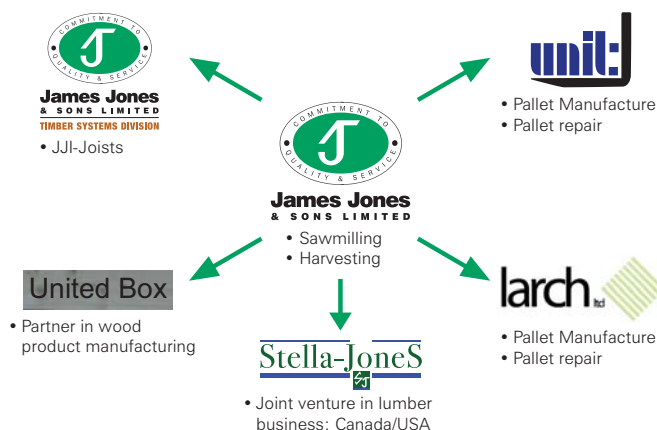
JJI-Joists are part of a comprehensive building system and are complemented by glulam and metal connectors and this manual highlights their use and combinations.

JJI-Joists are sold through dedicated distributors, merchants, timber frame kit manufacturers and roof truss manufacturers situated across the UK, Ireland and mainland Europe. These combined resources, backed up by dedicated James Jones & Sons personnel, ensure that the design, specification and supply of JJI-Joists is seamless and of the highest quality.



ROOTS

Mr James Jones started trading in timber and allied products in the middle of the nineteenth century. Since being incorporated in 1905, James Jones & Sons has grown both organically and by acquisition.



THE COMPANY

James Jones & Sons is one of the largest suppliers of British Timber in the UK today. The company's sawmills are strategically placed to take advantage of the increasing supply of saw logs being produced from post war plantations. These are bought from both private and state owned forests as well as woodlands owned and managed by the company.

FAMILY CONCERN

James Jones & Sons is a real family business. Even with a staff of over 500 it has the culture of a family firm. Like any good family, the company cares for its members. That concern extends to whole communities in rural areas where the company is a major employer. There is also an equal concern for customer satisfaction. The company's mission is to maintain the highest standards of quality and service in the industry.

CUTTING EDGE

The company strives to maintain its competitive advantages. Variety of product is one. Wood is harvested and processed for specific markets and end uses such as construction, palletwood, packaging and fencing.

James Jones & Sons has a team of highly trained professionals who look after the purchasing and harvesting of round timber, making sure that the right logs go to the right mill where they can be processed to best advantage. Good relationships with forest owners are vital and in most cases are of many years standing thus providing the right background for the purchase of our raw material.

Quality comes from modern sawmills staffed by experienced people. James Jones & Sons is fortunate in having many people who are experts in their field and who know about and understand wood. This ensures the quality of our products is maintained at the highest level.

THE FUTURE

As well as investing in state-of-the-art technology for our traditional sawmilling business, James Jones & Sons has taken the strategic decision to invest in and develop more innovative products. The JJI-Joist, manufactured by James Jones & Sons, Timber Systems Division, is the direct result of one of the new technologies that has been embraced by the company. Following the successful launch of the JJI-Joist range in 1999 the Timber Systems Division has added a fully automated second production line along with highly efficient finger jointing and web profiling lines to keep up with demand. In addition to the production investment, the Division has also set up a technical and design office to provide a full design and engineering support service.

THE JJI-JOIST SYSTEM

The JJI-Joist system relies on a unique combination of engineered products designed to compliment each other and deliver outstanding performance.

JJI-JOISTS

The work horse of the system, a versatile light weight structural workhorse ideal for floor joists, rafters, purlins and wall studs.



For more information see page 5

JJ-BEAM AND JJ-RIM (GLULAM)

For the most demanding applications, high strength and stiffness combined with dimensional stability make this the ideal choice for heavily loaded members in floors, roofs and walls.



For more information see page 11

METALWORK

A comprehensive range of connectors designed specifically for the JJI-Joist system are available from two approved suppliers.



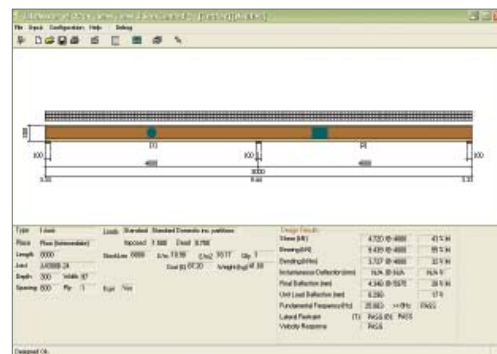
For more information see page 17

SOFTWARE

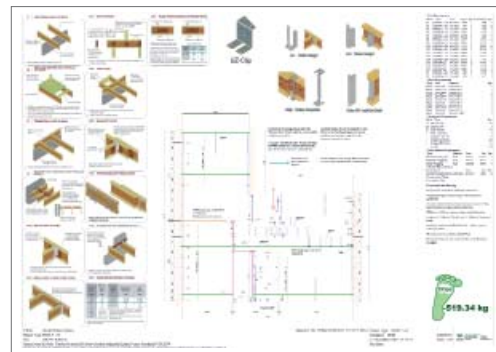
The JJI-Joist system is fully supported by three Windows™ based software packages written in the UK to provide fast and cost effective design solutions for today's construction industry.

These packages are regularly updated to ensure compliance with ever changing Building Regulations and Codes of Practice, each new version incorporating new features and developments to help the designer maximise the benefits of the system.

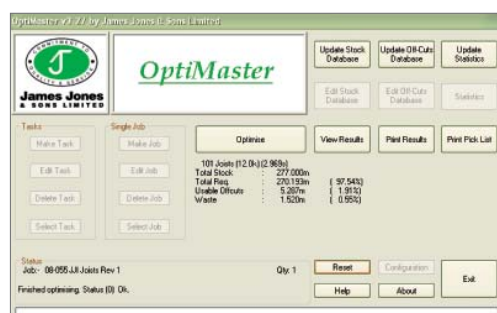
JoistMaster is an extremely powerful beam design tool, which enables the specifier to quickly assess the most cost effective joist solution, tailored to his/her particular design requirements, and provide a calculation printout suitable for local authority approval. JoistMaster is freely available to download from www.jji-joists.co.uk or www.jamesjones.co.uk



FloorMaster is a comprehensive floor design and layout package allowing trained designers to quickly and accurately produce detailed layout drawings, installation details, material call-offs, calculations and design quotations for any building footprint. FloorMaster export files allow quick and easy intergration into third party CAD and BIM software.



OptiMaster is a stock optimisation package designed to work with the output from FloorMaster.



DISTRIBUTION

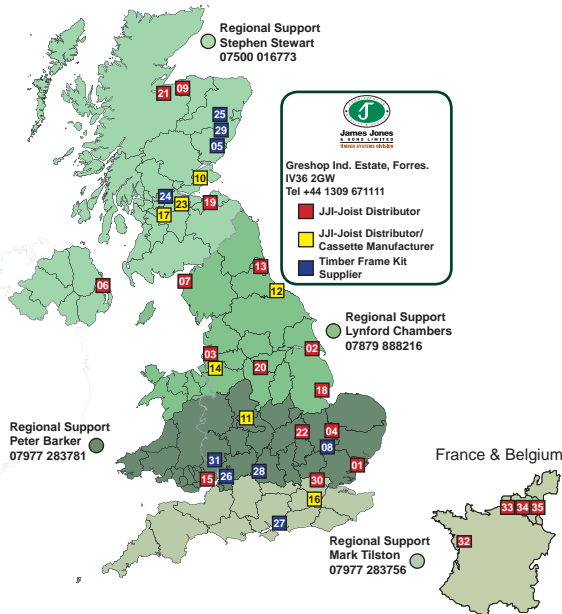
The JJI-Joist system is available from a network of builders/ timber merchants and timber frame and engineered timber system manufacturers providing local, quality expertise.



These distributors are trained to use our software and understand the correct use and specification of our products. This training is ongoing and ensures our distributors have the skills required to provide an efficient, cost-effective, JJI-Joist solution.

Distributor details are available to download from www.jamesjones.co.uk

JJI-JOISTS STOCKISTS & TECHNICAL SUPPORT



CUSTOMER SERVICES AND TECHNICAL SUPPORT

James Jones & Sons, Timber Systems Division has a highly trained team of Technical, Engineering and Sales personnel providing UK and Irish national coverage to ensure simple, safe and quick installation of JJI-Joist systems. A summary of the services offered is given below.

- Pre and after sales assistance
- Engineering support
- Product training courses
- Software and design training
- Building site training
- Full design and engineering service

APPROVALS

JJI-Joists are an accepted building material within the construction industry thanks to third party certification from BM TRADA European Technical Approval.



BM TRADA ETA is recognised by NHBC, Local Authority Building Control and others.



James Jones & Sons are founder members of the Structural Timber Association, formerly UK Timber Frame Association (UKTFA) and were involved in the drafting of the Code of Practice for the Design of Engineered Wood Products which provides guidance on the design of structures using I-Joists.



QUALITY CONTROL AND QUALITY ASSURANCE

The success of a manufactured product is often determined by its quality. It is for this reason the James Jones & Sons, Timber Systems Division maintains a thorough Quality Management System which enables us to achieve our goal of producing a consistent and uniform product of exceptionally high standards. JJI-Joists are manufactured under a Quality Assurance scheme which complies with ISO 9001:2008 and CE marking.



RESEARCH AND DEVELOPMENT

James Jones & Sons are proud of their tradition of innovation and product development. Central to the success of the Timber Systems Division, is an ongoing research and development programme designed to deliver new applications for existing products and to improve the performance of all products to keep pace within the ever changing Building Regulations and Codes of Practice.

In addition to this, raw material sourcing and production methods and technology are continuously reviewed and improved to maximise product quality and efficiency.

ENVIRONMENTAL MANAGEMENT

Environmental considerations are a critical factor in the production of JJI-Joists. Our certified ISO 14001:2004 Environmental Management System has enabled the company to target key areas to reduce the impacts of our activities on the environment.



The introduction of biomass heating systems utilising wood co-products, the continuous commitment to waste minimisation, energy savings and the recycling of materials used, ensures the delivery of JJI-Joists with the smallest environmental footprint possible. This in-built consideration of the environment in our current and future plans has shaped our purchasing policy to choose only those technologies that can prevent pollution and improve our environmental performance year on year.

The competencies of all our employees enables our environmental objectives to be implemented and exceeded every year. A safe, quality driven and improvement culture ensures environmental performance is always present at the very centre of all our activities. As environmental considerations affect the whole JJI-Joist supply chain, we are engaged in continuous dialogue with our suppliers and distributors to minimise potential impact.

Our commitment to ISO 14001:2004 from start-up, not only guarantees our compliance with all current and forthcoming legislation but delivers a JJI-Joist with excellent and continually improving environmental credentials.

SUSTAINABLE TIMBER SOURCING & CHAIN OF CUSTODY

The UK Government policy on timber purchasing has stated that timber should only be purchased from legal and sustainable sources. Increasingly, both public and private sectors are encouraged to follow this policy.

Sustainable timber supply has always been integral to the manufacture of our engineered wood products. Consequently JJI-Joists are able to be specified as FSC Certified. All product claims are independently verified by BM TRADA Certification on an on-going basis.

Within the James Jones Group and via our trade body Confor, we work closely with both FSC & PEFC to ensure any future requirements are complied with. James Jones Harvesting Division and our Timber Systems Division Chain of Custody systems enable all clients to have full traceability to source to guarantee supply chain legality and sustainability. Consequently our JJI-Joists are both EUTR compliant and are derived from known and trusted sources.



CARBON ACCOUNTING & LIFE CYCLE ASSESSMENT (LCA)

Our third key sustainability element is our PAS 2050:2011 carbon accounting model which is assured by Ecometrica, the UK leading Greenhouse Gas specialists, on an annual basis. Not only does this enable us to measure, compare and reduce our key "trigger" impacts at each stage of the production process but our overall carbon negative footprint can be applied to individual house design and supply contract volumes.



Our LCA measurements enable our environmental performance profile to be measured and improved upon by assessing all environmental impacts associated with the sourcing, transport and manufacture of our product i.e. from the forest to the end user.

JJI-Joists can help to mitigate climate change as timber acts as a carbon sink. Carbon dioxide (CO₂) is absorbed by trees and used to create wood. This CO₂ is only released back into the environment when the joists come to the end of their lifetime. As only sustainable timber is used for the production of JJI-Joists, other trees are planted to replace harvested ones immediately, closing the CO₂ cycle and contributing to keep a constant or even increasing volume of CO₂ locked away from the atmosphere where it cannot contribute to climate change. Increasingly supply chain partnerships are being developed with key clients to enable our quantified carbon negative supply to support and contribute to downstream Corporate Social Responsibility (CSR) commitments

Improved supply logistics, new resin formulations and improved biomass heating efficiencies are recent examples of targeted and quantifiable improvements within the life-cycle performance of our JJI-Joists

Our carbon accounting complements the generic schemes used to quantify environmental impacts of products such as BRE environmental profiles. Scores for this scheme are used in the assessment process of 'The Code for Sustainable Homes' in England and Wales and 'Ecohomes' in Scotland. Timber I-joists such as JJI-Joists achieve the best scores in this scheme (A+) and therefore can help specifiers to achieve their "Zero Carbon" construction goals.

THERMAL PERFORMANCE

Other advantages of using JJI-Joists are their superior strength-to-weight ratio and readily available deep sections (up to 450mm) when compared with solid timber. In this way more insulation can be used within the building envelope and significant savings in heating can be achieved.

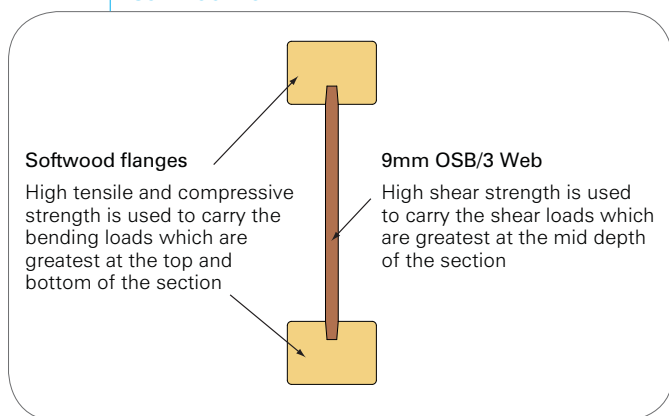
The thin web used in JJI-Joists contributes to minimise repeated thermal bridging in timber frame structures enabling JJI-Joists to achieve better U-values than solid timber. This property makes JJI-Joists ideal as a structural member in roofs and walls in low energy buildings.

The UK government has already expressed its preference for better insulated and airtight building envelopes as a way to reduce energy consumption. The adoption of insulated structures using JJI-Joists and designed according to principles such as Passivhaus can significantly reduce the energy requirements for heating and this approach will be essential to achieve a truly Zero Carbon House.

INTRODUCTION

A JJI-Joist is a composite engineered timber joist, combining 45mm deep high-grade finger jointed softwood flanges (C24) with a 9mm thick oriented strand board (OSB/3) web. Four flange widths are available at 47, 63, 72 and 97mm wide.

COMPOSITION



These materials have different specific properties and by combining the two materials in this way to form a composite section you can use the strengths of each one where it is needed most. This, results in the new section outperforming the individual materials that it is made from (the sum is greater than its parts) making it more structurally efficient.

Using advanced technology these components are combined to produce an innovative alternative to conventional construction timber with many additional advantages.

ADVANTAGES

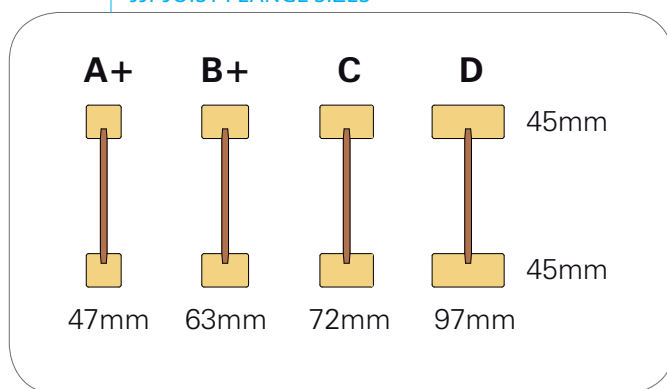
JJI-Joists are designed to give a superior strength to weight ratio enabling the manufacture of longer and lighter structural members. The JJI-Joist, with a softwood flange:

- Is capable of spanning longer distances
- Is easier to handle
- Is easier to fix and nail
- Is less prone to splitting
- Is quicker to install
- Is extremely stable
- Reduces building maintenance
- Provides a less complex design solution
- Is simple to specify using superior software
- Has Part E compliant details available
- Is FSC/PEFC accredited
- Has very low embodied energy
- Has independently assured carbon accounting to PAS2050:2011

JJI-JOIST RANGE AND TOLERANCES

JJI-Joists are available in a comprehensive range of sizes, designed specifically for the UK market. JJI-Joists are available in lengths of up to 12m.

JJI-JOIST FLANGE SIZES



Joist Depth (mm)	JJI-Joist Flange Sizes				Timber Grade
	A+ 47mm	B+ 63mm	C 72mm	D 97mm	
145	✓				C24
195	✓	✓	✓	✓	C24
220	✓	✓	✓	✓	C24
235	✓	✓	✓	✓	C24
245	✓	✓	✓	✓	C24
300	✓	✓	✓	✓	C24
350	✓	✓	✓	✓	C24
400	✓	✓	✓	✓	C24
450	✓	✓	✓	✓	C24

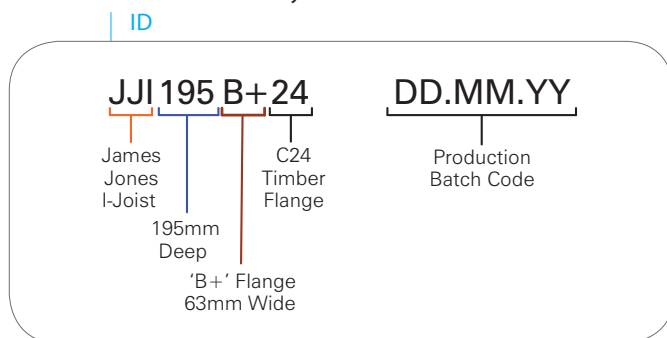
Table 1. JJI-Joist Product Range

Member Dimension	Tolerance (mm)
Overall Joist Length	+/-3.0
Overall Joist Depth	+/-2.0
Flange Thickness/Depth	+/-2.0
Web Thickness	+/-0.8

Table 2. JJI-Joist Manufacturing Tolerance

JJI-JOIST IDENTIFICATION AND MARKING

JJI-Joists are identified by an alpha numeric code that specifies the joist depth, flange size and flange grade (see example below). This code is printed at regular intervals along the centre line of the web along with the production time and date to facilitate on-site identification and traceability.



In addition to the above information, the clear warning 'DO NOT CUT FLANGES' is printed along the length of each flange as a precaution against creating unnecessary structural damage.

JJI-JOIST PROPERTIES

It is possible to design JJI-Joist structures using either a Permissible Stress Design Code (BS 5268-2) or a Limit State Design Code (EN1995-1-1/Eurocode 5). Each code requires properties that are derived and presented in a different way.

Permissible stress design properties, intended for use with BS 5268-2 and characteristic capacities, intended for use with Eurocode 5, can be found in BM TRADA ETA 10/0335.

Joist Type	Depth (mm)	Bending moment capacity	Bending stiffness	Shear strength capacity	Shear stiffness	Intermediate bearing capacity – minimum 89mm bearing length		End bearing capacity – minimum 45mm bearing length		End bearing capacity – minimum 89mm bearing length		Weight per metre length
		M (kNm)	EI (10 ⁹ Nmm ²)	V (kN)	GA (10 ⁶ N)	N/S (kN)	W/S (kN)	N/S (kN)	W/S (kN)	N/S (kN)	W/S (kN)	W (kg/m)
JJI 145 A+	145	1.64	139.6	3.12	0.550	5.36	6.92	2.78	3.60	3.38	4.55	2.26
JJI 195 A+	195	2.40	305.1	3.48	0.907	5.66	7.95	2.78	5.27	3.38	5.27	2.56
JJI 195 B+		3.05	424.7	3.87	0.907	7.18	9.28	3.73	5.27	4.31	6.10	3.21
JJI 195 C		3.40	505.6	4.07	0.907	8.21	10.61	4.22	5.51	4.31	6.97	3.57
JJI 195 D		4.32	740.5	4.60	0.907	8.73	12.69	4.22	7.42	4.31	9.39	4.58
JJI 220 A+	220	2.79	407.4	3.71	1.086	6.25	7.95	2.96	5.27	3.45	5.27	2.70
JJI 220 B+		3.54	588.5	4.09	1.086	7.18	9.28	3.73	5.27	4.31	6.10	3.35
JJI 220 C		3.95	667.3	4.29	1.086	8.21	10.61	4.22	5.51	4.31	6.97	3.72
JJI 220 D		5.02	941.3	4.81	1.086	8.73	12.69	4.22	7.42	4.31	9.39	4.73
JJI 235 A+	235	3.03	472.4	3.85	1.193	6.60	7.95	3.13	5.27	3.62	5.27	2.79
JJI 235 B+		3.84	678.1	4.22	1.193	7.18	9.28	3.73	5.27	4.31	6.10	3.44
JJI 235 C		4.28	771.3	4.42	1.193	8.21	10.61	4.22	5.51	4.31	6.97	3.80
JJI 235 D		5.44	1088.0	4.95	1.193	8.73	12.69	4.22	7.42	4.31	9.39	4.82
JJI 245 A+	245	3.19	518.0	3.95	1.265	6.84	7.95	3.24	5.27	3.72	5.27	2.85
JJI 245 B+		4.04	737.2	4.32	1.265	7.18	9.28	3.73	5.27	4.31	6.10	3.50
JJI 245 C		4.50	844.4	4.52	1.265	8.21	10.61	4.22	5.51	4.31	6.97	3.86
JJI 245 D		5.72	1195.4	5.04	1.265	8.73	12.69	4.22	7.42	4.31	9.39	4.87
JJI 300 A+	300	4.09	816.3	4.54	1.658	6.17	7.95	3.13	5.27	3.86	5.27	3.17
JJI 300 B+		5.17	1121.9	4.88	1.658	7.18	9.28	3.73	5.27	4.14	6.10	3.82
JJI 300 C		5.75	1319.5	5.07	1.658	8.21	10.61	3.95	5.51	4.14	6.97	4.18
JJI 300 D		7.29	1899.0	5.59	1.658	8.73	12.69	3.95	7.42	4.14	9.39	5.20
*JJI 350 A+	350	4.93	1113.5	5.11	2.015	6.17	6.92	3.13	3.60	3.18	4.55	3.46
*JJI 350 B+		6.21	1484.6	5.44	2.015	7.18	9.28	3.35	4.82	3.18	6.10	4.11
JJI 350 C		6.90	1899.6	5.62	2.015	8.21	10.61	3.35	5.51	3.57	6.97	4.48
JJI 350 D		8.74	2647.6	6.12	2.015	8.73	12.69	3.35	7.42	3.57	9.39	5.49
*JJI 400 A+	400	5.80	1521.6	5.71	2.373	6.17	6.92	2.69	3.60	3.02	4.55	3.76
*JJI 400 B+		7.28	2023.3	6.02	2.373	7.18	9.28	2.69	4.82	3.02	6.10	4.40
JJI 400 C		8.08	2673.0	6.19	2.373	8.21	10.61	2.69	5.51	3.32	6.97	4.77
JJI 400 D		10.20	3428.0	6.68	2.373	8.44	12.69	2.69	7.42	3.32	9.39	5.78
*JJI 450 A+	450	6.68	1999.3	6.32	2.730	6.17	6.92	2.22	3.60	3.02	4.55	4.05
*JJI 450 B+		8.36	2651.5	6.61	2.730	7.04	9.09	2.22	4.82	3.02	6.10	4.70
*JJI 450 C		9.27	3018.4	6.78	2.730	7.04	9.42	2.22	5.51	3.02	6.97	5.06
JJI 450 D		11.69	4170.4	7.26	2.730	7.04	12.69	2.37	7.42	3.02	9.39	6.07

Table 3. Long Term Permissible Design Properties for JJI-Joists (BS 5268-2)

Notes for Table 3:

- Do not mix values from Table 3 and Table 4
- Values given are for long term load durations only ($k_3=1.0$)
- Values are applicable to joists in Service Class 1 only
- N/S: no web stiffeners required, W/S: web stiffeners required
- All strength properties are given for JJI-Joists used in load sharing situations. Non-load sharing values can be obtained as follows:
Moment, Shear and Bearing Capacity – Divide the tabulated value by 1.1 ($k_g = 1.1$)
- Minimum end bearing length = 45mm, minimum intermediate bearing length = 89mm
- End bearing capacities for bearing lengths between 45-89mm can be found by linear interpolation
- The long term uniformly distributed bottom flange pull-off load is 5.5kN/m
- For Residential Floors within Self Contained Dwellings with a maximum imposed load of 1.5kN/m², the JJI-Joist Moment, Shear and Bearing capacities can be multiplied by 1.12 ($k_{dom} = 1.12$)
- *The top and bottom flanges of these sizes require continuous lateral restraint at a maximum of 300mm centres unless a lateral buckling check has been performed

Joist Type	Depth	Bending moment capacity	Bending stiffness	Shear strength capacity	Shear stiffness	Intermediate bearing capacity – minimum 89mm bearing length		End bearing capacity – minimum 45mm bearing length		End bearing capacity – minimum 89mm bearing length		Weight per metre length
		M	EI	V	GA	N/S	W/S	N/S	W/S	N/S	W/S	W
	(mm)	(kNm)	(10 ⁹ Nmm ²)	(kN)	(10 ⁶ N)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kg/m)
JJI 145 A+	145	3.89	139.6	9.54	0.748	16.37	16.37	8.50	8.50	10.33	10.76	2.26
JJI 195 A+	195	5.67	305.1	10.64	1.234	16.37	16.37	8.50	8.50	10.31	10.76	2.56
JJI 195 B+		7.20	424.7	11.82	1.234	21.94	21.94	11.39	11.39	13.16	14.42	3.21
JJI 195 C		8.03	505.6	12.44	1.234	25.07	25.07	12.90	13.02	13.16	16.48	3.57
JJI 195 D		10.22	740.5	14.06	1.234	26.66	30.00	12.90	17.54	13.16	22.20	4.58
JJI 220 A+	220	6.60	407.4	11.33	1.477	16.37	16.37	8.50	8.50	10.31	10.76	2.70
JJI 220 B+		8.37	588.5	12.48	1.477	21.94	21.94	11.39	11.39	13.16	14.42	3.35
JJI 220 C		9.32	667.3	13.09	1.477	25.07	25.07	12.90	13.02	13.16	16.48	3.72
JJI 220 D		11.86	941.3	14.71	1.477	26.66	30.00	12.90	17.54	13.16	22.20	4.73
JJI 235 A+	235	7.17	472.4	11.77	1.623	16.37	16.37	8.50	8.50	10.31	10.76	2.79
JJI 235 B+		9.08	678.1	12.90	1.623	21.94	21.94	11.39	11.39	13.16	14.42	3.44
JJI 235 C		10.11	771.3	13.51	1.623	25.07	25.07	12.90	13.02	13.16	16.48	3.80
JJI 235 D		12.85	1088.0	15.12	1.623	26.66	30.00	12.90	17.54	13.16	22.20	4.82
JJI 245 A+	245	7.54	518.0	12.08	1.720	16.37	16.37	8.50	8.50	10.31	10.76	2.85
JJI 245 B+		9.55	737.2	13.19	1.720	21.94	21.94	11.39	11.39	13.16	14.42	3.50
JJI 245 C		10.64	844.4	13.80	1.720	25.07	25.07	12.90	13.02	13.16	16.48	3.86
JJI 245 D		13.52	1195.4	15.40	1.720	26.66	30.00	12.90	17.54	13.16	22.20	4.87
JJI 300 A+	300	9.67	816.3	13.86	2.255	16.37	16.37	8.50	8.50	10.31	10.76	3.17
JJI 300 B+		12.21	1121.9	14.91	2.255	21.94	21.94	11.39	11.39	12.64	14.42	3.82
JJI 300 C		13.58	1319.5	15.49	2.255	25.07	25.07	12.08	13.02	12.64	16.48	4.18
JJI 300 D		17.22	1899.0	17.07	2.255	26.66	30.00	12.08	17.54	12.64	22.20	5.20
*JJI 350 A+	350	11.66	1113.5	15.61	2.741	16.37	16.37	8.50	8.50	9.72	10.76	3.46
*JJI 350 B+		14.68	1484.6	16.60	2.741	21.94	21.94	10.22	11.39	9.72	14.42	4.11
JJI 350 C		16.31	1899.6	17.16	2.741	25.07	25.07	10.22	13.02	10.91	16.48	4.48
JJI 350 D		20.65	2647.6	18.70	2.741	26.66	30.00	10.22	17.54	10.91	22.20	5.49
*JJI 400 A+	400	13.70	1521.6	17.43	3.227	16.37	16.37	8.20	8.50	9.23	10.76	3.76
*JJI 400 B+		17.20	2023.3	18.37	3.227	21.94	21.94	8.20	11.39	9.23	14.42	4.40
JJI 400 C		19.09	2673.0	18.91	3.227	25.07	25.07	8.20	13.02	10.15	16.48	4.77
JJI 400 D		24.12	3428.0	20.41	3.227	25.79	30.00	8.20	17.54	10.15	22.20	5.78
*JJI 450 A+	450	15.79	1999.3	19.31	3.713	16.37	16.37	6.79	8.50	9.23	10.76	4.05
*JJI 450 B+		19.77	2651.5	20.20	3.713	21.50	21.50	6.79	11.39	9.23	14.42	4.70
*JJI 450 C		21.92	3018.4	20.72	3.713	21.50	22.27	6.79	13.02	9.23	16.48	5.06
JJI 450 D		27.64	4170.4	22.18	3.713	21.50	30.00	6.79	17.54	9.21	22.20	6.07

Table 4. Characteristic Capacities for JJI-Joists (Eurocode 5)

Notes for Table 4:

- Do not mix values from Table 3 and Table 4
- N/S: no web stiffeners required, W/S: web stiffeners required
- Minimum end bearing length = 45mm, minimum intermediate bearing length = 89mm

Notes for Table 4:

- Advice on choosing appropriate partial factors for limit state design can be found in BM TRADA ETA-10/0335
- *The top and bottom flanges of these sizes require continuous lateral restraint at a maximum of 300mm centres unless a lateral buckling check has been performed
- All strength properties are given for JJI-Joists used as non-systems. For joists acting as a system multiply Moment, Shear and Bearing by 1.1 ($k_{sys}=1.1$)

JJI-JOIST VERTICAL LOAD CAPACITIES

JJI Joist Depth	Permissible long term load per metre run (kN/m)	Characteristic load per metre run (kN/m)
195	25.0	75.0
220	20.0	60.0
235	20.0	60.0
245	19.0	57.0
300	17.0	51.0
350	13.7	41.1
400	10.7	32.1
450	10.3	30.9

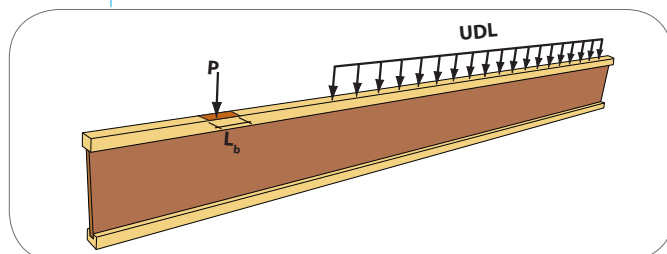
Table 5. JJI-Joist Vertical Loads

Notes for Table 5:

- Permissible loads are given for long term load duration
- Point loads (P) can be calculated using the following expression where L_b is the contact length of the applied load in mm. $P = UDL \times (L_b + 60) / 1000$
- Allowance may be made for load spreading of sole plates and bottom rails



JJI POINT LOADS AND UDL



JJI-JOIST HOLE INSTALLATION GUIDE: CIRCULAR, SQUARE AND RECTANGULAR HOLES

Service holes MUST NOT BE CUT in the JJI-Joist flange.

The maximum size of a service hole that can be cut in the web of a JJI-Joist at a particular location depends on the specific load configuration on the joist. Because of this it is not possible to provide general rules that apply to all cases.

The table below gives the minimum required distance, L (mm), from inside face of support to nearest edge of hole for uniformly loaded, simply supported joists under standard domestic loading of 0.75kN/m² dead load and 1.5kN/m² imposed load at up to 600mm centres. Where this is not the case, the hole(s) can be assessed using the JoistMaster software. Contact your Distributor for advice.

Joist Depth (mm)	Joist Span (mm)	Hole Size (mm)													
		50		75		100		125		150		175		200	
		○+□	□	○+□	□	○+□	□	○+□	□	○+□	□	○+□	□	○+□	□
145	1000	300	300												
	1500	300	300												
	2000	300	300												
	2500	342	300												
	3042	613	504												
195	2500	300	300	300	300	300	300								
	3000	300	300	300	300	300	330								
	3500	300	300	300	300	300	580								
	4000	300	329	450	539	548	830								
	4343	321	500	622	710	719	1002								
220	3000	300	300	300	300	300	300	300	427						
	3500	300	300	300	309	348	419	419	677						
	4000	300	300	379	559	598	669	669	927						
	4500	300	454	629	809	848	919	919	1177						
	4675	319	541	717	896	935	1006	1006	1265						
235	3000	300	300	300	300	300	300	300	474						
	3500	300	300	300	300	323	455	455	724						
	4000	300	300	300	518	573	705	705	974						
	4500	300	349	547	768	823	955	955	1224						
	4855	300	526	725	946	1000	1132	1132	1402						
245	3000	300	300	300	300	300	300	300	502	300	502				
	3500	300	300	300	300	300	458	458	752	513	752				
	4000	300	300	300	476	539	708	708	1002	763	1002				
	4500	300	300	481	726	789	958	958	1252	1013	1252				
	4970	300	504	716	961	1024	1193	1193	1487	1248	1487				
300	3500	300	300	300	300	300	300	300	526	487	646	613	873	662	873
	4000	300	300	300	300	300	517	517	776	737	896	863	1123	912	1123
	4500	300	300	300	348	445	767	767	1026	987	1146	1113	1373	1162	1373
	5000	300	300	300	598	695	1017	1017	1276	1237	1396	1363	1623	1412	1623
	5577	300	300	551	886	984	1306	1306	1565	1525	1685	1652	1912	1701	1912

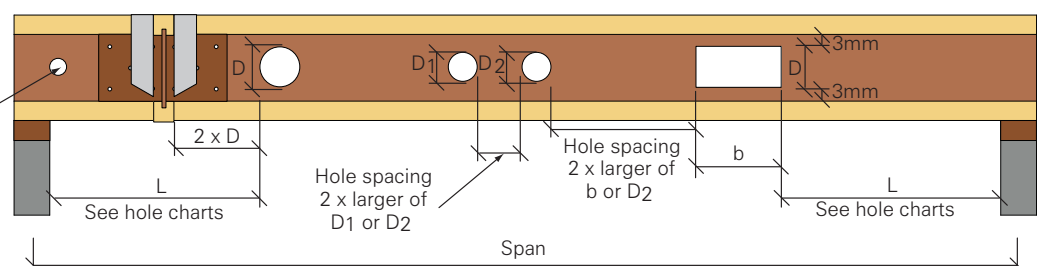
Table 6. Allowable Locations for Circular, Square and Rectangular Holes (Domestic Applications)

Notes for Table 6:

- = Circular Holes, □ = Square Holes and ▭ = Rectangular Holes
- Where more than one hole is to be cut, the minimum spacing between holes must be 2 times the width of the largest hole
- The rectangular hole width b should not exceed 1.5 x times the height D
- Cut all holes carefully. Do not over-cut and do not cut the flanges
- Where holes are required in the rim and header joists of timber frame construction refer to James Jones & Sons
- Plastic plumbing is ideal for use with JJI-Joists. Where copper plumbing is to be used, careful consideration of the sequence of pipe installation is required
- The bearing support length used for this table is 100mm
- Joist Span refers to engineering span

SERVICE HOLE HELP DIAGRAM

A 35mm hole (18mm for 145 deep joist) may be drilled anywhere on the centre line of the web material provided there is a minimum of 35mm (18mm) from the edge of the hole to the end of the joist and it is not directly over a support

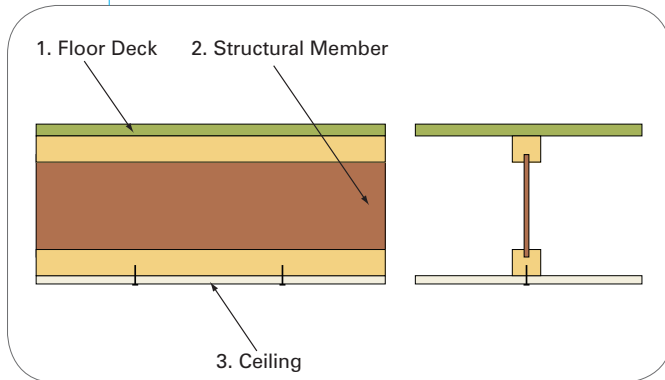


FIRE RESISTANCE

Successful fire tests have been carried out on JJI-Joists by Chiltern International Fire. A half-hour floor, a one-hour floor and a half-hour floor incorporating ceiling downlighters have all been tested. The following details show the approved floor constructions described in Chiltern International Fire Assessment Numbers FEA/F99142A Rev B and FEA/F99142B that provide a half-hour and one hour period of fire resistance respectively.

HALF-HOUR

30 MIN. FIRE RESISTANCE



1. Floor Deck

- 22mm (for 600mm centres joists) and 18mm (for less than 450mm centres joists) flooring grade chipboard
- 18mm flooring grade plywood
- 18mm oriented strand board (OSB)
- 21mm T&G softwood flooring

2. Structural Member

- JJI-Joist designed to support the applied loads at maximum 600mm centres (excluding 145mm deep)

3. Ceiling

- 15mm gypsum wallboard without board edge noggings
- 12.5mm gypsum wallboard with 5mm gypsum plaster skim with board edge noggings
- 12.5mm 'fire resisting' plasterboard with board edge noggings
- 15mm 'fire resisting' plasterboard and no board edge noggings

Optional – Ceiling downlighters (not shown) up to 130mm diameter at minimum 500mm spacing

Optional – Glass wool or rock fibre insulation (not shown) laid on back of ceiling lining

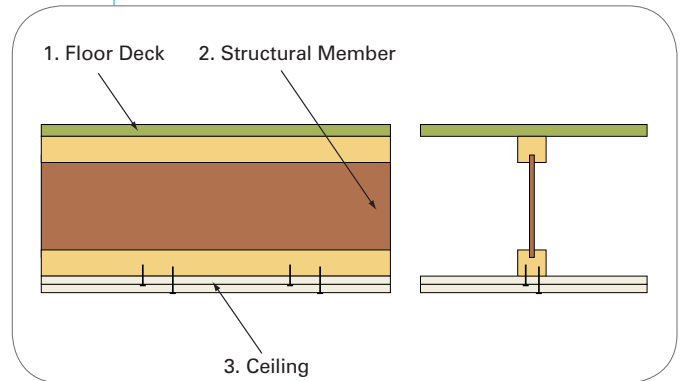
Reference – Chiltern International Fire assessment No. FEA/F99142A Rev B

TREATMENT AND DURABILITY

JJI-Joists are untreated and when used in a Service Class 1 or 2 environment, the ETA certificate advises that they may be taken to have a service life in excess of 50 years.

ONE-HOUR

60 MIN. FIRE RESISTANCE



1. Floor Deck

- 22mm (for 600mm centres joists) and 18mm (for less than 450mm centres joists) flooring grade chipboard
- 18mm flooring grade plywood
- 18mm oriented strand board (OSB)
- 21mm T&G softwood flooring

2. Structural Member

- JJI-Joist designed to support the applied loads at maximum 600mm centres (excluding 145mm deep)

3. Ceiling

- 12.5mm + 19mm gypsum wallboard and no board edge noggings
- 2 no. layers 15mm gypsum wallboard with edge noggings

Optional – Glass wool or rock fibre insulation (not shown) laid on back of ceiling lining

Reference – Chiltern International Fire assessment No. FEA/F99142B

FLAME RETARDANT (FR) TREATMENT

James Jones and Sons have been heavily involved in the Structural Timber Association (formerly UKTFA) on-going project to develop fire design guidance and test methods aimed at mitigating the risk of fire during construction of timber frame buildings. As part of this work we have performed fire tests with flame retardants from two manufacturers with positive results. Where there is no alternative it is possible for us to supply a non-standard FR treated joist that complies with the Structural Timber Association FR build requirements. Pricing and delivery times on application.

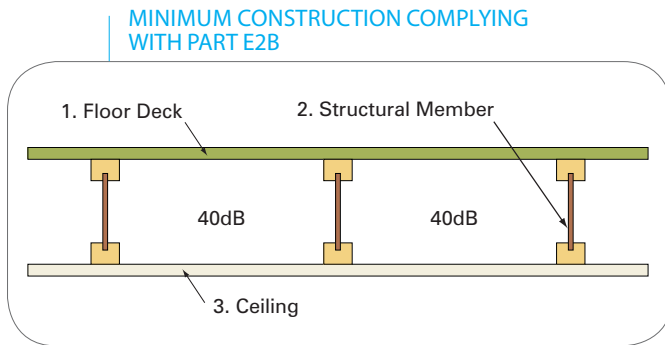
PRESERVATIVE TREATMENT

JJI-Joists are available with preservative treated timber flanges. This allows their use in Use Class 2 conditions in accordance with BS EN335-1, and Hazard Class 2 conditions in accordance with NHBC Standards, i.e. load bearing external wall studs and flat roof joists. This treatment does not affect the structural properties of the JJI-Joist. Please contact James Jones and Sons for further information.

ACOUSTIC REQUIREMENTS

JJI-Joists can be used in both intermediate and separating floors that comply with Building Regulation requirements for Resistance to the Passage of Sound (Part E) provided appropriate detailing is used. Alternative solutions may be required in Scotland. Please refer to the Scottish Building Regulations. Part 5: Noise.

INTERMEDIATE FLOORS



1. Floor Deck – 18mm flooring grade chipboard.
2. Structural Member – 220mm deep JJI-Joists at a minimum 400mm centres
3. Ceiling – 15mm gypsum wall board and no board edge noggings

SCHEDULE OF WEIGHTS FOR BUILDING MATERIALS

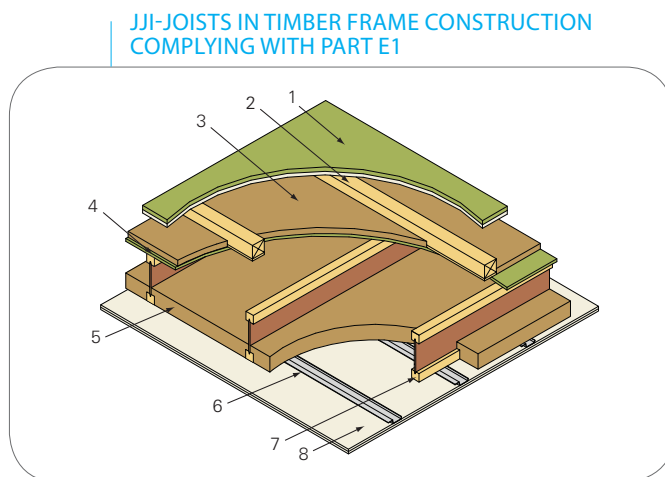
The following schedule provides a useful reference for building material weights (kN/m²) and has been prepared from proprietary information and BS648 Weights of Materials.

Material	kN/m ²	Material	kN/m ²
18mm Chipboard	0.13	12.5mm Plasterboard	0.09
22mm Chipboard	0.16	15mm Plasterboard	0.11
15mm Plywood	0.10	19mm Plank	0.15
19mm Plywood	0.12	12.5mm Fireboard	0.11
15mm OSB	0.11	5mm Skim Coat	0.05
18mm OSB	0.13	100mm Glass Fibre	0.02
18mm T&G Boards	0.10	100mm Rock Wool	0.04
22mm T&G Boards	0.12	Timber Studs with 12.5mm Plasterboard	0.29

Table 7. Material Weights

COMPARTMENT FLOOR

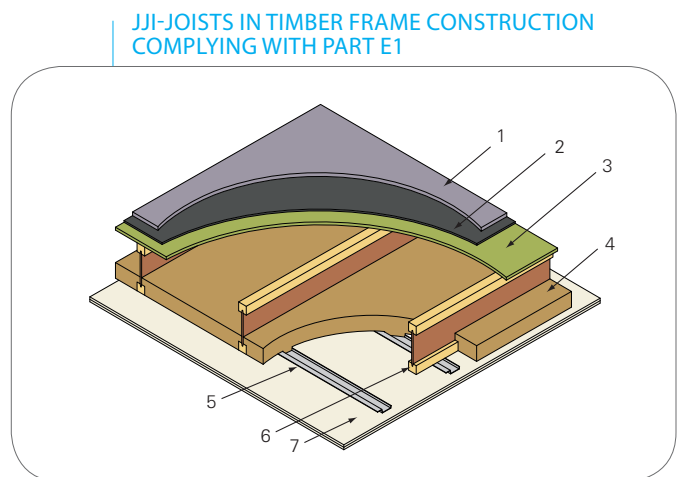
Robust detail E-FT-1
Generic solution



1. 18mm chipboard and 19mm plasterboard plank
2. 70mm dynamic battens at 600mm centres
3. Minimum 25mm quilt between battens
4. Sub-deck board, minimum 15mm
5. 100mm mineral fibre based quilt
6. Resilient bar at 400mm centres
7. Minimum 235mm deep JJI-Joist at centres to suit span
8. 12.5mm plasterboard and 19mm plasterboard plank or 2 no. layers 15mm plasterboard

COMPARTMENT FLOOR

Robust detail E-FT-5
www.cellecta.co.uk



1. Cellecta dry screed board
2. Cellecta composite resilient layer
3. Sub-deck board, minimum 15mm
4. 100mm mineral fibre based quilt
5. Resilient bars at 400mm centres
6. Minimum 245mm deep JJI-Joist at centres to suit span
7. 12.5mm plasterboard and 19mm plasterboard plank or 2 no. layers of 15mm plasterboard

INTRODUCTION

JJ-Beam and JJ-Rim (Glulam) are both high specification engineered timber products made by gluing together strength graded timber laminations to make up larger sections and distribute the natural defects evenly throughout the volume. The laminations are finger jointed to allow long lengths to be formed. This results in a structural unit of great strength and dimensional stability. Glulam beams can be produced in a range of sectional sizes and are available from James Jones & Sons in lengths up to 12m.

JJ-Beam is the higher specification of the two products and is ideal for use as a highly loaded structural beam.

JJ-Rim is a lower specification providing a economical solution for use as rim material in timber frame construction, but may also be used as a beam.

TYPICAL GLULAM SECTIONS



ADVANTAGES

Glulam beams offer many design performance advantages over conventional timber sections making them ideal for use in domestic and commercial JJI-Joist systems where high load capacity is required. JJ-Beam and JJ-Rim are:

- Strong – high specification laminates
- Stiff – resulting in small deflections
- Consistent – quality assured production process
- Stable – good dimensional stability and consistent sizing
- Reliable – elimination of the drying splits/shakes common in solid timber
- Long – available in 12m lengths
- Straight – no twist even with large sections and longer lengths

These characteristics make JJ-Beam and JJ-Rim ideal for use as trimmers, beams, purlins, rim boards, columns and lintels, etc. In many instances JJ-Beam and JJ-Rim can be used to replace steel elements making installation and fixing easier.



JJ-BEAM AND JJ-RIM RANGE AND TOLERANCES

James Jones & Sons can supply JJ-Beam and JJ-Rim as part of the JJI-Joist system. Both products are available in depths that match the JJI-Joist range (Table 1) and three standard widths. See table below for standard range. Other sizes and grades are available to special order.

Section Depth	Width		
	38	45	90
195	✓	✓	✓
220	✓	✓	✓
235	✓	✓	✓
245	✓	✓	✓
300	✓*	✓	✓
350		✓*	✓
400		✓*	✓
450		✓*	✓

Table 8. JJ-Beam and JJ-Rim Product Range

Note for Table 8:

1. * Unless a separate stability check is performed, these depths should only be used as multiply members or rim beams

Member Dimension	Tolerance (mm)
Width	+/- 2.0 mm
Depth	+/- 2.0 mm
Length	+/- 5.0 mm

Table 9. JJ-Beam and JJ-Rim Manufacturing Tolerances

JJ-BEAM AND JJ-RIM IDENTIFICATION AND MARKING

JJ-Beam and JJ-Rim are only available through our Distributors and are generally not marked on the product so that it may be left visible if desired. Care should be take to ensure that JJ-Beam and JJ-Rim used onsite has been supplied by the Distributor and not a similar but lower specification product from another source.

JJ-BEAM AND JJ-RIM PROPERTIES

JJ-Beam and JJ-Rim should be designed to Eurocode 5 and requires the use of characteristic values as shown in Table 10.

Characteristic Values		JJ-Rim	JJ-Beam	Units
Bending strength	$f_{m,g,k}$	24	32	N/mm ²
Tension strength	$f_{t,0,g,k}$	14	19.5	N/mm ²
	$f_{t,90,g,k}$	0.35	0.45	N/mm ²
Compression strength	$f_{c,0,g,k}$	21	26.5	N/mm ²
	$f_{c,90,g,k}$	2.4	3.0	N/mm ²
Shear strength	$f_{v,g,k}$	2.2	3.2	N/mm ²
Modulus of elasticity	$E_{0,g,mean}$	11600	13700	N/mm ²
	$E_{0,g,05}$	9400	11100	N/mm ²
	$E_{90,g,mean}$	320	420	N/mm ²
Shear modulus	$G_{g,mean}$	590	780	N/mm ²
Density	$\rho_{g,k}$	350	410	Kg/m ³

Table 10. Characteristic Values

PARTIAL FACTORS

Care should be taken to ensure that all partial factors used to convert the characteristic values to design values are correctly chosen for the prevailing design conditions. For example, load duration, member depth, service class, etc.

DURATION OF LOAD

Service class	Load Duration Class				
	Permanent	Long term	Medium term	Short term	Instantaneous
1	0.60	0.70	0.80	0.90	1.10
2	0.60	0.70	0.80	0.90	1.10
3	0.50	0.55	0.65	0.70	0.90

Table 11. k_{mod} for JJ-Beam and JJ-Rim design

MATERIAL

The material modification factor can be taken as $\gamma_M = 1.25$.

SERVICE CLASS

Service class	k_{def}
1	0.60
2	0.80

Table 12. k_{def} for JJ-Beam and JJ-Rim design

To assist designers who are not familiar with Eurocode 5, Table 13 has been prepared by applying the appropriate factors to the characteristic values of JJ-Beam and JJ-Rim for a domestic floor application.

Width	Depth	Area	d/w	Depth Factor K_h	Section Modulus Z	Moment of Inertia I	JJ-Rim					JJ-Beam				
							Weight	Flexural Rigidity EI	Shear Rigidity GA	Moment Capacity M_d	Shear Capacity V_d	Weight	Flexural Rigidity EI	Shear Rigidity GA	Moment Capacity M_d	Shear Capacity V_d
(mm)	(mm)	(mm ²)	(-)	(-)	(10 ⁵ mm ³)	(10 ⁷ mm ⁴)	(kg/m)	(10 ⁹ Nmm ²)	(10 ⁶ N)	(kNm)	(kN)	(kg/m)	(10 ⁹ Nmm ²)	(10 ⁶ N)	(kNm)	(kN)
38	195	7410	5.1	1.10	2.41	2.35	2.96	272	4.37	2.71	3.11	3.19	322	5.78	3.62	6.74
	220	8360	5.8	1.10	3.07	3.37	3.34	391	4.93	3.45	3.51	3.59	462	6.52	4.60	7.61
	235	8930	6.2	1.10	3.50	4.11	3.57	477	5.27	3.93	3.74	3.84	563	6.97	5.24	8.13
	245	9310	6.4	1.09	3.80	4.66	3.72	540	5.49	4.26	3.90	4.00	638	7.26	5.68	8.47
	300	11400	7.9	1.07	5.70	8.55	4.56	992	6.73	6.26	4.78	4.90	1171	8.89	8.34	10.38
45	195	8775	4.3	1.10	2.85	2.78	3.51	323	5.18	3.21	3.68	3.77	381	6.84	4.28	7.99
	220	9900	4.9	1.10	3.63	3.99	3.96	463	5.84	4.09	4.15	4.26	547	7.72	5.45	9.01
	235	10575	5.2	1.10	4.14	4.87	4.23	565	6.24	4.66	4.43	4.55	667	8.25	6.21	9.63
	245	11025	5.4	1.09	4.50	5.51	4.41	640	6.50	5.04	4.62	4.74	756	8.60	6.72	10.04
	300	13500	6.7	1.07	6.75	10.13	5.40	1175	7.97	7.41	5.66	5.81	1387	10.53	9.88	12.29
	350	15750	7.8	1.06	9.19	16.08	6.30	1865	9.29	9.93	6.60	6.77	2203	12.29	13.24	14.34
	400	18000	8.9	1.04	12.00	24.00	7.20	2784	10.62	12.80	7.55	7.74	3288	14.04	17.06	16.38
	450	20250	10.0	1.03	15.19	34.17	8.10	3964	11.95	16.01	8.49	8.71	4682	15.80	21.34	18.43
90	195	17550	2.2	1.10	5.70	5.56	7.02	645	10.35	6.42	7.36	7.55	762	13.69	8.57	15.97
	220	19800	2.4	1.10	7.26	7.99	7.92	926	11.68	8.18	8.30	8.51	1094	15.44	10.90	18.02
	235	21150	2.6	1.10	8.28	9.73	8.46	1129	12.48	9.32	8.87	9.09	1333	16.50	12.42	19.25
	245	22050	2.7	1.09	9.00	11.03	8.82	1279	13.01	10.08	9.24	9.48	1511	17.20	13.44	20.07
	300	27000	3.3	1.07	13.50	20.25	10.80	2349	15.93	14.82	11.32	11.61	2774	21.06	19.75	24.58
	350	31500	3.9	1.06	18.38	32.16	12.60	3730	18.59	19.86	13.21	13.55	4405	24.57	26.48	28.67
	400	36000	4.4	1.04	24.00	48.00	14.40	5568	21.24	25.59	15.09	15.48	6576	28.08	34.12	32.77
	450	40500	5.0	1.03	30.38	68.34	16.20	7928	23.90	32.01	16.98	17.42	9363	31.59	42.68	36.86

Table 13. JJ-Beam and JJ-Rim Design Values for Domestic Flooring Applications

Notes for Table 13:

1. The moment and shear capacities are applicable for domestic floor applications only
2. Strength modification factor $k_{mod} = 0.8$
3. Partial material factor $\gamma_M = 1.25$
4. Partial load factor $\gamma_F = 1.5$
5. Depth factor = $(600/h)^{0.1}$
6. Larger section properties are available upon request

JJ-BEAM AND JJ-RIM VERTICAL LOAD CAPACITIES

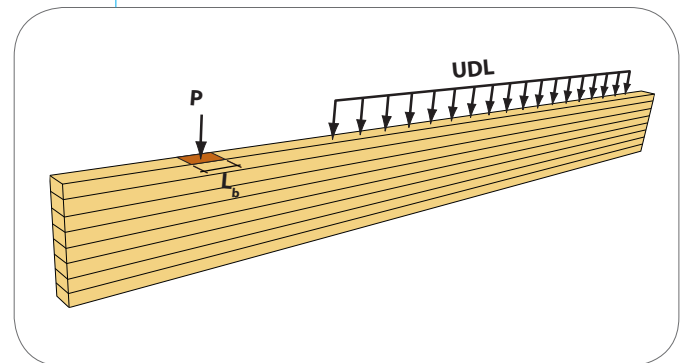
Width	Permissible long term load per metre run (kN/m)		Characteristic load per metre run (kN/m)	
	JJ-Rim	JJ-Beam	JJ-Rim	JJ-Beam
38	38.9	48.6	91.2	114.0
45	46.1	57.6	108.0	135.0
90	92.2	115.2	216.0	270.0

Table 14. JJ-Beam and JJ-Rim Vertical Loads

Notes for Table 14:

1. Permissible loads are derived using Eurocode 5 Medium Term load duration $k_{mod} = 0.8$
2. Point loads (P) can be calculated using the following expression where L_b is the contact length of the applied load in mm. $P = UDL \times (L_b + 60)/1000$
3. Allowance may be made for load spreading of sole plates and bottom rails

JJ-BEAM AND JJ-RIM POINT LOADS AND UDL



STORAGE ON SITE

JJ-Beam and JJ-Rim will typically arrive on site with a moisture content between 10% and 15%, and will achieve a moisture content of approximately 12% when installed in Service Class 1 conditions.

JJ-Beam and JJ-Rim should be stored clear of the ground on a flat level surface and protected from the weather.

Once installed, if the structure will not be weather tight for a prolonged period of time, the JJ-Beam and JJ-Rim should be protected from the weather to avoid excessive changes in moisture content, and associated dimensional changes.

TREATMENT AND DURABILITY

JJ-Beam and JJ-Rim is untreated. When used in a Service Class 1 or 2 environment it will have a natural durability comparable to that of solid European white wood.

Following discussions with the NHBC it has been confirmed that when used as a rim beam in timber frame construction and protected by a layer of sheathing and breather paper, no additional preservative treatment is required.

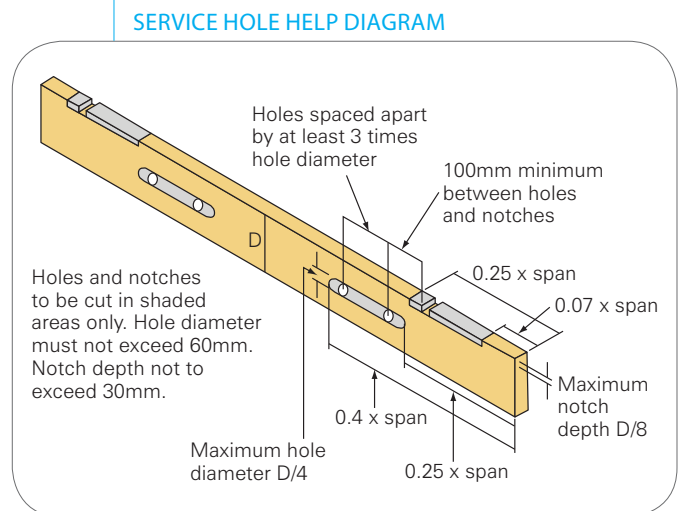
Prior to preservative treatment advice should be sought from the manufacturer.

FIRE RESISTANCE AND TREATMENT

For the purpose of calculating the fire resistance of JJ-Beam and JJ-Rim members, a charring rate of 0.66mm per minute should be used.

SERVICE HOLES IN JJ-BEAM AND JJ-RIM

Holes or notches should be formed in accordance with the guidelines given for solid timber members in The Building Regulations Approved Document "Timber Intermediate Floors for Dwellings", clause 2.5. The hole and notch diagram is applicable to uniformly loaded single span beams only. For all other applications, consult the JJI-Joist Distributor.



In addition to the rules given above a 35mm circular hole can be drilled at any location along the centre line of a JJ-Beam and JJ-Rim members provided the following rules are observed:

- The hole must be a minimum of one member depth away from the end of the joist
- The hole must be a minimum of one member depth away from the nearest support
- No two adjacent holes should be located any closer together than 70mm edge to edge
- For holes larger than 35mm contact your Distributor for advice

FIXING OF MULTIPLY JJ-BEAM AND JJ-RIM MEMBERS

Multiply JJ-Beam and JJ-Rim members can be fixed together using nails, screws or bolts depending on availability and preference.

Screws – Where possible, James Jones & Sons recommend the use of large diameter self tapping screws in preference to nails or bolts. The following products can be supplied by the approved JJI-Joist metalwork suppliers.

- Cullen Building Products LedgerLok @ Ø5.8mm
- Simpson Strong-Tie SDW screw @ Ø5.6mm

For details of the available screw sizes and advice on how they should be used please refer to the relevant metalwork manufacturer’s technical literature (see page 17 for contact details).

For cases where large diameter self-tapping screws are not available this section provides some standard nailing and bolting details for uniformly loaded multiply members loaded from one face only (e.g. incoming joists on hangers at 600mm centres or less).

Nails – For two ply 38mm and 45mm members nails are the cheapest and most easily made fixing. Nails can also be used in three ply 38mm and 45mm members although designers are encouraged to use a screwed connection solution where possible.

Bolts – Bolts can be used to connect together up to 5 ply 45mm members.

Section Makeup	Fixing Detail	2 ply			3 ply		4 ply		5 ply	
		38	45	90	38	45	38	45	38	45
Ply Thickness (mm)		38	45	90	38	45	38	45	38	45
Overall width (mm)		76	90	180	114	135	152	180	190	225
2 rows of 3.1x75mm nails (300 centres)	A	4.51	4.55	-	3.38	3.42	-	-	-	-
3 rows of 3.1x75mm nails (300 centres)	B	6.77	6.83	-	5.08	5.12	-	-	-	-
2 rows of M12 bolts (600 centres)	C	15.20	16.10	21.68	11.40	12.07	10.13	10.73	9.50	10.06
2 rows of M12 bolts (400 centres)	D	22.79	24.15	32.52	17.10	18.11	15.20	16.10	14.25	15.09
2 rows of M12 bolts (300 centres)	E	30.39	32.20	43.36	22.79	24.15	20.26	21.46	18.99	20.12

Table 15a. Maximum Permissible Uniform Line Load (kN/m) for Multiply JJ-Rim Members Loaded from One Face

Section Makeup	Fixing Detail	2 ply			3 ply		4 ply		5 ply	
		38	45	90	38	45	38	45	38	45
Ply Thickness (mm)		38	45	90	38	45	38	45	38	45
Overall width (mm)		76	90	180	114	135	152	180	190	225
2 rows of 3.1x75mm nails (300 centres)	F	5.00	5.05	-	3.75	3.78	-	-	-	-
3 rows of 3.1x75mm nails (300 centres)	G	7.49	7.57	-	5.62	5.67	-	-	-	-
2 rows of M12 bolts (600 centres)	H	16.86	18.01	23.47	12.65	13.51	11.24	12.01	10.54	11.26
2 rows of M12 bolts (400 centres)	I	25.29	27.01	35.19	18.97	20.26	16.86	18.01	15.81	16.88
2 rows of M12 bolts (300 centres)	J	33.71	36.02	46.93	25.29	27.02	22.48	24.01	21.07	22.51

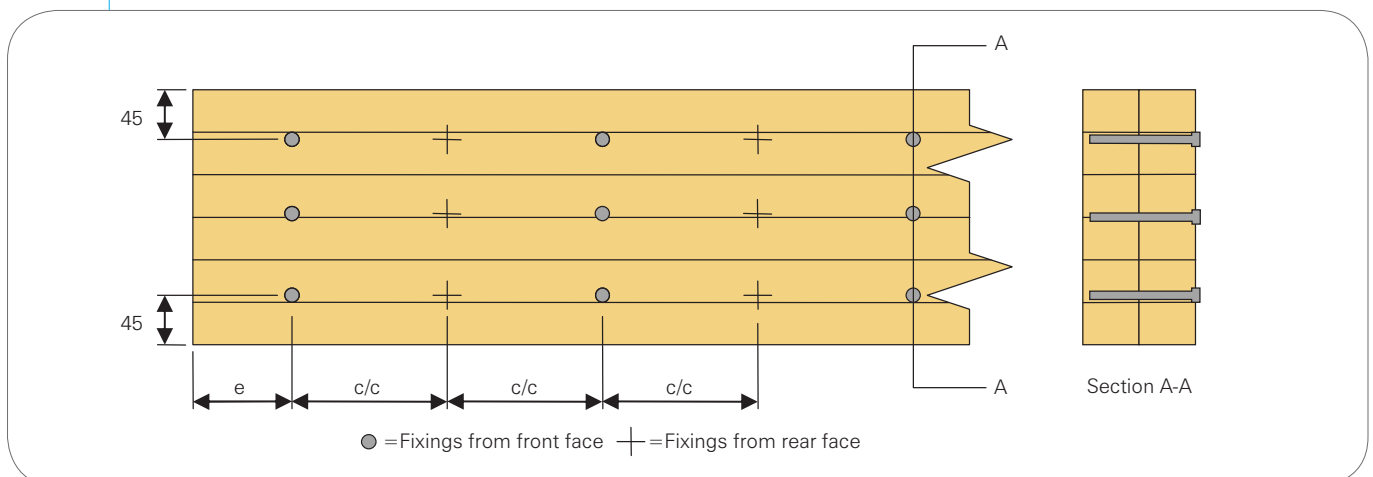
Table 15b. Maximum Permissible Uniform Line Load (kN/m) for Multiply JJ-Beam Members Loaded from One Face

Notes for Table 15a and b:

1. The values in the tables above are applicable to members loaded to one face only
2. Nail diameters indicated are based on common sizes of power driven nails, hammer driven nails up to 4.5mm may be used
3. 38mm diameter x 3mm thick washers are required under each head and nut on M12 bolts. Bolts to be minimum 4.6 grade
4. Sections over 180mm wide should be loaded equally from both sides unless checked by an Engineer
5. Bolt length to be no less than the overall width of beam + 18mm, e.g. a 90mm JJ-Beam and JJ-Rim would require a 108mm bolt
6. Fixing details can be advised by Distributor or noted on layout drawing

Nails in two ply members should be fixed in two rows 45mm in from the top and bottom edge and one row along the centre line if required, driven from alternate sides. The minimum end distance “e” should be 90mm.

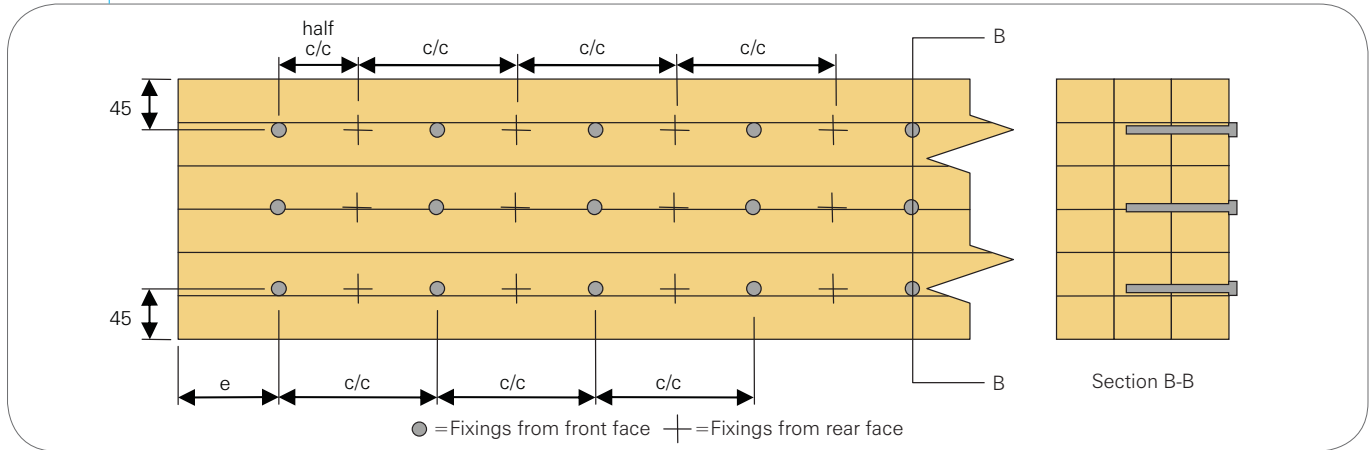
NAILING PATTERN FOR 2 PLY JJ-BEAM AND JJ-RIM MEMBERS



Nails in three ply members should be fixed in two rows 45mm in from the top and bottom edge and one row along the centre line if required, driven through each outer ply into the central one.

Note that nails from any one face should be at the specified centres with the nails from the opposite face offset by half the centres distance. The minimum distance "e" from the last column of nails to the end of the member should be 90mm.

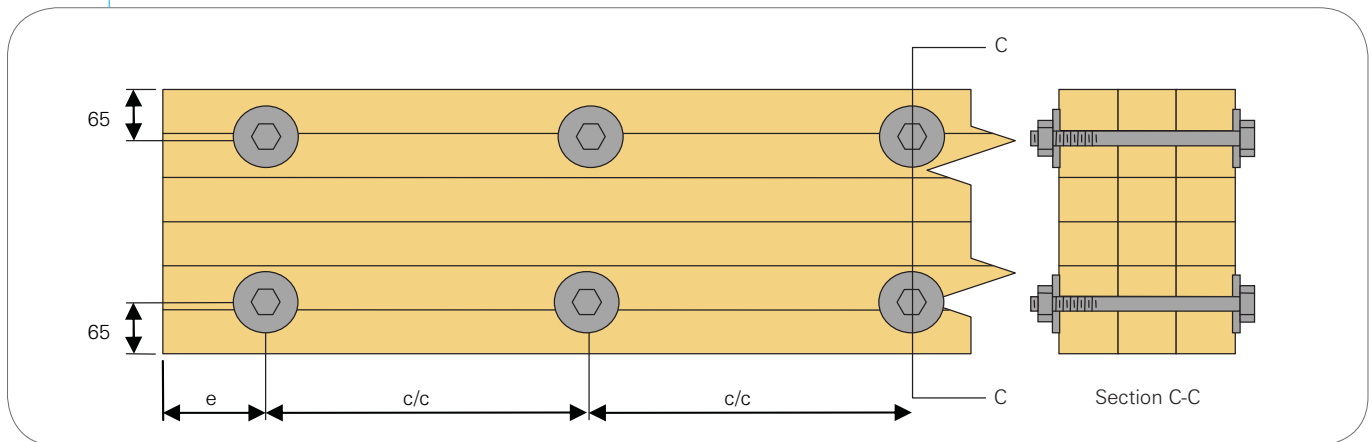
NAILING PATTERN FOR 3 PLY JJ-BEAM AND JJ-RIM MEMBERS



Bolts should be fixed in two rows 65mm in from the top and bottom edge.

Bolt holes should be drilled at Ø12mm and bolts tapped into place. The minimum end distance "e" should be 48mm.

BOLTING PATTERN FOR UP TO 5 PLY JJ-BEAM AND JJ-RIM MEMBERS

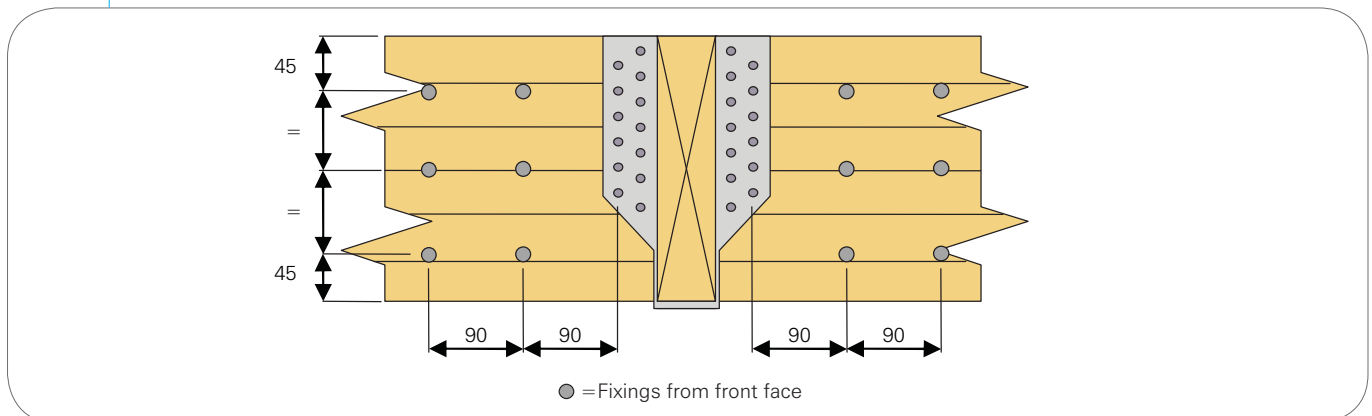


POINT LOADS

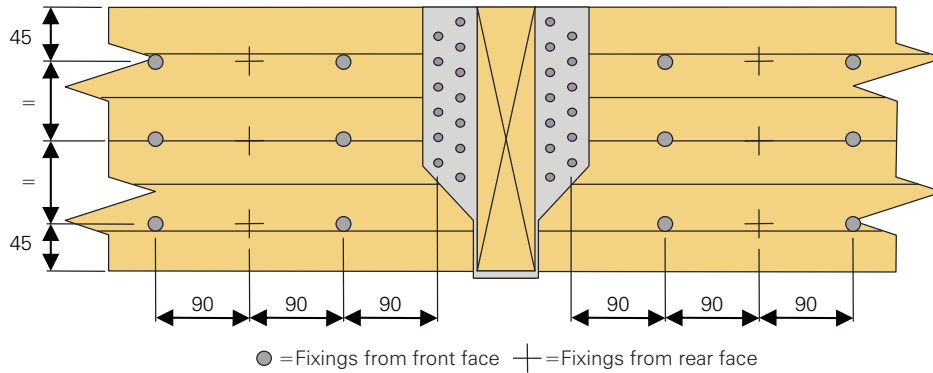
Multiply JJ-Beam and JJ-Rim members are often used as trimming joists parallel with the short edge of stair wells resulting in significant point loads from the trimmer. In situations like this where an isolated point load is to be carried by a multiply member, the designer needs to consider a localised fixing close to the incoming member.

Tables 16 a and b give maximum long term point loads that can be carried if the following fixing details are used.

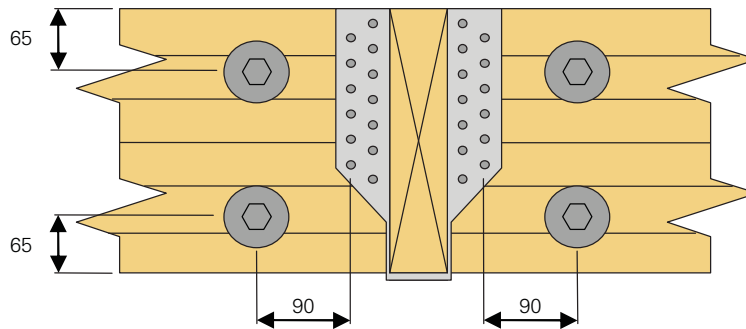
NAILING PATTERN FOR A 2 PLY JJ-BEAM AND JJ-RIM MEMBER WITH AN INCOMING POINT LOAD



NAILING PATTERN FOR A 3 PLY JJ-BEAM AND JJ-RIM MEMBER WITH AN INCOMING POINT LOAD



BOLTING PATTERN FOR JJ-BEAM AND JJ-RIM MEMBER (UP TO 4 PLY) WITH AN INCOMING POINT LOAD



Section Makeup	Fixing Detail	2 ply			3 ply		4 ply	
		38	45	90	38	45	38	45
Ply Thickness (mm)		38	45	90	38	45	38	45
Overall width (mm)		76	90	180	114	135	152	180
Nail Detail	K	8.12	7.68	-	6.09	5.76	-	-
Bolt Detail	L	18.23	19.31	26.02	13.67	14.49	12.15	12.88

Table 16a. Maximum Permissible Isolated Point Load (kN) for Multiply JJ-Rim Members Loaded from One Face

Section Makeup	Fixing Detail	2 ply			3 ply		4 ply	
		38	45	90	38	45	38	45
Ply Thickness (mm)		38	45	90	38	45	38	45
Overall width (mm)		76	90	180	114	135	152	180
Nail Detail	M	8.99	9.08	-	6.74	6.81	-	-
Bolt Detail	N	20.23	21.61	28.16	15.18	16.21	13.49	14.41

Table 16b. Maximum Permissible Isolated Point Load (kN) for Multiply JJ-Beam Member Loaded from One Face

Notes for Table 16a and b:

1. The values in the tables above are applicable to members loaded to one face only
2. Capacities for nail details are based on 3.1mm diameter power driven nails (75mm long for 38mm thick plies and 90mm long for 45mm plies), hammer driven nails up to 4.5mm diameter may be used
3. 38mm diameter x 3mm thick washers are required under each head and nut on M12 bolts. Bolts to be minimum 4.6 grade
4. Bolt length to be no less than the overall width of beam + 18mm, e.g. a 90mm JJ-Beam and JJ-Rim would require a 108mm bolt
5. Fixing details can be advised by Distributor or noted on layout drawing

JJI-JOIST CONNECTION HARDWARE

James Jones & Sons continues to work closely with the UK's leading timber engineering hardware manufacturers, developing ranges of fixings to suit JJI-Joists and JJ-Beam. The products include a complete range of fixings for timber to timber, timber to masonry and timber to steel connections. Only hardware approved by James Jones & Sons should be used with

JJI-Joists and JJ-Beam to ensure quality construction standards. In addition, all approved hardware is automatically specified by James Jones & Sons JoistMaster and FloorMaster software.

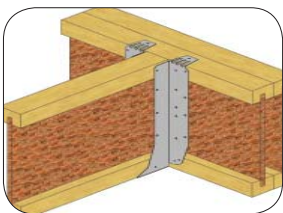
All connection hardware/fixings are available from JJI-Joist Distributors as part of the JJI-Joist system.



www.itw-industry.com
+44 (0)1592 771132

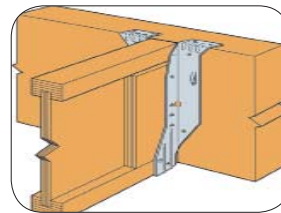


www.strongtie.co.uk
+44 (0)1827 255600



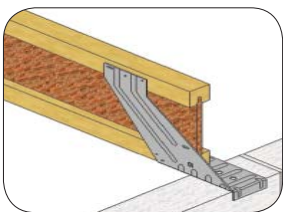
The UH Hanger

The UH Hanger – for any joist to joist or joist to trimmer application



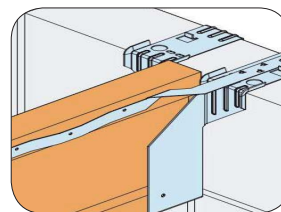
The ITSE Hanger

The ITSE Hanger – top fix hanger for supporting I-Joists from timber member



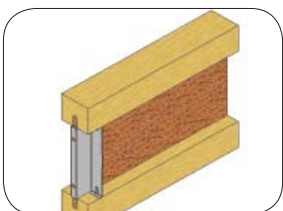
RA Hanger

The RA Hanger – the easy to use safety solution for timber to masonry connections which is built off the same course of blockwork as built-in joists



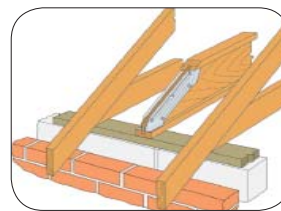
Safety Fast Hanger

The Safety Fast Hanger – a masonry hanger that can support load without the need for propping or masonry above to hold the hanger in place



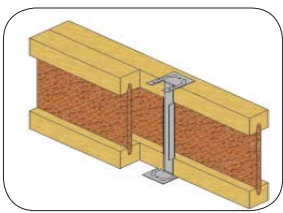
Gripper

The Gripper – the easy solution for Building Regulation compliance at JJI-Joist ends when building into masonry walls



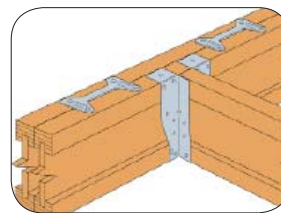
JES Joist End Support

The JES Joist End Support – a two piece metal work system which enables the use of engineered timber I-Joists in loft conversions



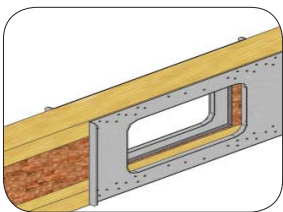
I-Clip

The I-Clip – an alternative solution to traditional filler blocks for simple integrity inspection and a quicker on-site construction



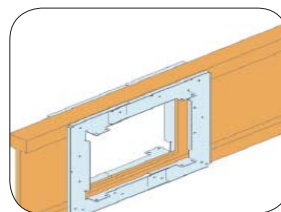
MJC Connector

The MJC Connector – allows two I-Joists or two metal web joists to be fixed together to act like a single unit



SHI Plate

The SHI Plate – allows large service pipes, ducting and cables to run through an aperture cut through the web of the I-Joist



IHS I-Joist Hole Support

The IHS I-Joist Hole Support – designed to strengthen I-Joists when holes are required to be cut in locations not normally permitted

General Notes

- For details of newly approved manufacturers contact James Jones & Sons
- Refer to approved manufacturers literature for details of hanger ranges, safe working loads, nailing requirements and installation instructions
- Web stiffeners are not required when approved hangers are used unless the JJI-Joist design states otherwise
- DO NOT USE NON-APPROVED HANGERS – IF IN DOUBT, ASK

FACTORS AFFECTING FLOOR PERFORMANCE

The following list describes factors that affect floor performance and consideration of these factors may be helpful when designing and installing a JJI-Joist floor system:

Joist Depth

Deeper joists create a stiffer floor thereby reducing deflection. A deep floor joist solution may in fact be cheaper than a shallow joist solution as you may be able to use thinner joists at wider centres.

Deck Fixing

A correctly nailed floor deck will improve floor performance by about 12%*. Gluing the floor deck to the joists, and gluing tongued and grooved joints is required by NHBC Standards Section 6.4 S1.9 and S2.0, and is also recommended in BS 7916. In addition, the floor performance can improve by as much as 70% when the floor deck is glued to the joists*.

Deck Thickness

Thicker floor deck material will improve the floor performance.

Ceiling Treatments

Directly applied ceiling finishes will improve floor performance by about 3%*.

Blocking

Full depth blocking will improve floor performance.

Workmanship

Good quality workmanship is essential to achieve good floor performance. The provision of well prepared and level bearings, methodical erection procedure, diligent installation of all fixings and in particular fixing of the floor deck (including gluing where required) will have a significant effect on floor performance. The maximum acceptable tolerance on the level of bearings is +/- 3mm.

* Figures obtained from independent laboratory tests originating from a government (DETR) research project.

SPECIAL CONSIDERATION FOR GROUND FLOOR DESIGN

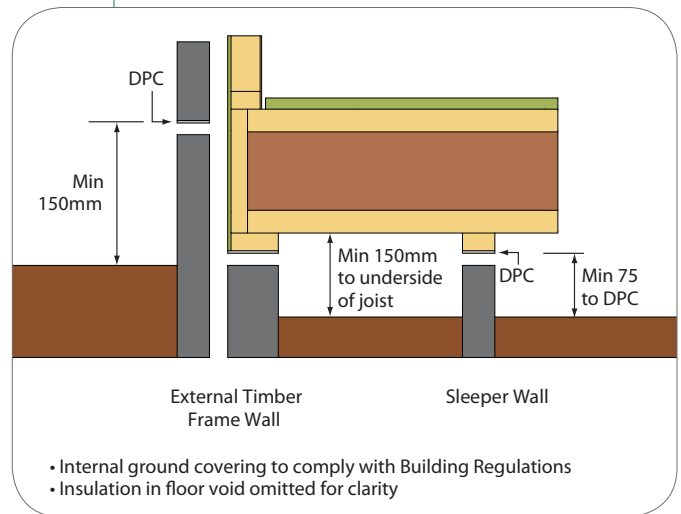
Timber in ground floor construction is in a more moist environment than timber in an upper floor. As such, JJI-Joists for use in ground floors should be designed using joist properties for Service Class 2 conditions.

Insulation

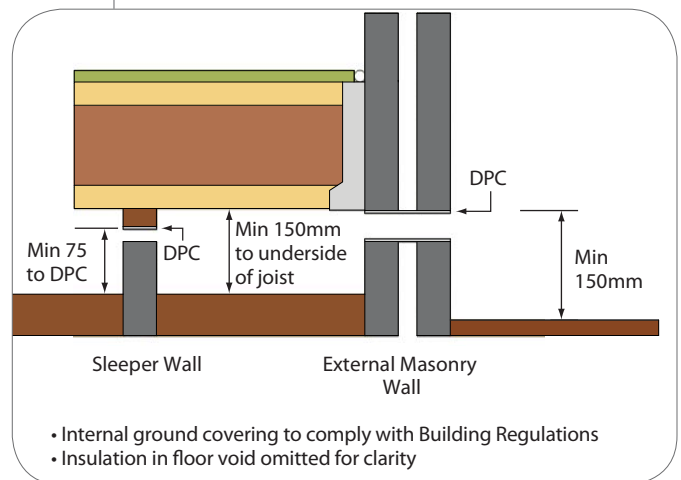
Thermal insulation is required in all ground floors and each different building type should be assessed individually to identify the specific U-value requirements and thus the corresponding thickness of insulation to be used. Three options for providing ground floor insulation are as follows:

1. Quilt insulation supported on plastic netting or breather membrane
2. Quilt insulation supported on a board fixed to the top side of the bottom flange of the JJI-Joist
3. Solid insulation supported on bottom flange of the JJI-Joist

F38 TYPICAL TIMBER FRAME GROUND FLOOR DETAIL



F44 TYPICAL MASONRY GROUND FLOOR DETAIL



Most heat loss through a ground floor occurs around the floor perimeter and so the inclusion of insulation at the edges helps maintain overall insulation levels.

Resistance to Moisture

All suspended ground floors should be constructed to resist the ingress of moisture. Where external ground level is above the ground cover level, then the ground cover should be laid to fall to a suitable drainage outlet.

Ventilation

All parts of the void underneath the suspended floor require a ventilation path to the outside. The ventilation openings should be at least 1500mm² for each metre run of two opposite sides of the floor, or alternatively in Scotland, an opening area 500mm² for every 1m² of floor area may be provided.

Radon Gas

The construction of suspended timber ground floors in areas affected by Radon gas requires specialist advice.

Access for the Disabled

For guidance on providing access thresholds consult James Jones & Sons or the Stationery Office booklet Accessible thresholds in new housing (ISBN 011 702 333 7).

DOMESTIC FLOOR SPAN TABLES

The domestic intermediate floor span tables below are based on the following design criteria:

- Dead Load including partition allowance is 1.15kN/m² for flats or 0.75kN/m² for houses
- Imposed Load 1.5kN/m² (Domestic floor imposed load).
- Deflection limit 0.003 x span or 12mm (NHBC requirement) whichever is lesser
- The spans given are for simply supported and uniformly loaded joists only
- Where the load conditions are different to those described, refer to the JJI-Joist supplier for further assistance

- The joists are designed using the principles of BS 5268-2
- Adequate lateral restraint to the top flange of the joists is assumed to be provided by the floor deck. 18mm chipboard or equivalent for joists up to 400mm centres and 22mm chipboard or equivalent for joists at up to 600mm centres

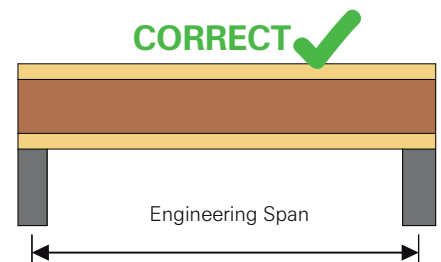
JJI-Joist calculation sheets display a Serviceability Index (SI) which is a measure of the joist performance, maximum allowable deflection/actual deflection. The minimum permissible SI value is 1.0. The spans given in the tables below have a SI of 1.0 for a 0.003 x span or 12mm deflection limit. The spans do not include any of the beneficial effects of the various factors which may affect the floor performance as detailed on page 18.

Joist Type	Apartments				Houses				Most Economical Solution (1-132)			
	Dead load up to 1.15kN/m ²				Dead load up to 0.75kN/m ²							
	Joist Centres (mm)				Joist Centres (mm)				Joist Centres (mm)			
	300	400	480	600	300	400	480	600	300	400	480	600
JJI 145 A+	3197	2860	2660	2428	3402	3048	2839	2596	63	27	10	1
JJI 195 A+	4155	3782	3527	3232	4343	4017	3755	3447	69	30	12	2
JJI 195 B+	4478	4135	3902	3570	4684	4328	4114	3811	81	44	21	5
JJI 195 C	4656	4297	4081	3760	4872	4498	4274	4012	86	48	25	7
JJI 195 D	5064	4664	4424	4143	5303	4888	4639	4348	107	73	49	20
JJI 220 A+	4473	4136	3909	3586	4675	4325	4115	3821	77	40	17	3
JJI 220 B+	4863	4491	4268	4006	5086	4700	4468	4197	91	54	29	9
JJI 220 C	5002	4617	4386	4115	5232	4833	4593	4312	105	72	47	19
JJI 220 D	5398	4975	4721	4423	5651	5212	4948	4640	118	92	67	37
JJI 235 A+	4645	4296	4086	3782	4855	4492	4274	4020	79	42	18	4
JJI 235 B+	5044	4659	4428	4158	5275	4875	4635	4354	95	56	33	11
JJI 235 C	5192	4794	4554	4274	5431	5017	4769	4478	112	78	7	26
JJI 235 D	5604	5166	4903	4595	5866	5412	5139	4819	123	100	76	46
JJI 245 A+	4756	4399	4184	3908	4970	4599	4376	4116	82	45	23	6
JJI 245 B+	5155	4762	4526	4250	5390	4982	4737	4451	97	59	35	13
JJI 245 C	5315	4907	4662	4376	5559	5136	4881	4584	113	83	60	31
JJI 245 D	5742	5293	5024	4709	6010	5545	5265	4938	126	108	88	58
JJI 300 A+	5338	4938	4698	4418	5577	5162	4913	4622	90	51	28	8
JJI 300 B+	5741	5306	5044	4739	6002	5550	5279	4961	101	64	41	15
JJI 300 C	5956	5501	5228	4909	6229	5756	5473	5142	117	89	65	34
JJI 300 D	6461	5959	5657	5304	6761	6240	5927	5561	129	115	99	71
*JJI 350 A+	5777	5346	5087	4784	6036	5587	5319	5005	98	61	36	14
*JJI 350 B+	6172	5707	5427	5100	6452	5968	5677	5338	110	75	52	24
JJI 350 C	6528	6030	5731	5382	6827	6310	5999	5636	120	94	70	39
JJI 350 D	7032	6487	6160	5777	7359	6793	6453	6056	130	122	111	85
*JJI 400 A+	6248	5781	5502	5175	6527	6043	5752	5413	102	66	43	16
*JJI 400 B+	6672	6168	5866	5513	6973	6450	6137	5770	114	84	62	32
JJI 400 C	7108	6565	6239	5859	7433	6869	6531	6136	124	103	80	53
JJI 400 D	7516	6935	6587	6179	7863	7261	6899	6476	131	127	116	96
*JJI 450 A+	6690	6191	5891	5541	6989	6471	6159	5796	109	74	50	22
*JJI 450 B+	7140	6601	6278	5901	7462	6903	6568	6176	119	93	68	38
*JJI 450 C	7354	6797	6462	6071	7688	7109	6762	6356	125	106	87	57
JJI 450 D	7911	7303	6937	6510	8275	7644	7264	6821	132	128	121	104

Table 17. Maximum Engineering Span for Domestic Intermediate Floors

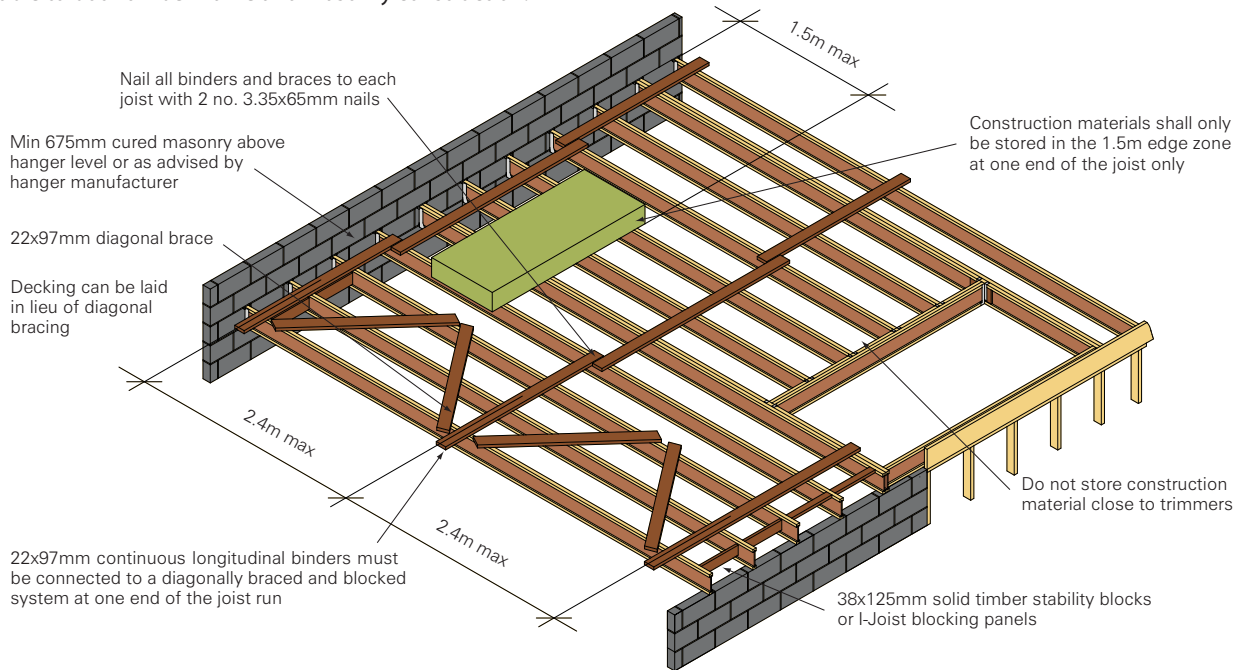
Notes for Table 17:

1. These tables serve as guidance only. For a more detailed JJI-Joist appraisal contact a JJI-Joist Distributor
2. To achieve the stated spans, adequate JJI-Joist bearing will be required. Web stiffeners may be necessary
3. The effect of the dead weight of non-load bearing partitions in apartments can be assumed to be included in the design where self-weight of the partition does not exceed 0.8kN/m run and the self-weight of the floor construction does not exceed 0.9kN/m²
4. The effect of the dead weight of non-load bearing partitions in houses can be assumed to be included in the design where self-weight of the partition does not exceed 0.8kN/m run and the self-weight of the floor construction does not exceed 0.5kN/m²
5. Permissible web holes to be drilled in accordance with JoistMaster software or hole chart Table 6 on page 8
6. For all solutions that work for a particular span the one with the lowest 'Most Economical Solution' index will be the most cost effective
7. * The top and bottom flanges of these sizes require continuous lateral restraint at a maximum of 300mm centres unless a lateral buckling check has been performed



INSTALLATION GUIDELINES

This diagram indicates temporary erection bracing only. It is applicable to both timber frame and masonry construction.



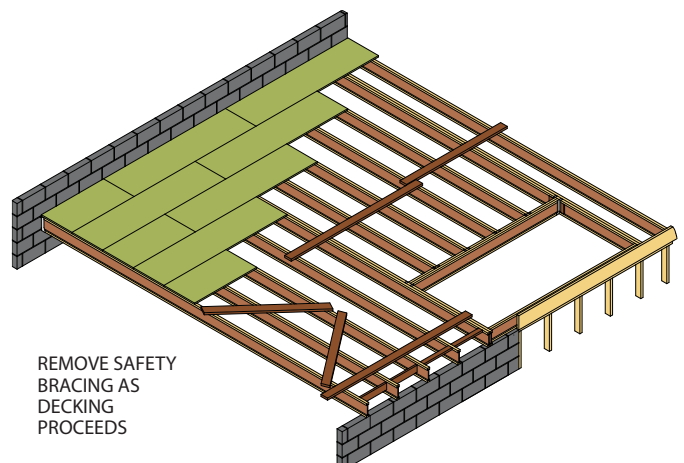
STABILITY BLOCKING NOTES

- Use timber blocks or JJI-Joist blocking pieces
 - Timber blocks to be minimum 38x125mm cut squarely and accurately to maintain joist spacing. Fasten with minimum 2 no. 3.35x65mm nails
 - Stability blocks need to be fixed to 3 joists and cover a minimum distance of 1200mm
 - Timber blocks in the diagonally braced systems are required in each run of joists and at cantilever supports
 - When joists butt on an interior support, block both sets of joists
 - Additional braced and blocked systems should be provided at 12m spacing in long joist runs
6. Lateral strength should be provided by a diagonally braced and blocked system across at least 3 joists as shown in the Erection Bracing Details (diagram above). Additional braced and blocking systems should be provided at 12m spacing in long joist runs
 7. Once a JJI-Joist floor has been fully braced, construction materials may be placed on the floor provided that the overall weight of material to be placed on a single joist does not exceed 250kg (200kg for 195mm deep joists). To ensure that the weight is distributed in a safe manner we recommend that timber bearers (perpendicular to joist run) or a standard pallet (1200x1200) are placed under the construction materials. Bearers must extend over at least 2 joists. Please refer to Technical Bulletin 47.
 8. Flooring should be fully fixed to the JJI-Joists before additional loads are placed on the floor
 9. The ends of cantilevers should be stabilised with longitudinal binders fixed to the top and bottom flanges
 10. Temporary bracing may be progressively removed as decking is fixed

TEMPORARY ERECTION BRACING NOTES

The builder is responsible for identifying and minimising the risks involved in erecting JJI-Joists to ensure that the health and safety of all workers is maintained. Builders should be aware of the health and safety responsibilities imposed on them by the Construction (Design and Management) Regulations 2007. Proper erection procedures and bracing are vital to the safe construction of JJI-Joists floors. The following notes may assist builders in preparing a safety assessment.

1. Do not allow workers to walk on unbraced joists
2. Do not store building materials on unbraced joists
3. JJI-Joists should be erected straight and vertical. The maximum deviation from horizontal should not exceed 10mm and the maximum deviation from the vertical should not exceed 2mm
4. JJI-Joists are unstable until fully braced. Bracing includes: longitudinal binders, diagonal bracing, stability blocking, rim joist/rim boards
5. All longitudinal binders, diagonal braces, stability blocks, and hangers should be completely installed and fully nailed as detailed



JJI-JOIST SITE STORAGE

Protect joists from the elements. Keep them dry.



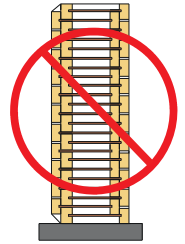
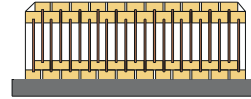
Use supports at about 3.0m spacing to keep joists clean, level and above the ground.

Use suitable lifting equipment to offload joist bundles.



Transport joists on edge, not flat.

Store joists on edge.



DO NOT store joists flat.



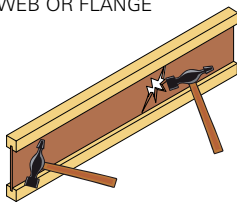
DO NOT lift joists by top flange.



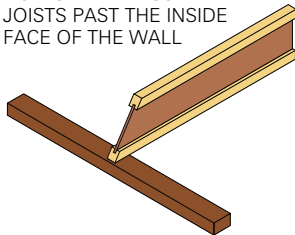
DO NOT lift joists on the flat.

ATTENTION! THE FOLLOWING CONDITIONS ARE NOT ALLOWED

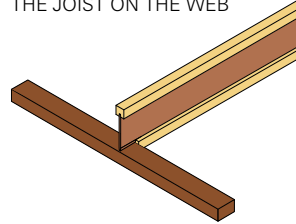
DO NOT HAMMER ON THE WEB OR FLANGE



DO NOT BEVEL CUT THE JOISTS PAST THE INSIDE FACE OF THE WALL



DO NOT SUPPORT THE JOIST ON THE WEB

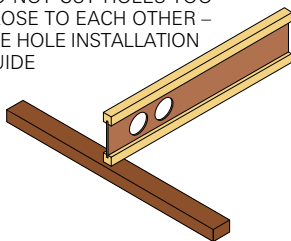


DO NOT WALK ON JOISTS UNTIL PROPER BRACING IS IN PLACE

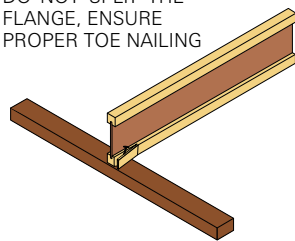


DO NOT STACK BUILDING MATERIALS ON UNBRACED JOISTS

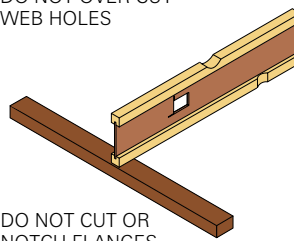
DO NOT CUT HOLES TOO CLOSE TO EACH OTHER – SEE HOLE INSTALLATION GUIDE



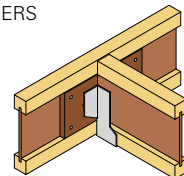
DO NOT SPLIT THE FLANGE, ENSURE PROPER TOE NAILING



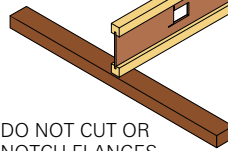
DO NOT OVER-CUT WEB HOLES



DO NOT USE NON-APPROVED HANGERS



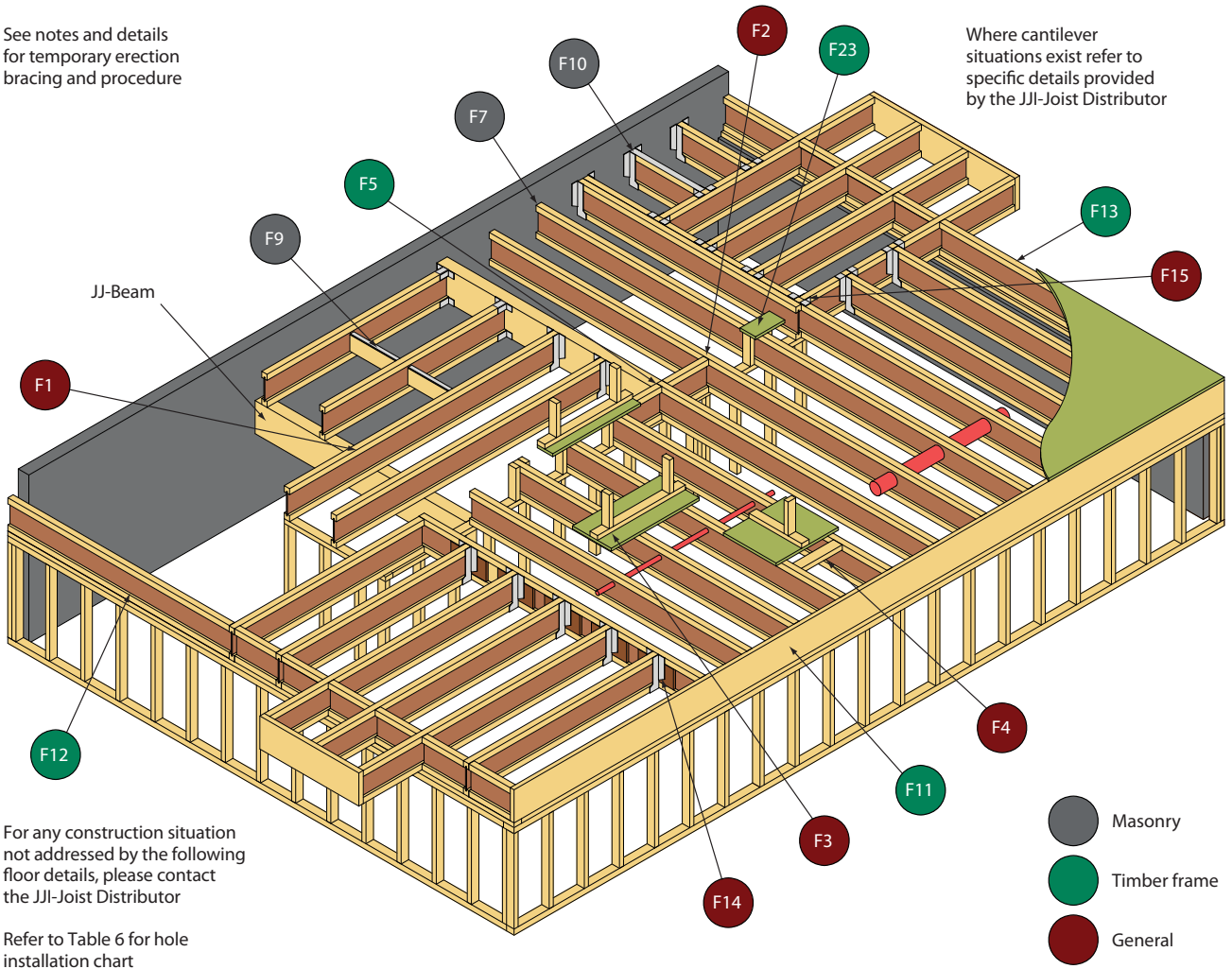
DO NOT CUT OR NOTCH FLANGES



EXAMPLE JJI-JOIST FLOOR SYSTEM

See notes and details for temporary erection bracing and procedure

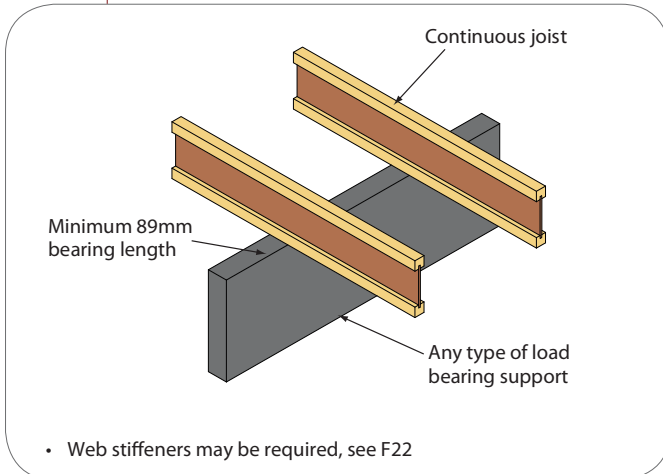
Where cantilever situations exist refer to specific details provided by the JJI-Joist Distributor



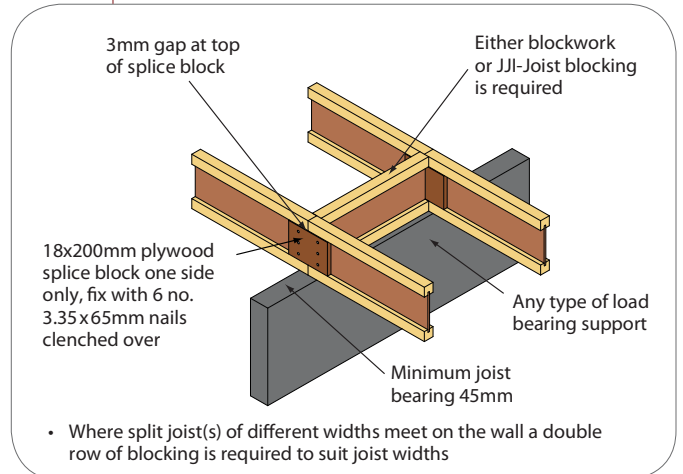
For any construction situation not addressed by the following floor details, please contact the JJI-Joist Distributor

Refer to Table 6 for hole installation chart

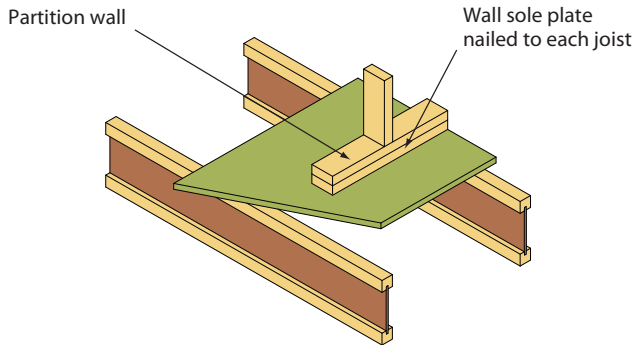
F1 CONTINUOUS JOIST ON WALL



F2 SPLIT JOIST ON WALL

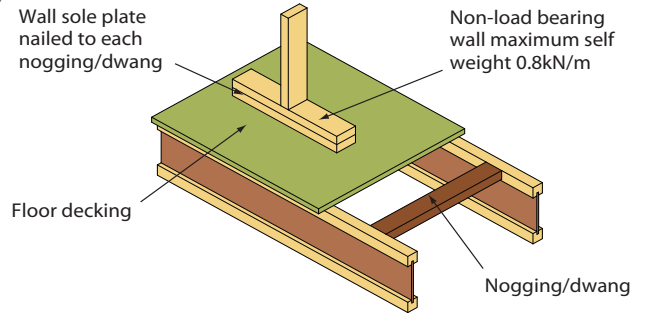


F3 | WALL AT 90° TO JOISTS



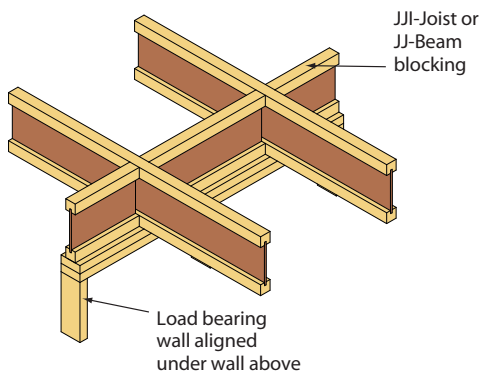
- The Floor Designer is responsible for ensuring the joist design is adequate to support the wall

F4 | NON-LOAD BEARING WALL PARALLEL TO JOISTS



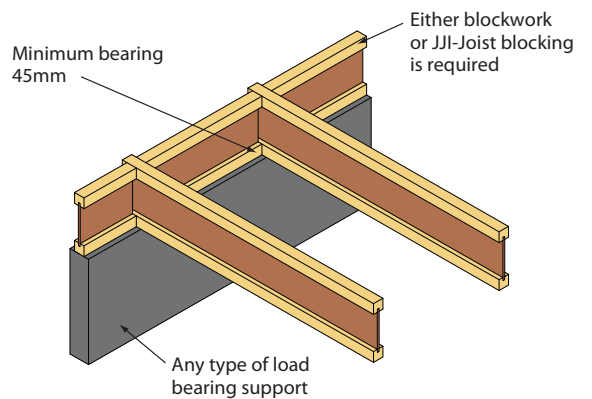
- 38x75mm nogging/dwang or JJI-C flange at maximum 600 c/c attached with 2 no. 3.35x65mm nails skew nailed at each end, alternatively use approved clips
- The Floor Designer is responsible for ensuring the joist design is adequate to support the wall

F5 | INTERMEDIATE BEARING WITH LOAD BEARING WALL ABOVE



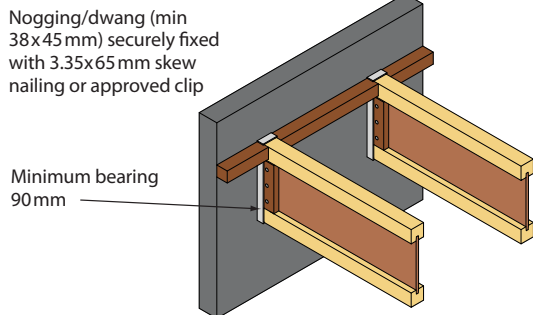
- Refer to F detail notes – timber frame (see page 28)
- Refer to page 7 for permissible vertical load capacities

F6 | TERMINATING JOIST ON WALL



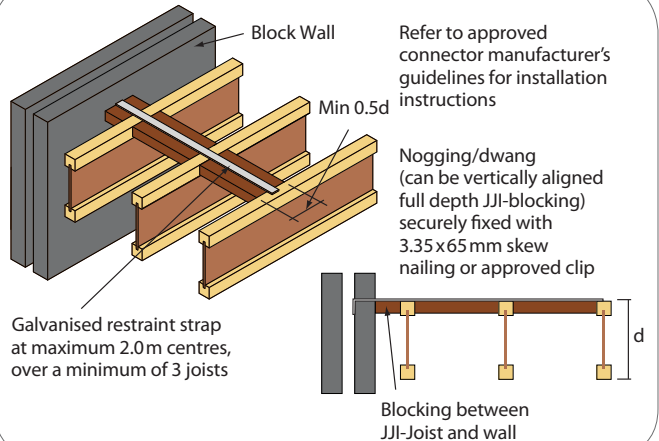
- Suitable detailing required if used on an external wall

F7 | JOIST BEARING IN BLOCK WALL



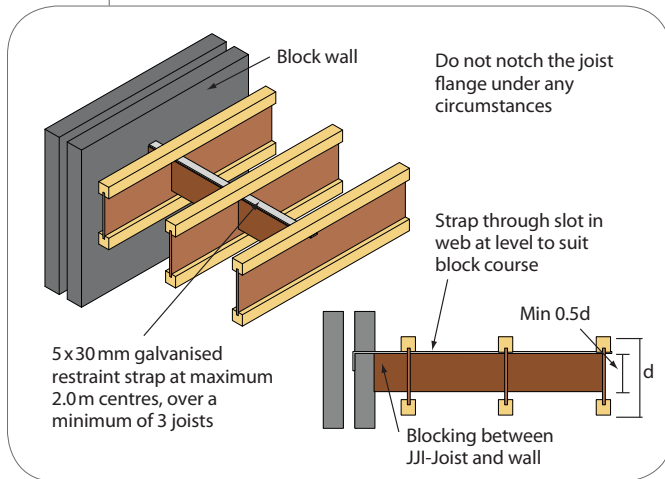
- Construct blockwork around joist and fill all voids with web fillers, mortar and point with mastic sealant
- Alternative proprietary systems may be used if approved by JJ&S
- Restraint straps will be required for greater than 2 storeys*
- *Straps required on all floors

F8 | MASONRY WALL RESTRAINT JOIST PARALLEL DETAIL 1

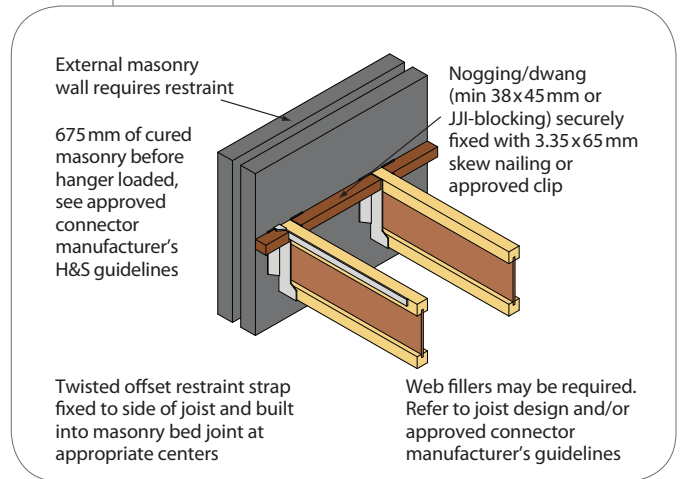


RESTRAINT STRAPS ARE THE RESPONSIBILITY OF THE BUILDING DESIGNER

F9 MASONRY WALL RESTRAINT JOIST PARALLEL
DETAIL 2

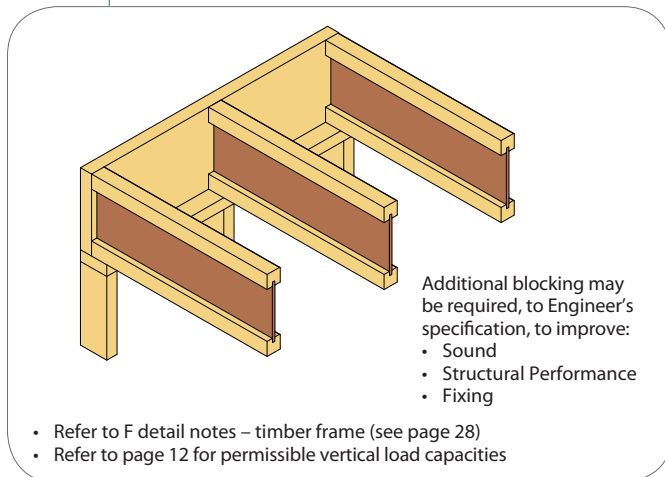


F10 WALL RESTRAINT, BLOCK WALL
HANGER SUPPORT

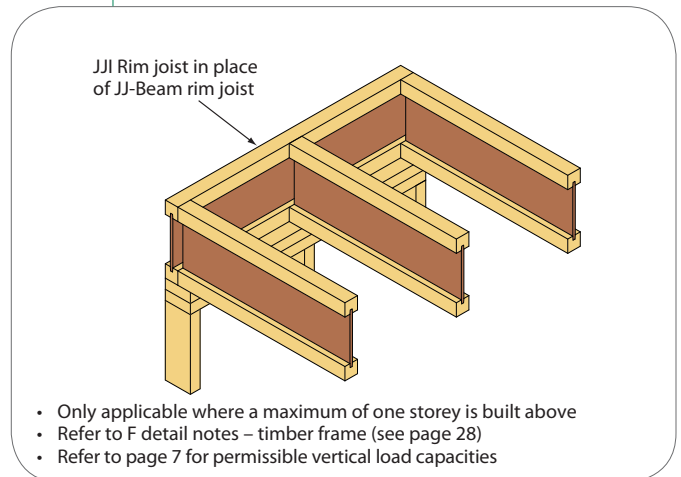


RESTRAINT STRAPS ARE THE RESPONSIBILITY OF THE BUILDING DESIGNER

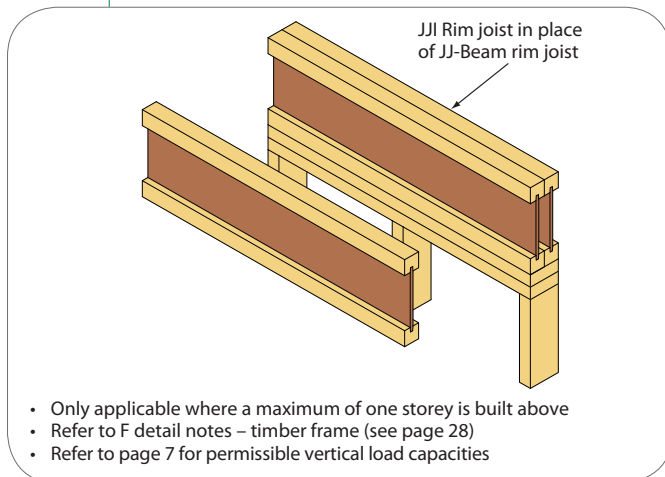
F11 JOIST BEARING ON EXTERNAL WALL



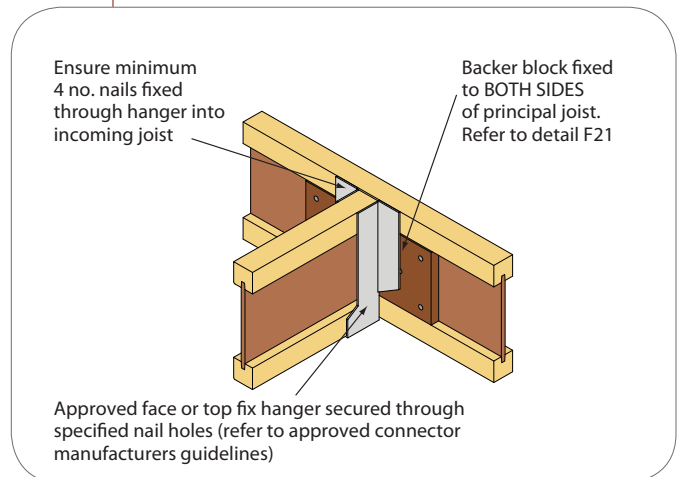
F12 JOIST BEARING ON EXTERNAL WALL



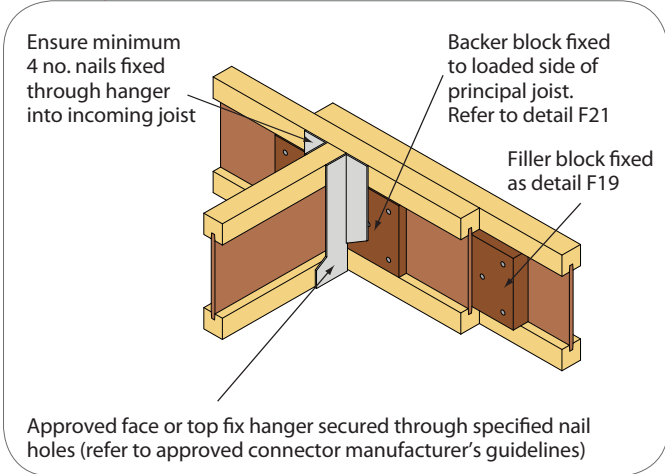
F13 JOIST PARALLEL TO EXTERNAL WALL



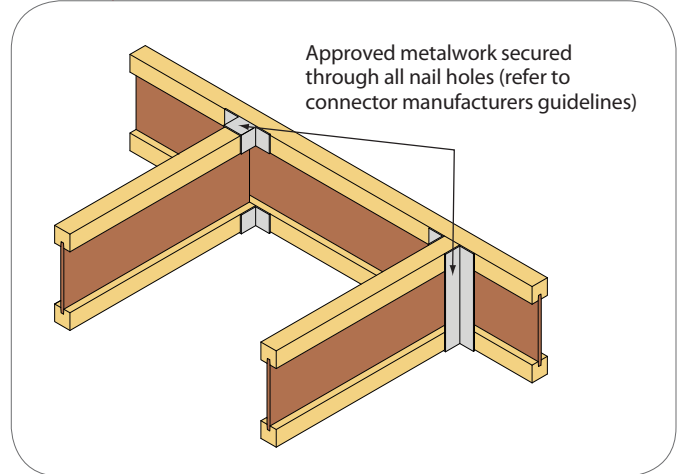
F14 SINGLE JOIST TO JOIST



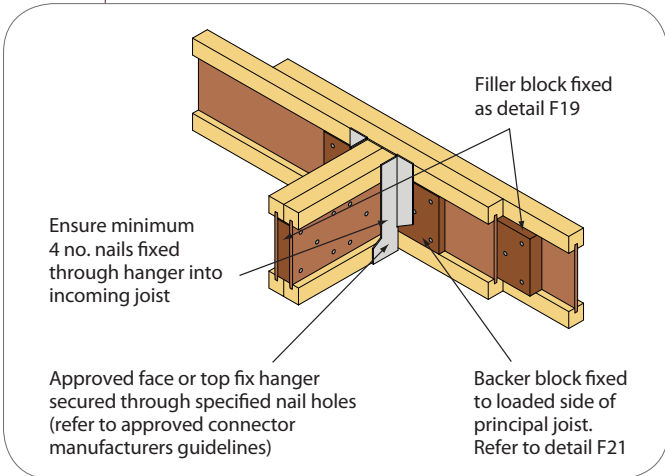
F15 | SINGLE JOIST TO MULTIPLE JOIST



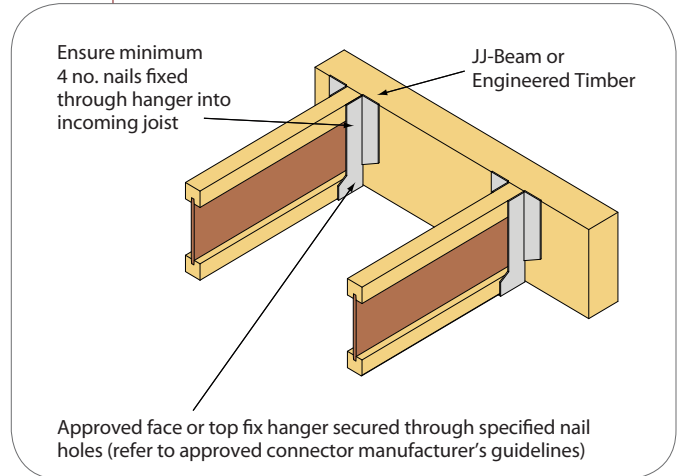
F16 | SINGLE JOIST TO JOIST (LIGHT LOAD)



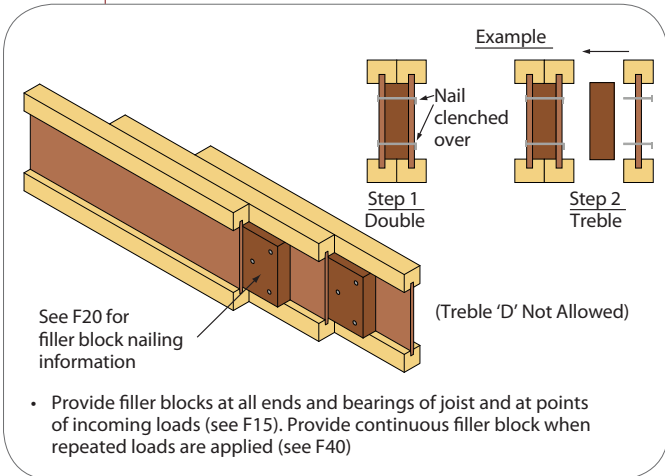
F17 | MULTIPLE JOIST TO MULTIPLE JOIST



F18 | JOIST TO ENGINEERED TIMBER



F19 | FILLER BLOCK – DOUBLE OR TREBLE JOIST



F20 | FILLER AND BACKER BLOCK TABLE

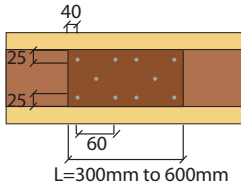
JJI-Joist Depth (mm)	Filler and Backer Block Depth (mm)	JJI-Joist Flange Type	Backer Block / Web Stiffener Thickness (mm)	Filler Block Thickness (mm)
195	100	A+	19	38
220	125	B+	27	54
235	145	C	32	63
245	150	D	44	2x44
300	200			
350	125+125			
400	150+150			
450	200+150			

- Refer to details provided by the JJI-Joist supplier for required locations of filler and backer blocks
- Where a continuous filler block is used see detail F40

- Filler and backer blocks should be kiln dried timber, structural grade plywood or OSB/3

F21 FILLER AND BACKER BLOCK NAILING DETAIL

For A,B and C flange size

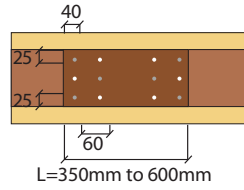


- Denotes nails from rear face
- Denotes nails from front face

All filler blocks and backer blocks for face fix hangers to be fixed tight to bottom flange with a minimum 3mm gap at the top

Backer blocks for top fix hangers to be fixed tight to the top flange with a minimum 3mm gap at the bottom

For D flange size only



Nail lengths (mm)

Flange Spec	Backer Block	Filler Block
A+	65	65
B+	65	90
C	90	90
D	90	90

Minimum nail diameter 3.1mm

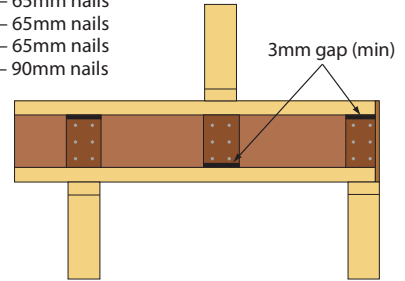
F22 WEB STIFFENER

Web stiffeners are required where indicated on drawings provided by the JJI-Joist supplier

- 19 thick for JJI A+ – 65mm nails
- 27 thick for JJI B+ – 65mm nails
- 31 thick for JJI C – 65mm nails
- 44 thick for JJI D – 90mm nails



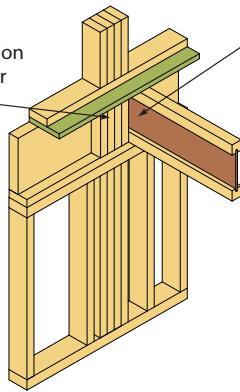
Fixed with 6 no. 3.35mm diameter nails length as noted above



- 100mm wide plywood, OSB/3 or kiln dried timber stiffener block fitted to both sides

F23 COMPRESSION BLOCK

Minimum 3 no. 35x72mm compression blocks cut 2mm taller than JJI-Joist



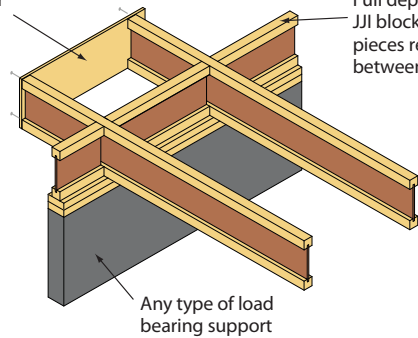
Fix blocks to joist with one nail, each into top and bottom flanges

Alternatively use JJ-Beam blocking pieces

- Compression blocks are required where indicated on details provided by JJI-Joist supplier

F24 CANTILEVER

Cantilever closer required

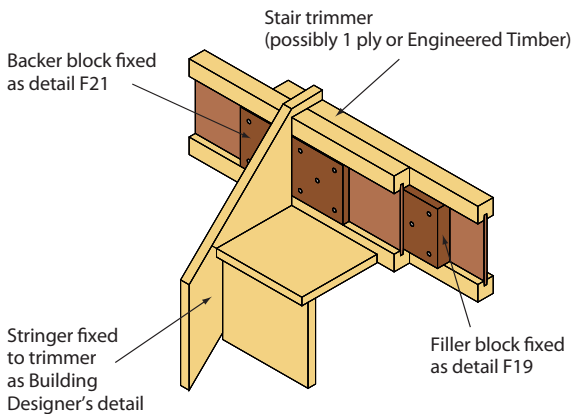


Full depth JJI blocking pieces required between joists

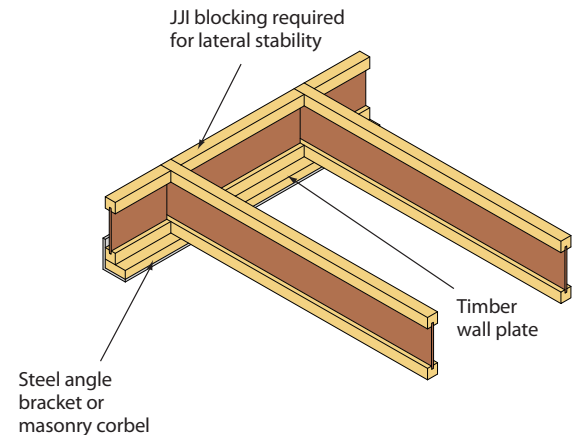
Any type of load bearing support

- Back span of cantilever must be at least 3 times the cantilever length
- 1.2m maximum cantilever length

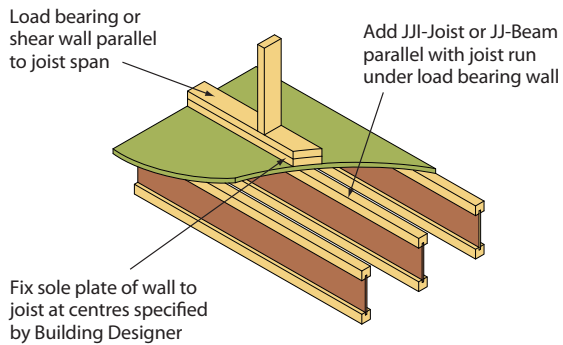
F25 STAIR STRINGER CONNECTION



F26 JJI SUPPORTED ON STEEL/CORBEL WALL

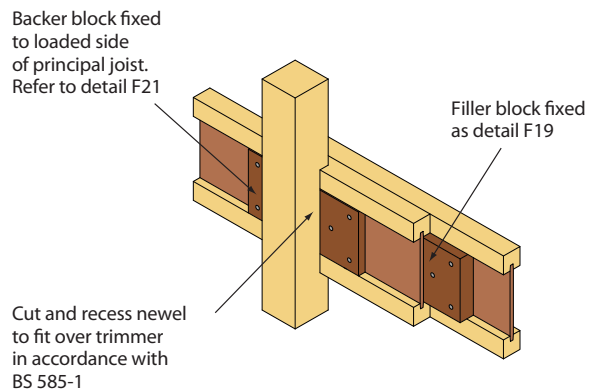


F27 | LOAD BEARING WALL PARALLEL TO JOIST RUN

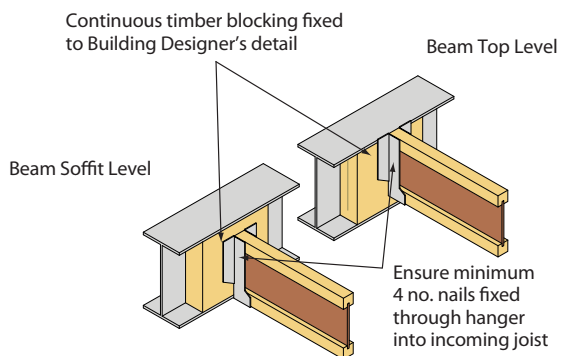


- Ensure that the added joist size is adequate to support the load of the bearing wall. A double joist may be required by the Building Designer

F28 | NEWEL POST TO TRIMMER

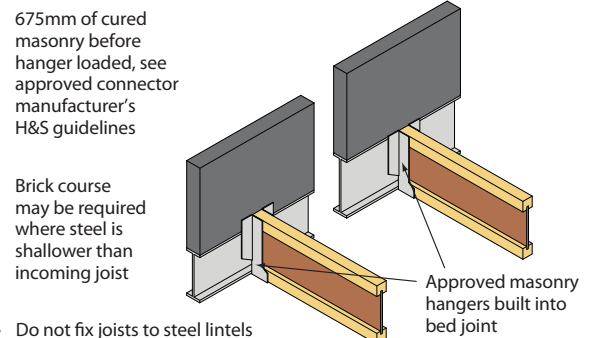


F29 | JOIST TO STEEL BEAM FACE FIXING



- Approved face fix hangers fixed through all nail holes
- Refer to approved metalwork supplier's literature for further information

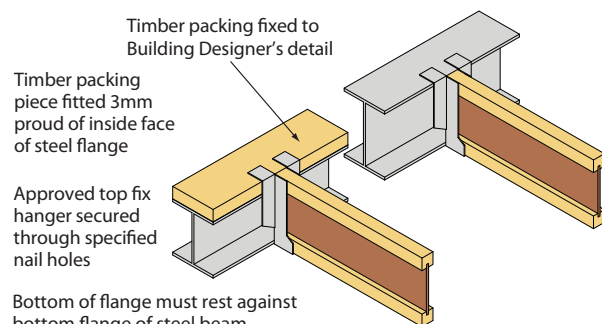
F30 | JOIST TO STEEL BEAM/MASONRY



- Do not fix joists to steel lintels unless approved by lintel manufacturer
- Bottom of hanger must rest against bottom flange of steel beam
- Refer to approved metalwork supplier's literature for further information

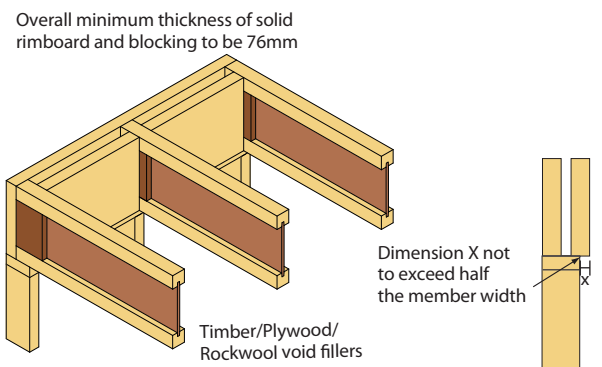
RESTRAINT STRAPS ARE THE RESPONSIBILITY OF THE BUILDING DESIGNER

F31 | JOIST TO STEEL BEAM TOP FIXING



- Bottom of flange must rest against bottom flange of steel beam
- Do not fix joists to steel lintels unless approved by lintel manufacturer
- Refer to approved metalwork supplier's literature for further information

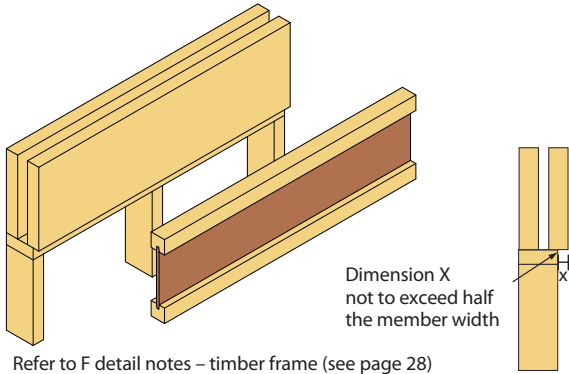
F32 | JOIST BEARING ON PARTY WALL



- Refer to F detail notes – timber frame (see page 28)
- Refer to page 12 for permissible vertical load capacities

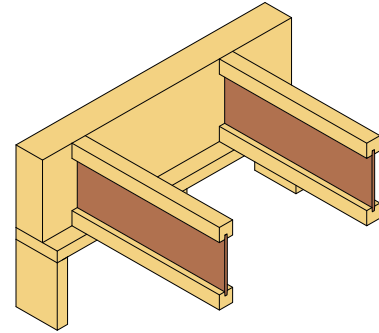
F33 | JOIST PARALLEL TO PARTY WALL

Overall minimum thickness of solid rimboard and blocking to be 76mm



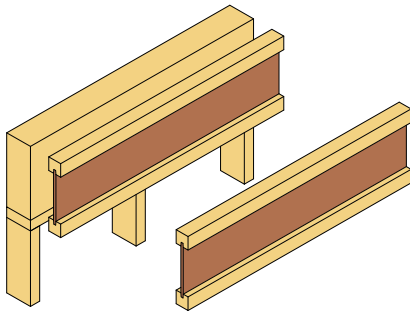
- Refer to F detail notes – timber frame (see page 28)
- Refer to page 12 for permissible vertical load capacities

F34 | INDICATIVE DISPROPORTIONATE COLLAPSE JOISTS AT 90° TO WALL



- Specification to Engineer's detail
- Refer to page 12 for permissible vertical load capacities

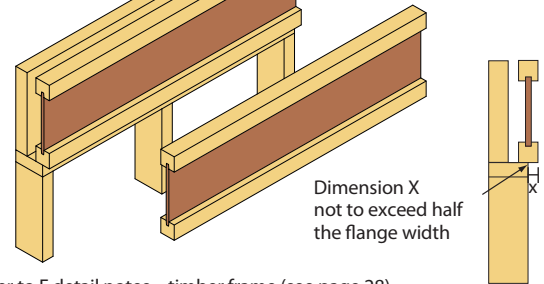
F35 | INDICATIVE DISPROPORTIONATE COLLAPSE JOISTS PARALLEL TO WALL



- Specification to Engineer's detail
- Refer to page 12 for permissible vertical load capacities

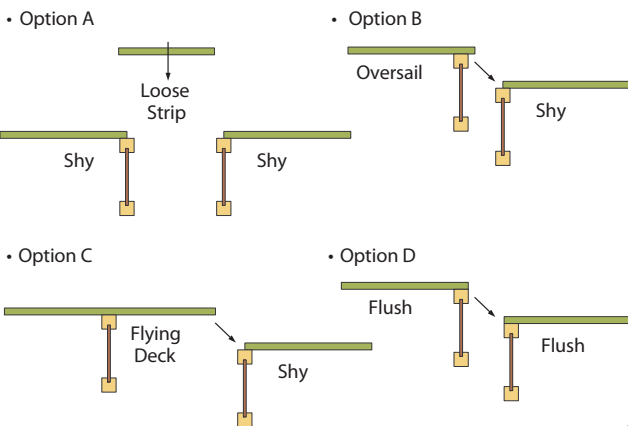
F36 | JOIST PARALLEL TO EXTERNAL WALL

Additional blocking may be required to provide adequate structural performance, to Engineer's detail



- Refer to F detail notes – timber frame (see page 28)
- Refer to page 12 for permissible vertical load capacities

F37 | FLOOR CASSETTE JOINING DETAIL



TIMBER FRAME DETAIL NOTES

1. See Table 5 and Table 14 for vertical load capacities
2. Rimboard thickness to timber frame kit manufacturer's Consulting Engineer's specification/approval
3. Rimboard fixed to bearing with 3.34x65mm nails at 150mm c/c
4. Secure rimboard to JJI-Joist with 2 no 3.35x65mm ring shank nails, one each to top and bottom flanges
5. Fix JJI-Joist to bearing with 2 no 3.35x65mm nails, 40mm from joist end
6. Minimum joist bearing length 45mm
7. Ensure the Building Designer is satisfied with fixing between the wall and floor

FOR F38 SEE PAGE 18

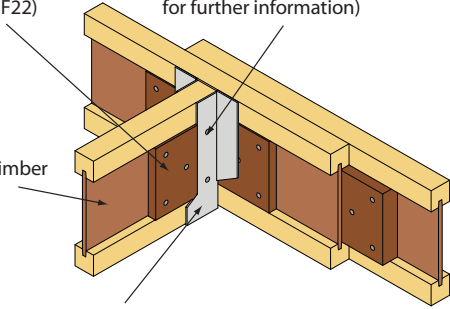
F39 | ENHANCED UPLIFT

Where JJI-Joists are used web fillers are required (see F22)

All triangular optional nail holes filled to provide enhanced uplift value (see hanger manufacturers literature for further information)

JJI-Joist or Engineered Timber

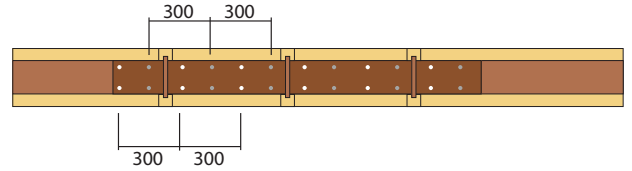
Approved face or top fix hanger secured through specified nail holes



F40 | FILLER BLOCKS

◉ = nails from rear face

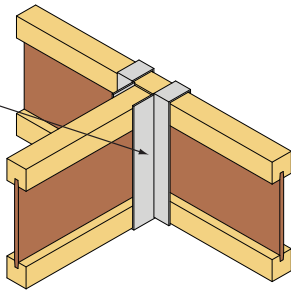
○ = nails from front face



- A continuous filler block should be utilised with multiple incoming loads
- A continuous backer block could also be provided
- Where continuous filler block is used, fix with 2 rows of nails at 300mm centres from both faces

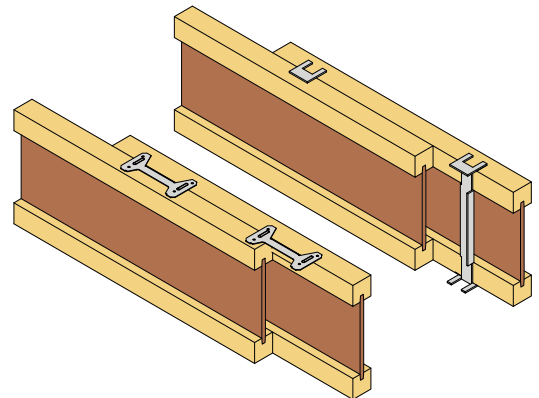
F41 | BACKER FREE JOIST TO JOIST

Ensure minimum 4 no. nails fixed through hanger into incoming joist



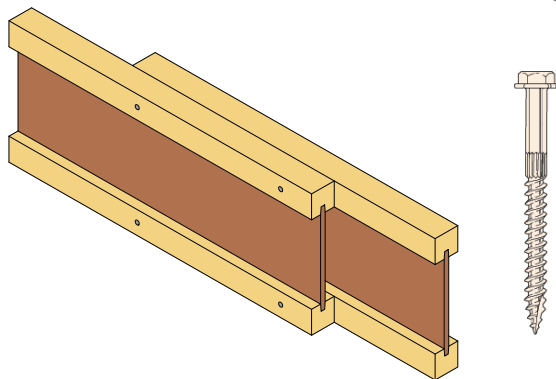
- Approved backer free hanger secured through specified nail holes
- Refer to approved connector manufacturer's guidelines

F42 | FIXING DOUBLE OR TREBLE JOISTS



- Refer to Approved Metalwork Supplier's Technical Literature for specification and installation guidelines

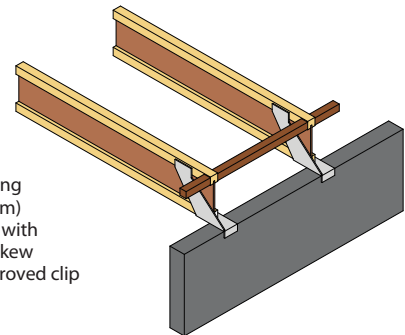
F43 | FIXING DOUBLE JOISTS



- Refer to Approved Metalwork Supplier's Technical Literature for specification and installation guidelines

F45 | MASONRY RESTRAINT HANGER DETAIL 1

Nogging/dwang (min 38x45 mm) securely fixed with 3.35x65 mm skew nailing or approved clip



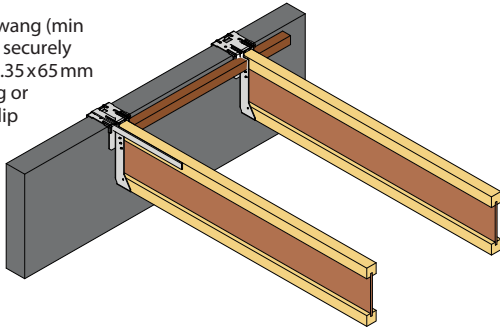
- JJI-Joist in approved masonry restraint type hangers
- Refer to Cullen Technical Literature for specification and installation guidelines
- Restraint straps may be required around openings – refer to Cullen technical literature

FOR F44 SEE PAGE 18

RESTRAINT STRAPS ARE THE RESPONSIBILITY OF THE BUILDING DESIGNER

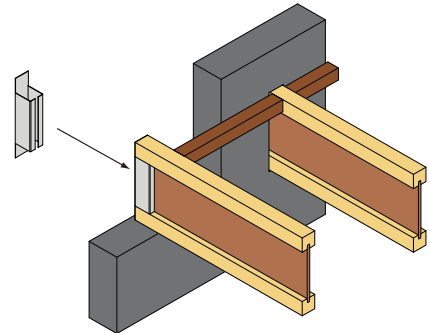
F46 MASONRY RESTRAINT HANGER DETAIL 2

Nogging/dwang (min 38x45mm) securely fixed with 3.35x65mm skew nailing or approved clip



- JJI-Joist in approved masonry restraint type hangers
- Refer to Simpson Strong-Tie technical literature for specification and installation guidelines
- Restraint straps may be required around openings – refer to Simpson technical literature

F47 ALTERNATIVE AIRTIGHTNESS DETAIL 1

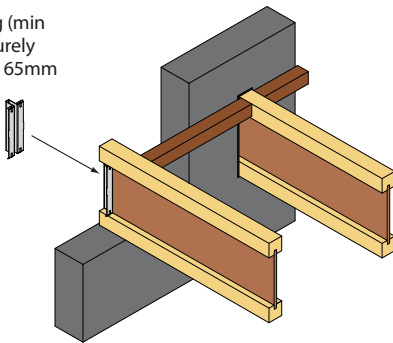


- Refer to Simpson Strong-Tie Technical Literature for specification and installation guidelines
- Restraint straps will be required for greater than two storeys*
*Straps required on all floors

RESTRAINT STRAPS ARE THE RESPONSIBILITY OF THE BUILDING DESIGNER

F48 ALTERNATIVE AIRTIGHTNESS DETAIL 2

Nogging/dwang (min 38 x 45mm) securely fixed with 3.36 x 65mm skew nailing or approved clip

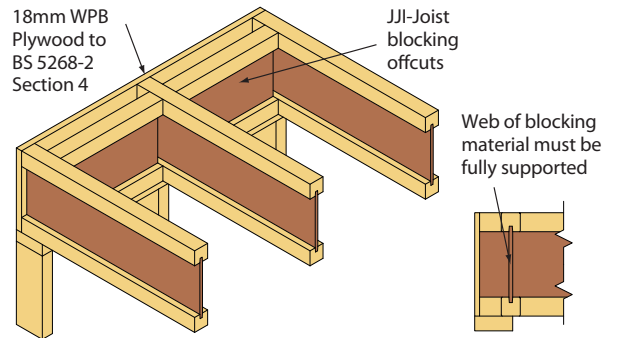


- Refer to Cullen Building Products Technical Literature for specification and installation guidelines
- Restraint straps will be required for greater than two storeys*
*Straps required on all floors

F49 JOIST BEARING ON EXTERNAL WALL LOW LOAD

18mm WPB Plywood to BS 5268-2 Section 4

JJI-Joist blocking offcuts



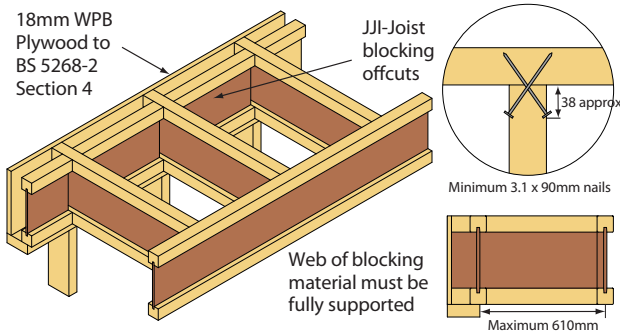
- Refer to page 7 for permissible vertical load capacities
- Alternatively use JJ-Beam blocking in lieu of JJI-Joists
- JJI-Joist blocking offcuts can be of any joist width

RESTRAINT STRAPS ARE THE RESPONSIBILITY OF THE BUILDING DESIGNER

F50 JOIST PARALLEL TO EXTERNAL WALL LOW LOAD

18mm WPB Plywood to BS 5268-2 Section 4

JJI-Joist blocking offcuts

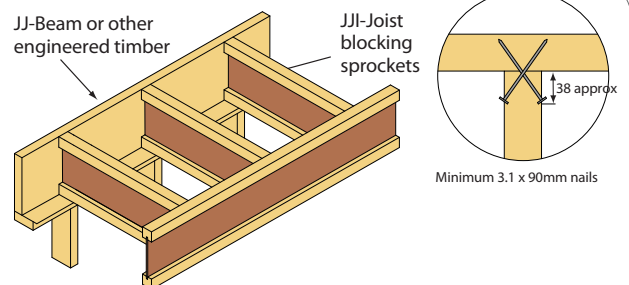


- Refer to page 7 for permissible vertical load capacities
- Alternatively use JJ-Beam blocking in lieu of JJI-Joists
- JJI-Joist blocking offcuts can be of any joist width

F51 JOIST PARALLEL DETAIL – SPROCKETS

JJ-Beam or other engineered timber

JJI-Joist blocking sprockets



- Additional blocking may be required to Engineer's specifications to improve:
 - Sound
 - Structural performance
 - Fixing
- Refer to timber frame detail notes (see page 28)
- Refer to page 12 for permissible vertical load capacities

INTRODUCTION

By making the most of their long spanning capabilities, JJI-Joists are ideally suited for use in roofs. This allows the Designer the freedom to create large open room spaces without the need for additional supports.



DESIGN CONSIDERATIONS

Unlike a floor design, a full roof design requires many additional considerations due to its location on the exposed envelope of the building and potentially complex geometry. Unlike floors, a roof is exposed to wind and snow loading.

Loading

Dead loads should be calculated for each job based on the specific roof makeup. Refer to BS 648 Weights of Building Materials or manufacturers literature for material data.

Imposed Snow and Wind loads should be based on the location of the building if known or alternatively on conservative estimates. BS 6399-3 and BS 6399-2 should be used for snow and wind loading respectively.

Joist Stability

Roofs should be braced during the erection process. Refer to temporary erection bracing notes. (See page 20.)

The compression flange of the JJI-Joist requires lateral restraint at regular centres to prevent lateral buckling. This can be achieved by using a permanent structural sarking layer directly fixed to the joist, or alternatively by battens/furring strips fixed perpendicular to each joist.

Where a wind load analysis indicates that the rafters will experience a stress reversal under wind suction loads, care should be taken to ensure that the bottom flange of the joist is suitably restrained. This can be achieved by, for example, directly applying a ceiling/soffit lining to the underside of the joists.

Blocking or Cross-bracing (see Roof Detail R10) may be required at support locations unless joists are held in place by alternative means.

Building Stability

Lateral restraint to gable walls etc. can be provided using details similar to those used for floors.

Racking of the whole roof structure should be prevented by the use of structural sarking or a system of triangulated bracing (this is required where only felt and tiling battens are used).

Deflection Limits

When considering member deflection a maximum limit of $0.003 \times \text{span}$ is recommended. When a finished ceiling is applied to the underside of the roof, for long spans, the designer should consider restricting the maximum deflection further to avoid damage to the finishing. The designer should also consider a more strict deflection limit for principal members such as ridge beams and purlins to minimise combined deflection.

Fixings

Fixing JJI-Joists to supports needs careful consideration to account for axial, tangential, horizontal and vertical loads. Particular care should be taken when considering uplift forces due to wind suction.

Responsibilities

A full roof design will address all the above issues, however, they may be dealt with by different parties (Roof Component Designer, Roof Designer, Building Designer). It is vital that the responsibility of each party is clearly defined at the start of the design process.

JJI-JOIST FLAT ROOFS

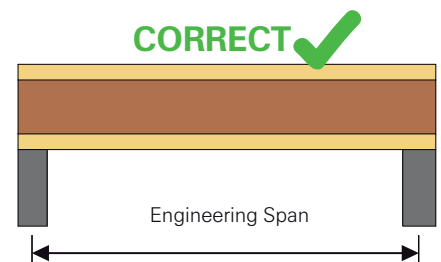
- Dead Load should take account of all components of the roof makeup including ceiling linings
- Imposed Load 0.75kN/m² (Snow)
- Deflection limit 0.003 x span
- Joist design includes a 0.9kN Man Load check at mid span
- The calculation of the spans includes a load sharing factor
- Adequate lateral restraint to the top flange of the joists is assumed to be provided by the roof deck
- The joists are designed using the principles of BS 5268-2
- Where the load conditions are different to those described above, refer to the JJI-Joist supplier for further assistance

Joist Type	Dead load up to 0.75kN/m ²				Dead load up to 1.00kN/m ²			
	Joist Centres (mm)				Joist Centres (mm)			
	300	400	480	600	300	400	480	600
JJI 145 A+	3242	3071	2956	2808	3071	2887	2765	2611
JJI 195 A+	4681	4407	4216	3874	4407	4121	3936	3650
JJI 195 B+	5339	5006	4673	4288	5007	4664	4404	4036
JJI 195 C	5718	5286	4931	4521	5351	4974	4645	4253
JJI 195 D	6627	5948	5542	5072	6174	5603	5214	4764
JJI 220 A+	5320	4992	4667	4291	4998	4664	4405	4046
JJI 220 B+	6149	5606	5235	4808	5752	5291	4937	4528
JJI 220 C	6456	5831	5443	4997	6031	5502	5132	4704
JJI 220 D	7230	6491	6053	5548	6826	6119	5701	5217
JJI 235 A+	5675	5257	4916	4522	5325	4965	4641	4265
JJI 235 B+	6537	5893	5505	5058	6110	5564	5193	4766
JJI 235 C	6823	6136	5730	5263	6412	5792	5404	4957
JJI 235 D	7607	6833	6375	5847	7184	6444	6006	5501
JJI 245 A+	5905	5428	5077	4672	5537	5130	4794	4407
JJI 245 B+	6743	6069	5671	5213	6330	5731	5351	4913
JJI 245 C	7041	6334	5917	5436	6655	5980	5581	5121
JJI 245 D	7861	7063	6591	6047	7425	6662	6212	5691
JJI 300 A+	7042	6351	5944	5475	6664	6005	5617	5169
JJI 300 B+	7799	7027	6573	6049	7377	6641	6207	5707
JJI 300 C	8214	7398	6917	6363	7768	6990	6530	6001
JJI 300 D	9225	8299	7752	7122	8719	7835	7313	6710
*JJI 350 A+	7832	7068	6618	6101	7414	6686	6257	5763
*JJI 350 B+	8592	7749	7252	6680	8131	7327	6853	6307
JJI 350 C	9302	8384	7842	7219	8800	7924	7407	6811
JJI 350 D	10345	9314	8706	8005	9781	8798	8217	7548
*JJI 400 A+	8707	7861	7363	6790	8244	7438	6963	6416
*JJI 400 B+	9546	8613	8063	7431	9036	8146	7622	7018
JJI 400 C	10443	9416	8810	8113	9881	8901	8324	7658
JJI 400 D	11310	10191	9530	8770	10698	9630	9000	8273
*JJI 450 A+	9550	8625	8080	7454	9044	8162	7643	7046
*JJI 450 B+	10463	9444	8843	8153	9906	8934	8361	7702
*JJI 450 C	10910	9844	9216	8494	10327	9311	8712	8022
JJI 450 D	11910L	10917	10214	9405	11457	10320	9650	8877

Table 18. Maximum Engineering Span For JJI-Joist Flat Roofs

Notes for Table 18:

1. These tables serve as guidance only. For a more detailed JJI-Joist appraisal contact a JJI-Joist Distributor
2. To achieve the stated spans, adequate JJI-Joist bearing will be required. Web stiffeners may be necessary
3. Designs based on a dead load as shown + 0.75kN/m² imposed snow load
4. Permissible web holes to be drilled in accordance with JoistMaster software
5. Design in accordance with BS 6399-3-4.3.1 (Minimum imposed load on roof with no access)
6. No allowance for rafter overhangs within tables
7. Figures followed by L denote engineering spans limited by the maximum manufactured JJI-Joist length of 12m
8. *The top and bottom flanges of these sizes require continuous lateral restraint at a maximum of 300mm centres unless a lateral buckling check has been performed
9. No wind allowance has been considered in this table



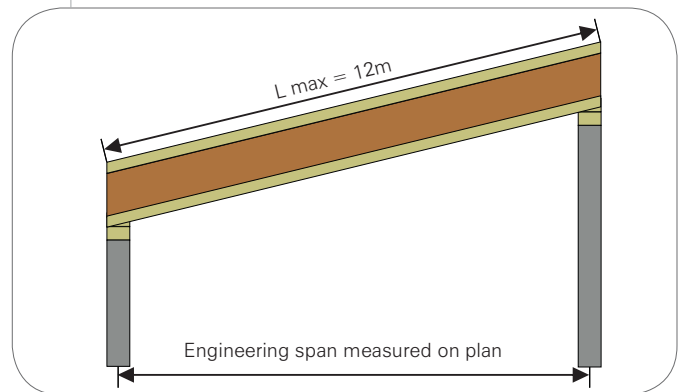
JJI-JOIST PITCHED RAFTERS

Support Requirements

When designing a JJI-Joist pitched rafter the Designer should ensure that there are at least two vertical supports under the rafter. Typically these would be a load bearing wall or ridge beam at the top end and a load bearing wall at the lower end. Additional intermediate supports may be provided by, for example, purlins.

It is possible to design the rafters with only one support at the lower end if the top end (Ridge) is resting on another rafter leaning in the opposite direction. This, however, leads to horizontal reactions at the lower end and higher axial loads that need to be considered by a qualified Engineer.

DEFINITION OF ENGINEERING SPAN FOR RAFTERS



Joist Type	Dead load up to 0.5kN/m ²			Dead load up to 1.0kN/m ²			Dead load up to 1.5kN/m ²		
	15°	30°	45°	15°	30°	45°	15°	30°	45°
JJI 145 A+	3022	2868	3045	2568	2437	2527	2286	2170	2223
JJI 195 A+	4095	3915	3991	3594	3418	3325	3230	3046	2937
JJI 195 B+	4538	4343	4437	3975	3784	3691	3590	3410	3255
JJI 195 C	4789	4585	4691	4190	3991	3898	3780	3593	3434
JJI 195 D	5383	5160	5295	4696	4479	4389	4225	4022	3858
JJI 220 A+	4532	4331	4408	3983	3786	3677	3609	3422	3252
JJI 220 B+	5085	4863	4961	4459	4243	4131	4033	3828	3647
JJI 220 C	5287	5058	5164	4633	4410	4298	4187	3976	3792
JJI 220 D	5880	5631	5764	5140	4898	4787	4635	4407	4216
JJI 235 A+	4774	4560	4638	4198	3989	3872	3806	3607	3425
JJI 235 B+	5347	5112	5210	4693	4463	4342	4247	4030	3836
JJI 235 C	5566	5323	5429	4881	4644	4522	4415	4190	3992
JJI 235 D	6192	5927	6061	5419	5161	5038	4891	4647	4440
JJI 245 A+	4930	4709	4786	4337	4120	3997	3934	3728	3538
JJI 245 B+	5508	5265	5363	4837	4599	4471	4380	4154	3952
JJI 245 C	5747	5495	5602	5043	4796	4667	4563	4329	4122
JJI 245 D	6402	6127	6261	5606	5337	5207	5062	4809	4591
JJI 300 A+	5772	5509	5589	5086	4828	4675	4620	4374	4143
JJI 300 B+	6383	6096	6195	5617	5335	5175	5095	4827	4580
JJI 300 C	6718	6418	6528	5907	5613	5449	5354	5075	4820
JJI 300 D	7529	7199	7339	6607	6284	6115	5978	5673	5401
*JJI 350 A+	6429	6133	6215	5672	5381	5203	5157	4879	4615
*JJI 350 B+	7044	6725	6823	6208	5893	5706	5639	5338	5057
JJI 350 C	7615	7272	7388	6703	6367	6173	6083	5762	5465
JJI 350 D	8455	8080	8224	7430	7062	6861	6731	6382	6066
*JJI 400 A+	7152	6821	6907	6313	5988	5786	5744	5433	5134
*JJI 400 B+	7833	7474	7577	6907	6554	6341	6279	5942	5623
JJI 400 C	8555	8167	8292	7536	7155	6931	6842	6479	6140
JJI 400 D	9255	8840	8395L	8143	7735	7504	7385	6998	6642
*JJI 450 A+	7848	7484	7574	6932	6573	6347	6219	5967	5636
*JJI 450 B+	8590	8195	8303	7580	7191	6952	6894	6521	6167
*JJI 450 C	8952	8542	8422	7895	7492	7247	7178	6792	6427
JJI 450 D	9919	9470	8395L	8736	8294	8037	7931	7510	7119

Table 19. Maximum Engineering Span For Pitched Rafters @ 600mm c/c

For Notes see Page 34

Joist Type	Dead load up to 0.5kN/m ²			Dead load up to 1.0kN/m ²			Dead load up to 1.5kN/m ²		
	15°	30°	45°	15°	30°	45°	15°	30°	45°
JJI 145 A+	3256	3093	3526	2841	2695	2939	2569	2437	2597
JJI 195 A+	4704	4441	4610	4047	3816	3854	3640	3431	3416
JJI 195 B+	5285	5047	5130	4580	4317	4284	4097	3862	3792
JJI 195 C	5583	5334	5427	4885	4605	4529	4358	4108	4006
JJI 195 D	6291	6016	6136	5519	5250	5111	4975	4692	4513
JJI 220 A+	5260	5019	5087	4578	4309	4258	4109	3867	3777
JJI 220 B+	5913	5646	5732	5208	4939	4791	4685	4408	4244
JJI 220 C	6153	5876	5969	5416	5144	4987	4895	4607	4416
JJI 220 D	6857	6553	6670	6025	5728	5564	5459	5176	4920
JJI 235 A+	5538	5283	5351	4872	4582	4481	4369	4108	3976
JJI 235 B+	6214	5931	6017	5476	5198	5032	4967	4670	4460
JJI 235 C	6473	6179	6273	5701	5413	5244	5176	4887	4646
JJI 235 D	7215	6893	7011	6345	6028	5852	5752	5452	5177
JJI 245 A+	5717	5452	5521	5047	4759	4625	4536	4263	4105
JJI 245 B+	6398	6105	6192	5641	5353	5181	5126	4832	4593
JJI 245 C	6680	6377	6471	5885	5588	5411	5345	5061	4795
JJI 245 D	7456	7122	7241	6560	6232	6046	5949	5637	5351
JJI 300 A+	6683	6371	6442	5908	5600	5402	5381	5086	4799
JJI 300 B+	7401	7058	7146	6534	6197	5986	5946	5623	5313
JJI 300 C	7795	7436	7533	6878	6525	6307	6255	5918	5596
JJI 300 D	8752	8355	8422L	7712	7321	7089	7004	6631	6282
*JJI 350 A+	7435	7085	7157	6577	6232	6006	5996	5664	5339
*JJI 350 B+	8155	7775	7862	7209	6833	6593	6566	6206	5856
JJI 350 C	8828	8419	8422L	7796	7392	7140	7096	6710	6339
JJI 350 D	9816	9365	8422L	8658	8215	7946	7871	7448	7046
*JJI 400 A+	8265	7875	7951	7316	6930	6676	6672	6301	5936
*JJI 400 B+	9061	8636	8422L	8013	7594	7322	7303	6900	6508
JJI 400 C	9911	9449	8422L	8757	8303	8014	7975	7539	7116
JJI 400 D	10733	10237	8422L	9476	8987	8422L	8622	8154	7706
*JJI 450 A+	9066	8637	8422L	8028	7603	7321	7325	6916	6512
*JJI 450 B+	9933	9465	8422L	8788	8326	8024	8012	7569	7133
*JJI 450 C	10357	9870	8422L	9160	8679	8369	8348	7888	7437
JJI 450 D	11492	10314L	8422L	10153	9626	8422L	9245	8740	8251

Table 20. Maximum Engineering Spans for JJI-Joist Pitched Rafters @ 400mm c/c

Notes for Tables 19 and 20:

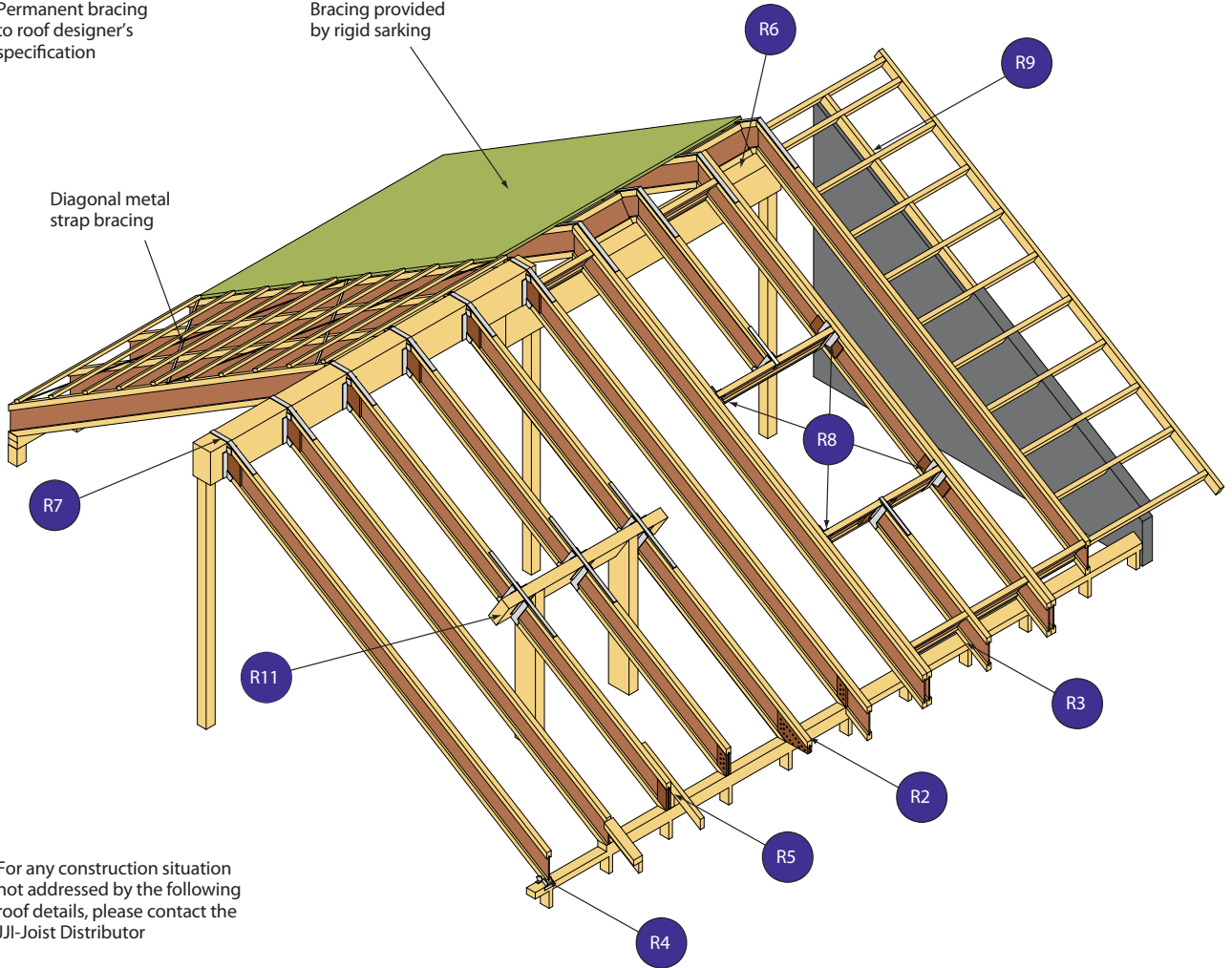
1. These tables serve as guidance only. For a more detailed JJI-Joist appraisal contact a JJI-Joist Distributor
2. To achieve the stated spans, adequate JJI-Joist bearing will be required. Web stiffeners may be necessary
3. Figures followed by L denote engineering spans limited by the maximum manufactured JJI-Joist length of 12m
4. Designs based on the dead load as shown + 0.75kN/m² imposed snow load up to 30° pitch reducing linearly thereafter to zero at 60° pitch (additional imposed loads may apply – seek Roof Designer guidance)
5. For roof pitches of 30° or less a short term man load of 0.9kN is applied to the middle of the rafter span to account for construction and maintenance loading. For steeper pitches it is assumed that a roof ladder would spread the load
6. Spans assume the rafter top flange is laterally restrained at maximum 400mm c/c using battens or rigid sarking
7. Permissible web holes to be drilled in accordance with JoistMaster software
8. Design in accordance with BS 6399-3-4.3.1 (Minimum imposed load on roof with no access)
9. No allowance for rafter overhangs within table
10. *The top and bottom flanges of these sizes require continuous lateral restraint at a maximum of 300mm centres unless a lateral buckling check has been performed
11. No wind allowance has been considered in this table

EXAMPLE JJI-JOIST ROOF SYSTEM

Permanent bracing to roof designer's specification

Bracing provided by rigid sarking

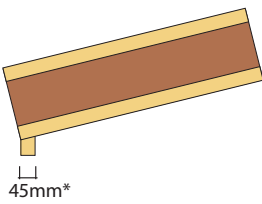
Diagonal metal strap bracing



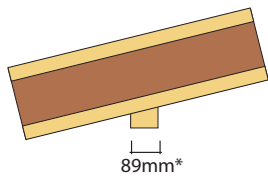
For any construction situation not addressed by the following roof details, please contact the JJI-Joist Distributor

R1 BEARING LENGTHS

Minimum End Bearing



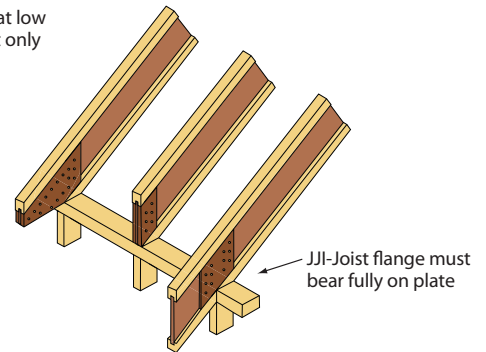
Minimum Intermediate Bearing



* Minimum bearing required by JOIST DESIGN. Consult Building/ Roof Designer for building stability requirements

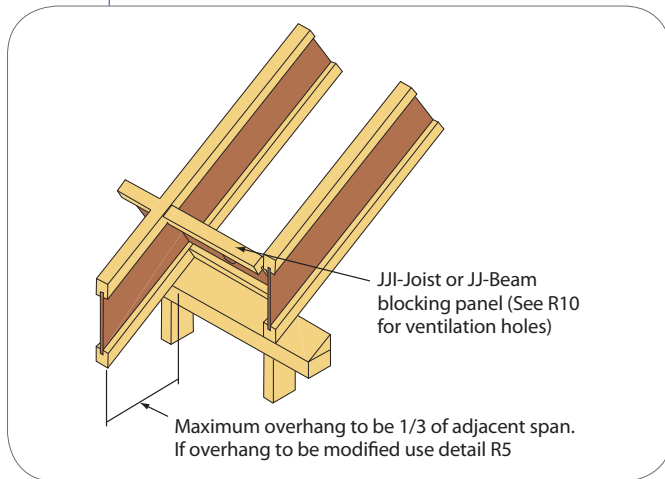
R2 BIRDSMOUTH CUT

Permitted at low end of joist only

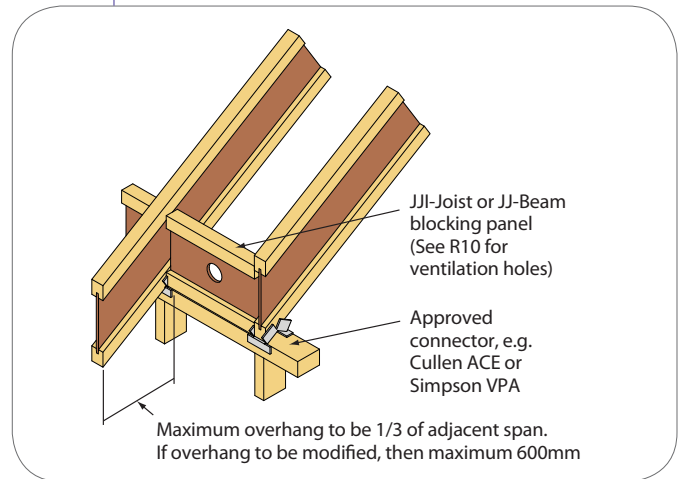


- Bevelled ply/timber web stiffener each side of JJI-Joist web. Fix in accordance with detail F22
- Do not bevel cut the JJI-Joist past the inside face of wall
- Blocking omitted for clarity

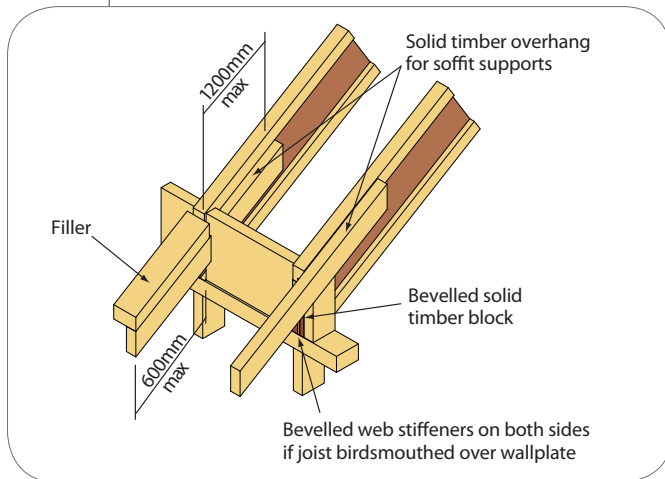
R3 BEVELLED SUPPORT PLATE FOR PITCHES UP TO 45°



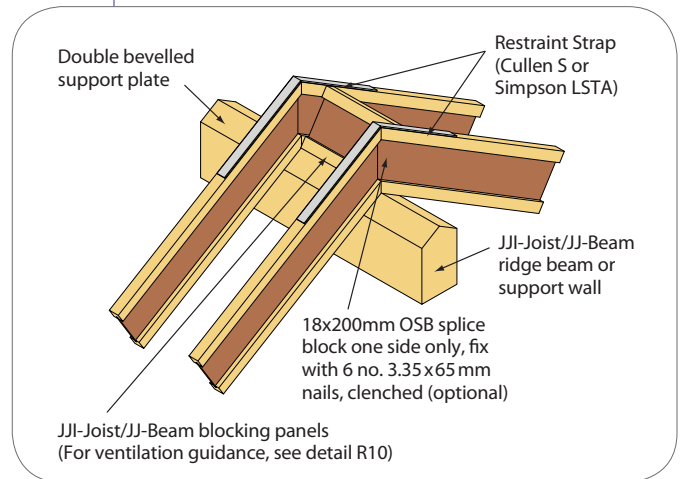
R4 ADJUSTABLE SEAT CONNECTOR FOR PITCHES 15° – 45°



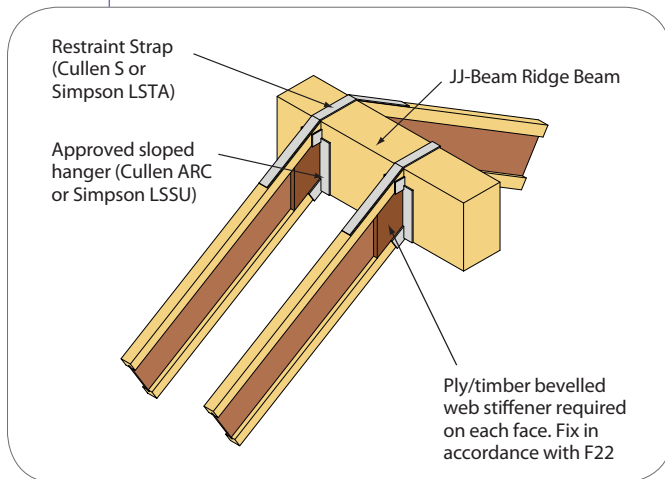
R5 LOOSE TIMBER OVERHANGS



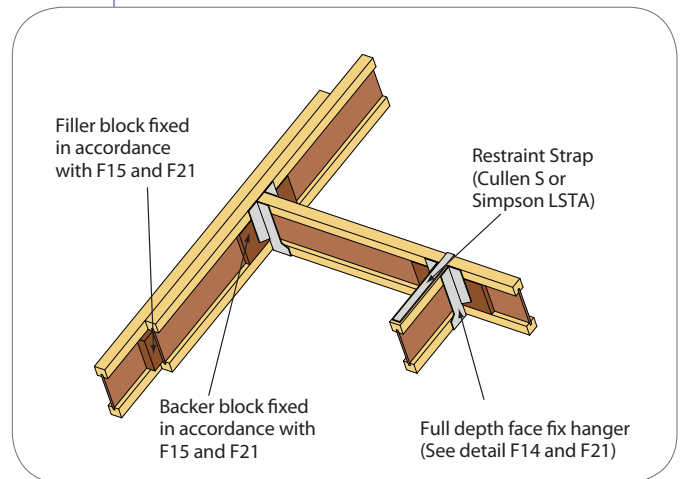
R6 DOWNSTAND RIDGE BEAM



R7 FLUSH RIDGE BEAM



R8 OPENING IN ROOF

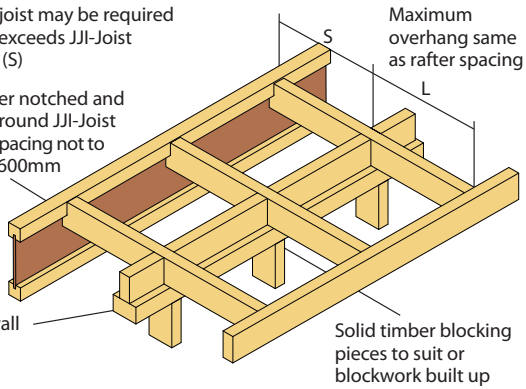


R9 GABLE LADDER

Double joist may be required when L exceeds JJJ-Joist spacing (S)

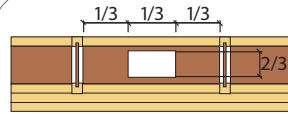
Outrigger notched and nailed around JJJ-Joist flange, spacing not to exceed 600mm

Gable wall panel

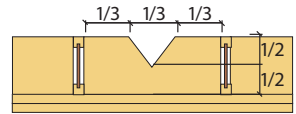


Alternatively, gable ladder to be made from JJJ-Joists

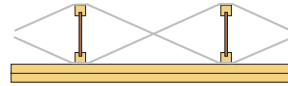
R10 BLOCKING AND VENTILATION HOLES



Maximum permissible ventilation hole in JJJ-Joists blocking



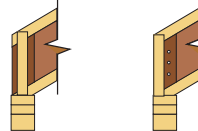
Maximum permissible ventilation V-cut for solid blocking



Braced by Simpson HSA or Cullen TJS straps



Maximum permissible hole zone for round, square or rectangular holes

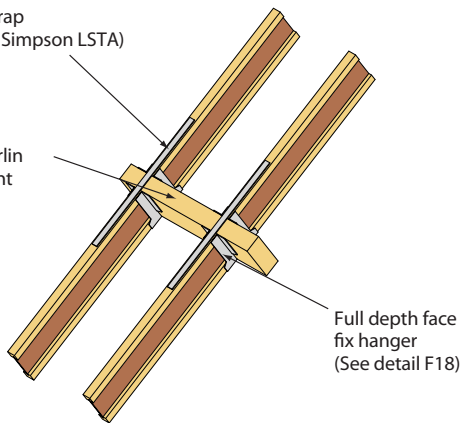


Vertical JJ-Beam blocking panels may be site trimmed to match JJJ-Joist depth at outer edge of wall or positioned on wall to match JJJ-Joist depth

R11 FLUSH PURLIN BEAM

Restraint Strap (Cullen S or Simpson LSTA)

JJ-Beam Purlin or equivalent



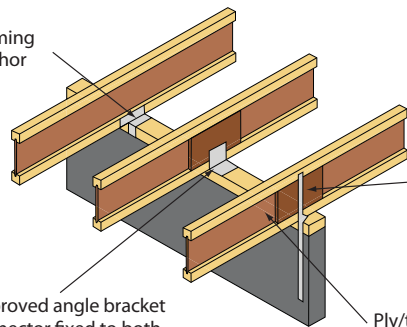
R12 RAFTER FIXING TO WALL PLATE

Framing Anchor

Approved angle bracket connector fixed to both sides of joist

Twisted restraint strap

Ply/timber bevelled web stiffener required on each face. Fix in accordance with F22



• Roof connectors to be determined by Roof Designer

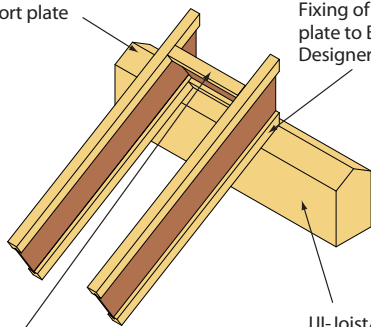
R13 RAFTER TERMINATING ON DOWNSTAND RIDGE BEAM

Double bevelled support plate

Fixing of rafter to support plate to Building Designer's specification

JJJ-Joist/JJ-Beam blocking panels (For ventilation guidance, see detail R10)

JJJ-Joist/JJ-Beam ridge beam or support wall



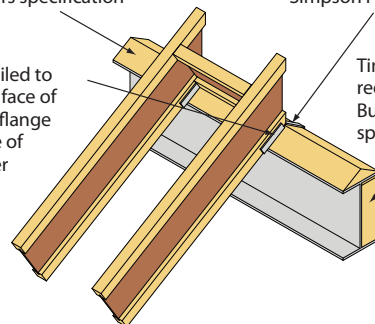
R14 RAFTER TERMINATING ON DOWNSTAND STEEL BEAM

Bevelled bearing timber attached to top of steel as per Building Designers specification

Approved restraint strap (Cullen RST2 or Simpson H10T15)

Strap nailed to the side face of bottom flange and face of void filler

Timber void filler required. Fixing to Building Designer's specification



• One strap required on each side of the rafter bottom flange

INTRODUCTION

JJI-Joists are ideally suited for use as wall studs where their availability in depths up to 450mm allows designers to insulate external walls to unprecedented levels. Even when shallower joists are used the narrow web profile provides a restricted path to heat transfer (reduced repeated thermal bridging) when compared with solid timber.



DESIGN CONSIDERATIONS

Where the wall is subjected only to horizontal wind loads with no vertical axial loads (e.g. ground level to eaves level infill panels in a portal frame structure) JJI-Joists allow very tall walls to be built using a continuous structural member.

James Jones & Sons recommend that JJI-Joists are incorporated into prefabricated wall panels in order to take advantage of the improved precision and quality typically available in a factory environment.

For further information on axial compression strengths please contact James Jones & Sons.

Each timber frame kit manufacturer will typically produce their own set of standard details to suit their specific production, manufacturing and technical requirements.

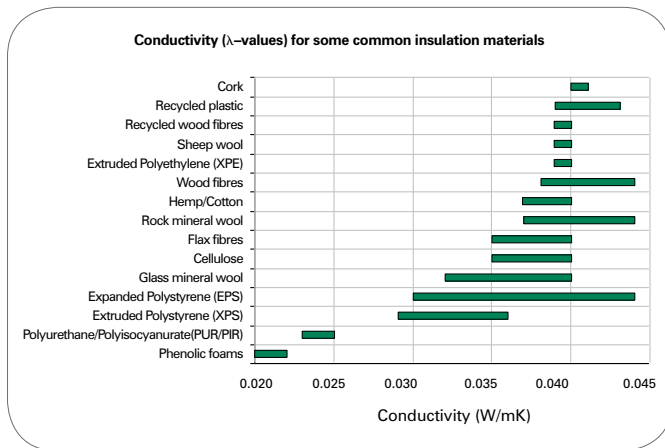
The structural design of JJI-Joist studs should be undertaken by a suitably qualified Engineer who should pay particular attention to buckling restraint, axial load distribution between inner and outer flanges and member to member fixings.

It is our recommendation that the use of JJI-Joist studs is best suited to external wall closed panel type manufacturing with a separate service zone on the inside face of the internal sheathing. It is beneficial to manufacture long panels due to the JJI-Joists being lightweight and particular care should be taken when insulating to avoid cold spots.

THERMAL PERFORMANCE OF JJI-JOISTS USED IN THE EXTERNAL ENVELOPE OF A BUILDING

There are many possible ways to utilise JJI-Joists in the external envelope of a building. The thermal performance of any chosen configuration and material combination should be assessed by a suitably qualified person.

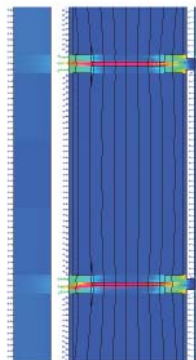
The U-Value of a detail is highly dependant on the quality of the insulation material used. The key property of the insulation in this respect is the conductivity (λ - Value) which varies from material to material and across different forms and densities of the same material. A selection of common insulation materials is provided below showing the range of λ - Values indicated in the manufacturer's literature.



Notes:

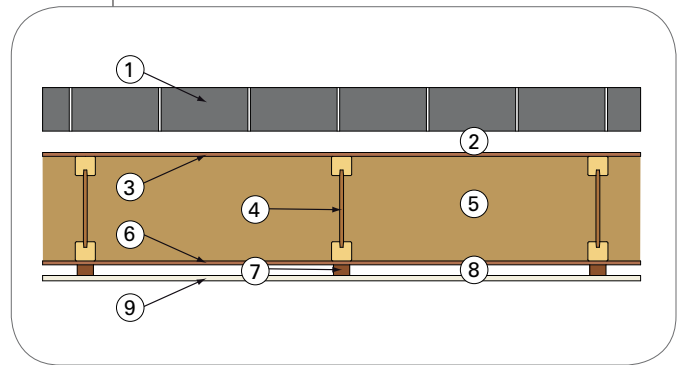
1. Values shown were obtained from a review of publicly available product information
2. List of materials is not intended to be exhaustive
3. These materials can be purchased in different forms (i.e slabs, batt, roll, loose...)
4. Always refer to manufacturer's published data

The following illustration details the heat transference through a typical JJI-Stud wall, construction as shown above right.



Whilst it can be seen that the JJI-Joist web conducts more heat than the surrounding insulation, the limited cross section of the 9mm OSB web, when compared to a typical solid timber stud, greatly reduces repeated thermal bridging.

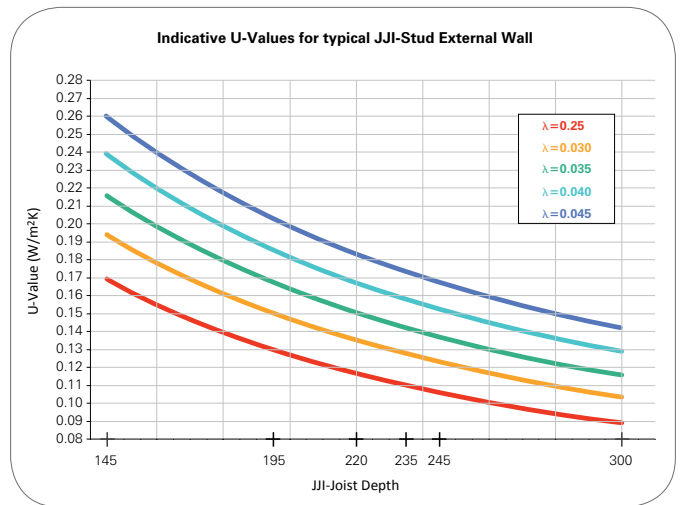
TYPICAL JJI-STUD EXTERNAL TIMBER FRAME WALL



1. Masonry 100mm
2. Air Cavity 50mm
3. Wood based board 9mm
4. JJI-Stud
5. Insulation material
6. Wood based board 9mm
7. Softwood batten 38 x 25
8. Service void
9. Plasterboard 12.5mm

Note: Vapour barriers, breather paper and wall ties omitted for clarity

The graph below can be used to relate the U-Value for a wall based on its thickness (JJI-Joist depth) and λ - Value of the chosen insulation.

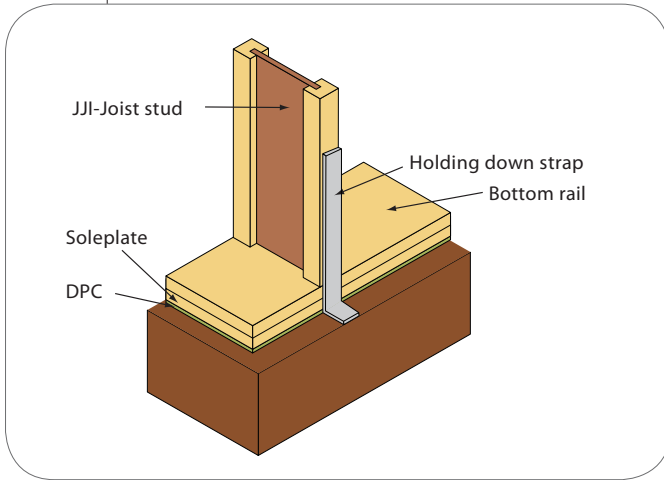


Notes:

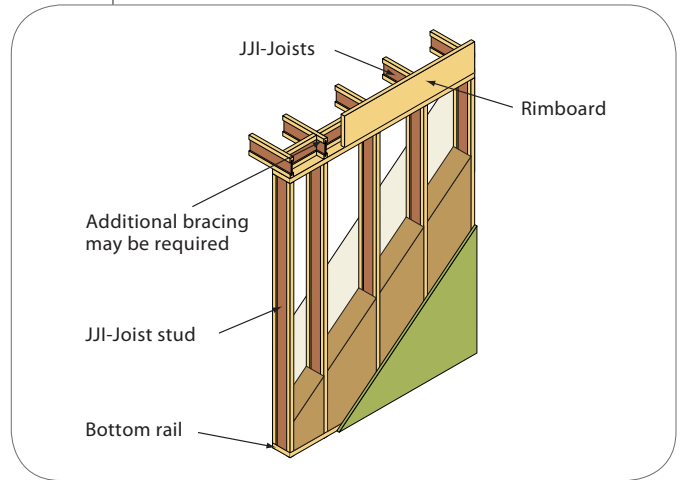
1. U-Values are calculated for the typical JJI-stud external wall detail (see above)
2. All U-Values have been calculated according to BS EN ISO 6946
3. JJI A+ studs at 600mm centres
4. Insulation is assumed to completely fill the JJI-Joist web void
5. Conductivity (λ -Values) are given in W/mK

For further information on thermal performance of JJI-Joist structures please contact James Jones & Sons

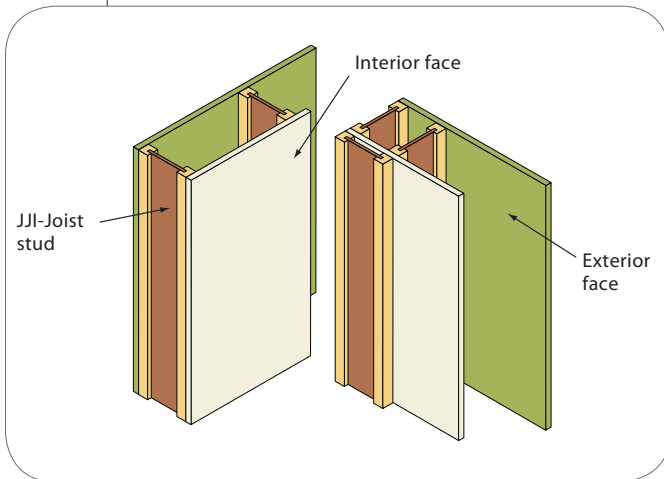
W1 | GROUND FLOOR TO WALL JUNCTION



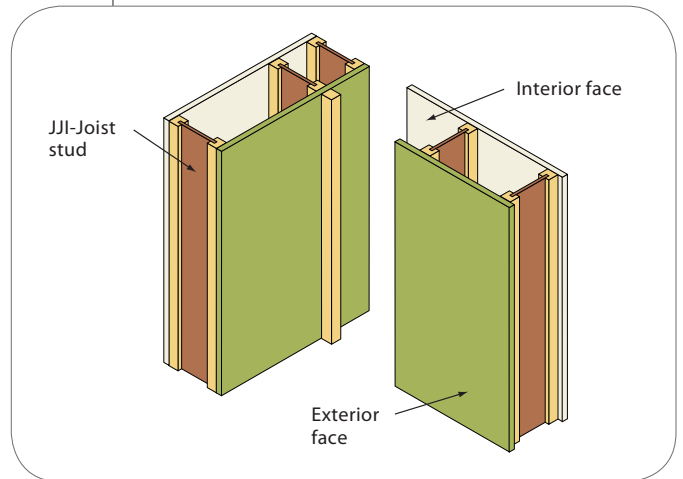
W2 | INTERMEDIATE FLOOR TO WALL JUNCTION



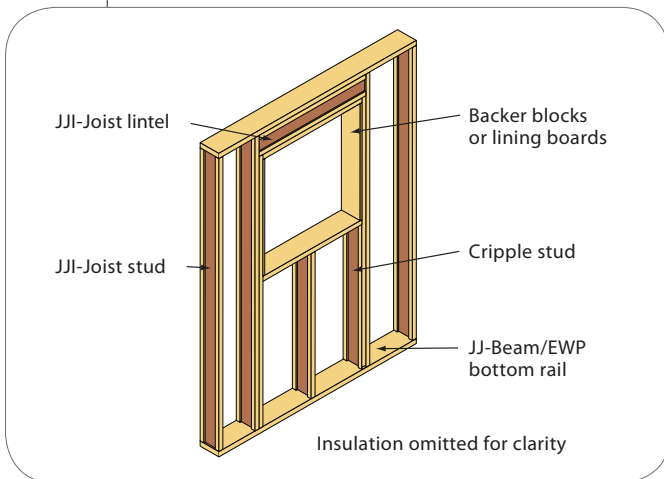
W3 | EXTERNAL WALL CORNER JUNCTION



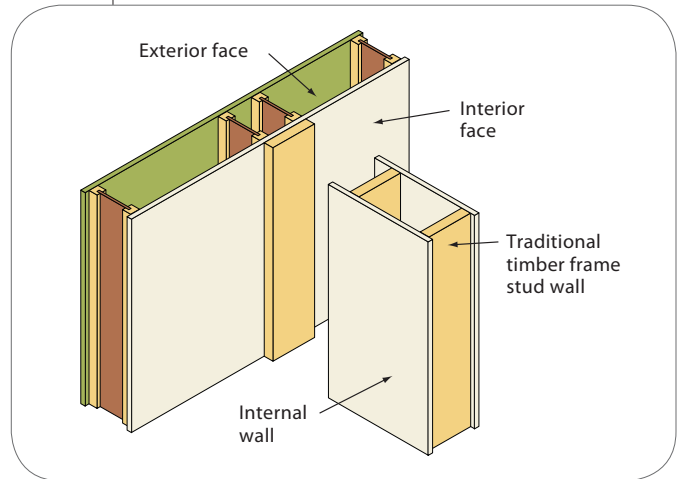
W4 | EXTERNAL WALL, INVERTED CORNER



W5 | STRUCTURAL OPENING



W6 | INTERNAL TO EXTERNAL WALL JUNCTION



Backer Block

Timber, plywood or OSB block nailed to web of JJI-Joist to allow fixing of joist hangers.

Beam

A principal member carrying other floor members.

JJ-Beam and JJ-Rim

A high specification Glulam beam made from laminations of strength graded timber glued together to make larger sections.

Building Designer

The design professional responsible for structural stability and integrity of the whole building.

Compression Block

Solid timber block fixed to rim joists or header joists where substantial vertical loads occur.

Dead Load

The self weight of the building components.

Deflection

Vertical deformation of a joist or beam due to the applied dead and imposed loads (see page 19).

Diagonal Brace

22x97mm timber used as part of erection bracing and fixed diagonally across top of JJI-Joists.

Erection Bracing

Temporary bracing used to stabilise the joists during construction.

Filler Block

Timber block used to fix multiple JJI-Joists together.

Flange

The timber component at the top and bottom of a JJI-Joist.

Header Joist

JJI-Joist section used on the perimeter of a building parallel to the span of the joists.

Imposed Load

The load due to the occupancy of the building. Often referred to as live load.

JJI-Joist

A structural timber composite formed in the shape of an I-section.

Longitudinal Binder

22x97mm timber used as part of erection bracing.

OSB

Oriented Strand Board, formed from wood strands glued together.

Rafter

A structural roof member aligned with the fall of the roof pitch.

Rim Board/Rim Joist

JJI-Joist or JJ-Beam section used on the perimeter of a building both parallel and perpendicular to the span of the joists.

Roof Component Designer

The design professional responsible for the design of the individual member (JJI-Joist rafter, JJ-Beam purlin, etc) within the roof structure.

Roof Designer

The design professional responsible for the whole roof structure. Responsibilities include the overall roof stability and its capacity to transmit wind forces to suitable load-bearing walls below.

Serviceability Index

A measure of a joist's performance relative to the minimum Code of Practice requirement.

Service Hole

A hole formed in the web of a JJI-Joist in accordance with prescribed rules.

Stability Blocks

Solid timber blocks fixed at the ends of JJI-Joists as part of stability bracing where the joists are not built into walls or fixed in hangers.

Wall Stud

A vertical structural member forming part of a wall.

Web

The OSB component of a JJI-Joist that separates the flanges.

Web Stiffener

Timber, plywood or OSB block nailed to the web of JJI-Joists where large reactions or applied loads occur.



JJI-Joists Distribution



JJI-Joists, JJ-Beam and associated connection hardware are readily available through a national network of specialists who have staff specifically trained in the design and installation of JJI-Joist systems.

- JJI-Joist Distributors are specifically chosen because of their professionalism and close relationships with builders
- JJI-Joist Distributors are strategically located throughout the UK and Ireland
- Stocks of JJI-Joists are held by all JJI-Joist Distributors
- Distributors employ technical staff who are trained in the use of JoistMaster and FloorMaster programs
- Deliveries and lead times are kept to a minimum due to the location of the JJI-Joist Distributor and the production facility being based in the UK
- Many JJI-Joist Distributors have several depots each with trained staff capable of nationwide distribution

JJI-Joists Technical Manual is also available in French and Dutch languages

For further details please contact:



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