We currently offer a face to face seminar on engineered wood products for modern methods of construction. These are offered for larger practices in the UK and Ireland. Please visit our website to request a face to face seminar and find out how to take our CPD online.

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 website: www.jamesjones.co.uk
Section 1

The JJI-Joist system

The JJI-Joist system is available from a network of authorised distributors throughout the UK and Ireland, who offer an estimating and design service inclusive of JJI-Joist layout plans, engineering calculations and material costings.
**JJI-Joists**

A JJI-Joist is a composite engineered timber joist combining 45mm deep high-grade finger jointed softwood flanges with a 9mm thick oriented strand board web. Four flange widths are available at 47, 63, 72 and 97mm wide. Using advance technology these components are combined to produce an innovative alternative to conventional construction timber with many advantages. JJI-Joists are produced to UK preferred dimensions.

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

**JJ-Beam (Glulam)**

JJ-Beam, Glue laminated timber (glulam) is a high strength and stiffness beam product that is an ideal choice for demanding applications and heavily loaded members.

**JJ-LVL (Laminated Veneer Lumber)**

JJ-LVL is an advanced wood product suitable for a wide range of structural applications. Available in two specifications; JJ-LVL-Beam and JJ-LVL-Rim. LVL is exceptionally strong for the most demanding of applications.

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**Metalwork**

James Jones and Sons continues to work closely with the UK’s leading engineered timber connector manufacturers. Only connectors approved by James Jones and Sons should be used within our system. All connectors are available from JJI-Joist distributors as part of the JJI-Joists system offer.
Design tools

Efficiency of design, manufacturing and on-site installation is key to the success of the JJI-Joist system. Through the development of our own design and optimisation software and its integration with external design and manufacturing software, we continue to remain at the forefront of industry innovation and the push for system integration for both traditional and offsite construction.

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.

JoistMaster is a powerful beam design tool for specification and cost analysis. Freely available to download from www.jamesjones.co.uk

JJI Design is a comprehensive floor design and layout package producing detailed layout drawings, material call-offs and optimisation, installation details and export files for CAD and BIM (Building Information Modelling). OptiMaster is a stock inventory and material optimisation tool aimed at improving the operational efficiency of the cutting and stock control process.

CAD and BIM (Building Information Modelling)

The James Jones software is fully integratable into the latest industry design software allowing both the import and export of design files. We currently export complete joist layouts in compliance with BIM level 2. For more information please contact James Jones and Sons Ltd.

Interactive span table

A helpful interactive span table can be found on the James Jones & Sons website at www.jamesjones.co.uk/interactive-span-table
Environmental considerations

Environmental considerations are a critical factor in the production of our JJI-Joists. Our environmental management system has enabled the company to target key areas to reduce the impacts of our activities on the environment.

ISO 14001

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

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® or PEFC™ Certified. All product claims are independently verified by a certification body on an on-going basis.

Environmental Product Declaration (EPD)

Our third key sustainability element is our Environmental product declaration (EPD) which has been independently verified according to the EPD International Method and it is managed by Environdec.

Through this EPD we can calculate the carbon capture within our JJI-Joists from individual house design to full supply contract volumes. 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.

To view our EPD please visit: www.environdec.com

Carbon Accounting and Life Cycle Assessment (LCA)

Our third key sustainability element is our Environmental product declaration (EPD) which has been independently verified according to the EPD International Method and it is managed by Environdec.

Through this EPD we can calculate the carbon capture within our JJI-Joists from individual house design to full supply contract volumes. 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.

Environmental Product Declaration (EPD)

Environmental Products Declarations (EPDs) are voluntary assessment documents that offer quantified information over a range of environmental impacts within the boundaries defined by companies, i.e. (greenhouse gases emissions, water usage and energy). They are produced using a Life Cycle Approach (LCA) using internationally accepted methodologies and they are independently reviewed which makes them more robust to stakeholder criticism.

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).

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.
Section 2

JJJ-Joists

A JJJ-Joist is a composite engineered timber joist, combining 45mm deep high-grade finger jointed softwood flanges with a 9mm thick oriented strand board (OSB/3) web.
Introduction

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

JJI-Joist Composition

- **Softwood flange**: High tensile and compressive strength is used to carry the bending loads which are greatest at the top and bottom.
- **9mm OSB web**: High shear strength is used to carry the shear loads which are greatest at the mid depth of the section.

Advantages

JJI-Joists are designed to give a superior strength to weight ratio when compared to traditional solid timber 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 product specific software
- Has Part E compliant details available
- Is FSC or PEFC accredited
- Has very low embodied energy
- Has independently assured carbon accounting to our Environmental Product Declaration (EPD)

JJI-Joist identification and marking

For onsite identification and traceability, all JJI-Joists are clearly marked with product and manufacturing information. The large markings on the OSB web detail the joist depth, flange size, manufacturing time/date and ETA product approval. Further information printed on the top and bottom timber flanges detail the timber strength class, chain of custody confirmation and a warning ‘DO NOT CUT FLANGES’.

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www.jamesjones.co.uk
**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). 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.

<table>
<thead>
<tr>
<th>Joist Type</th>
<th>Depth</th>
<th>Bending moment capacity</th>
<th>Bending stiffness</th>
<th>Shear strength capacity</th>
<th>Shear stiffness</th>
<th>Intermediate bearing capacity – minimum 89mm bearing length</th>
<th>End bearing capacity – minimum 45mm bearing length</th>
<th>Weight per metre length</th>
</tr>
</thead>
<tbody>
<tr>
<td>JJI 195 A+</td>
<td>195</td>
<td>5.67</td>
<td>305.1</td>
<td>10.64</td>
<td>1.234</td>
<td>16.37</td>
<td>8.50</td>
<td>10.76</td>
</tr>
<tr>
<td>JJI 195 C</td>
<td>8.03</td>
<td>505.6</td>
<td>12.44</td>
<td>1.234</td>
<td>25.07</td>
<td>25.07</td>
<td>12.90</td>
<td>16.48</td>
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<tr>
<td>JJI 220 A+</td>
<td>6.60</td>
<td>407.4</td>
<td>11.33</td>
<td>1.477</td>
<td>16.37</td>
<td>16.37</td>
<td>8.50</td>
<td>10.33</td>
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<td>25.07</td>
<td>12.90</td>
<td>16.48</td>
</tr>
<tr>
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<td>771.3</td>
<td>13.51</td>
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<td>25.07</td>
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<tr>
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<td>30.00</td>
<td>12.90</td>
<td>16.48</td>
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<tr>
<td>JJI 245 A+</td>
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<td>518.0</td>
<td>12.08</td>
<td>1.720</td>
<td>16.37</td>
<td>16.37</td>
<td>8.50</td>
<td>10.33</td>
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<tr>
<td>JJI 245 C</td>
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<td>844.4</td>
<td>13.80</td>
<td>1.720</td>
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<td>25.07</td>
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<tr>
<td>JJI 245 D</td>
<td>13.52</td>
<td>1195.4</td>
<td>15.40</td>
<td>1.720</td>
<td>26.66</td>
<td>30.00</td>
<td>12.90</td>
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<tr>
<td>JJI 300 A+</td>
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<td>816.3</td>
<td>13.86</td>
<td>2.255</td>
<td>16.37</td>
<td>16.37</td>
<td>8.50</td>
<td>10.33</td>
</tr>
<tr>
<td>JJI 300 C</td>
<td>13.58</td>
<td>1319.5</td>
<td>15.49</td>
<td>2.255</td>
<td>25.07</td>
<td>25.07</td>
<td>12.08</td>
<td>16.48</td>
</tr>
<tr>
<td>JJI 300 D</td>
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<td>1899.0</td>
<td>17.67</td>
<td>2.255</td>
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<td>30.00</td>
<td>12.08</td>
<td>16.48</td>
</tr>
<tr>
<td>JJI 350 C</td>
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<td>1899.6</td>
<td>17.67</td>
<td>2.741</td>
<td>25.07</td>
<td>25.07</td>
<td>12.02</td>
<td>16.48</td>
</tr>
<tr>
<td>JJI 350 D</td>
<td>20.65</td>
<td>2647.6</td>
<td>18.70</td>
<td>2.741</td>
<td>26.66</td>
<td>30.00</td>
<td>12.02</td>
<td>16.48</td>
</tr>
<tr>
<td>JJI 400 C</td>
<td>40.0</td>
<td>2673.0</td>
<td>18.91</td>
<td>3.227</td>
<td>25.07</td>
<td>25.07</td>
<td>12.00</td>
<td>16.48</td>
</tr>
<tr>
<td>JJI 400 D</td>
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<td>3.227</td>
<td>25.79</td>
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<td>12.00</td>
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</tr>
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<td>4170.4</td>
<td>22.18</td>
<td>3.713</td>
<td>21.50</td>
<td>30.00</td>
<td>6.79</td>
<td>16.48</td>
</tr>
</tbody>
</table>

**Table 2. Characteristic capacities for JJI-Joists (Eurocode 5)**

Notes for Table 2:
1. All strength properties are for joists acting as non-systems. For joist acting as a system multiply values by 1.1 ($K_{sys}=1.1$)
2. Minimum end bearing length =45mm, minimum intermediate bearing length =89mm
3. N/S: no web stiffeners required, W/S: Web stiffeners required
4. Advice on choosing appropriate partial factors for limit state design can be found in ETA-10/0335
5. Lateral buckling checks should be performed during the design of structures using JJI-Joists if both flanges are not fully restrained

**Characteristic JJI-Joist vertical load capacities when fully supported**

<table>
<thead>
<tr>
<th>JJI Joist Depth</th>
<th>Characteristic load per metre run (kN/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>195</td>
<td>75.0</td>
</tr>
<tr>
<td>220</td>
<td>75.0</td>
</tr>
<tr>
<td>235</td>
<td>70.0</td>
</tr>
<tr>
<td>245</td>
<td>64.0</td>
</tr>
<tr>
<td>300</td>
<td>60.0</td>
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<tr>
<td>350</td>
<td>41.0</td>
</tr>
<tr>
<td>400</td>
<td>32.0</td>
</tr>
<tr>
<td>450</td>
<td>31.0</td>
</tr>
</tbody>
</table>

**Note for Table 3:**
1. Values for point load can be calculated as $P=UDL \times \frac{(L_b+60)}{1000}$ where $L_b$ is the contact length of the load applied in mm
2. The beam is considered fully restrained, effects of buckling have been ignored
3. Allowance may be made for load spreading of sole plates and bottom rails at the designer's discretion

**JJI POINT LOAD 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. 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.

**Table 4. Allowable Locations for Circular, Square and Rectangular Holes (Domestic Applications)**

<table>
<thead>
<tr>
<th>Joist Depth (mm)</th>
<th>Joist Span (mm)</th>
<th>Hole Size (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>220</td>
<td>300</td>
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<tr>
<td>480</td>
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<tr>
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<td>300</td>
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<tr>
<td>350</td>
<td>300</td>
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</tr>
<tr>
<td>450</td>
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<tr>
<td>450</td>
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<td>300</td>
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<td>300</td>
<td>300</td>
</tr>
<tr>
<td>5803</td>
<td>300</td>
<td>300</td>
</tr>
</tbody>
</table>

Notes for Table 4:

1. Table 4 has been calculated for joints in intermediate domestic floors ($G_k = 0.75kN/m²$, $Q_k = 1.5kN/m²$, $Q = 2kN$) at 600mm centres
2. Where more than one hole is to be cut, the minimum spacing between holes must be 2 times the width of the largest hole
3. The rectangular hole width b should not exceed 1.5xD
4. Cut all holes carefully, do not overcut and do not cut flanges
5. Where holes are required in rim and header joists of timber frame construction refer to the building designer
6. Plastic plumbing is ideal with JJI-Joists. Where copper plumbing is to be used, careful consideration of the sequence of pipe installation is required
7. The bearing support length used for this table is 45mm
8. A 35mm hole may be drilled anywhere on the centre line of the web material provided there is a minimum of 35mm from the edge of the hole to the end of the joist and it is not directly over a support

**Service hole diagram**

**Alternative solutions - reinforcing plates**

For guidance on using reinforcing plates for large and highly loaded applications please contact your JJI-Joist distributor.
Acoustic requirements

JJI-Joists can be used in both intermediate and separating floors that comply with current building standards.

England and Wales, Building Regulations Part E (Resistance to the Passage of Sound), October 2015, Section 5: 5.23 Internal floor type C and Section 3: 3.1 Floor Type 3.1A.

Scottish Building Standards, Section 5 (Noise), October 2011, Scottish Government Example Construction and Generic Internal Constructions, Section 4.c: Floor Type 2 & 2A and Section 10: Floor Type 3B.

Intermediate floors

James Jones & Sons Ltd. have undertaken further acoustic tests to provide the builder with alternative solutions to that found in the above national standards. For further information please refer to Technical Bulletin 14 ‘Resistance to the Passage of Sound’ for use in England and Wales and Technical Bulletin 38 ‘44dB Rw Acoustic Performance of 220mm JJI-Joist floor’ for use in Scotland.

ENGLAND AND WALES INTERMEDIATE FLOOR

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
4. Also see fire requirements

SCOTLAND INTERMEDIATE FLOOR

1. 5mm bead of Caberfix joint and joist adhesive
2. 220mm JJI-Joist
3. 15mm Knauf Wallboard
4. 100mm Knauf acoustic roll
5. 22mm Caberdek P5 chipboard peel clean removed

Separating floor

JJI-Joists can be readily specified for use in separating floors in England and Wales and Scotland. Where increased performance with regard to acoustics, fire and the overall structure is required.

JJI-JOISTS IN TIMBER FRAME CONSTRUCTION COMPLYING WITH PART E1

Robust details E-FT-1

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 215mm deep JJI-Joist at centres to suit span
8. 12.5mm plasterboard and 19mm plasterboard plank
or 2 no. layers 15mm plasterboard

robustdetails®

E-FT-1 (England and Wales Generic solution)
E-FT-5 (England and Wales Cellecta® ScreedBoard® 28)
E-FT-7* (England and Wales FFT80)
V-FT-1 (Scotland Generic solution)

There are currently 4 solutions where JJI-Joists can be fully incorporated into the makeup of separating floors to achieve Robust Detail status.
For further information www.robustdetails.com/

* Recommended that Building Control be consulted to ensure full compatibility with other NI Regulations and Standards.

www.jamesjones.co.uk
Fire resistance

Successful fire tests have been carried out on JJI-Joists by International Fire Consultants Limited. Various solutions are available for half hour and one hour fire resistance performance to both European and British standards. The following details show examples of the approved floor constructions described in International Fire Consultants Assessment reports PAR/17613/01 to BS 476 and PAR/15150/01 &/02 to BS EN 1365.

Half-hour

30 MIN FIRE RESISTANCE

1. Floor Deck
2. Structural Member
3. Ceiling

Ceiling-30 min
- 15mm Type A plasterboard fixed directly to joist
- 15mm Type F plasterboard fixed directly to joist
- 12.5mm Type F plasterboard fixed to resilient bars, maximum 450mm bar centres
- 12.5mm Type D plasterboard fixed to resilient bars, maximum 400mm bar centres

Floor Deck-30 and 60 min
- 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

Structural Member-30 and 60 min
- JJI-Joist designed to support the applied loads at 600mm centres

One-hour

60 MIN FIRE RESISTANCE

1. Floor Deck
2. Structural Member
3. Ceiling

Ceiling-60 min
- 2no. 15mm Type F plasterboard fixed directly to joist
- 2no. 12.5mm Type F plasterboards fixed direct to joist, plus board edge noggins

Type A, D (enhanced acoustics) & F (enhanced fire resistance) plasterboards to BS EN 520.
Where services penetrate the plasterboard lining, i.e. downlighters, a fire rated unit of equivalent performance must be used. For alternative ceiling options please contact James Jones & Sons for information.

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.

Preservative treatment

JJI-Joists are available with preservative treated timber flanges. This allows their use in Use Class 2 conditions for category C1 and C2 structures covered under the STA (Structural Timber Association) separating distances during construction. The STA’s design guide to separating distances during construction is a multi-part document that provides comprehensive guidance on the mitigation of the potential risk posed by a fire in a timber frame structure whilst under construction, i.e. (prior to the installation of the finishings that usually provide fire resistance to the final building). For further information please refer to Technical Bulletin 51 ‘JJI-Joist fire solutions for use with the STA design guide to separating distances during construction.’

www.jamesjones.co.uk
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 2015. 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

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 38 x 125mm cut squarely and accurately to maintain joist spacing. Fasten with minimum 2 no. 3.35 x 65mm 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 below). 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). Please refer to Technical Bulletin 47, ‘Loading out JJI-Joist Floors’
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

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**JJJ-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.
- Transport joists on edge, not flat.
- Store joists on edge.
- Use suitable lifting equipment to offload joist bundles.

**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 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 split the flange, ensure proper toe nailing.
- DO NOT cut or notch flanges.
- DO NOT stack building materials on unbraced joists.
- DO NOT use non-approved hangers.
- DO NOT walk on joists until proper bracing is in place.

**Stairwell hatch system**

Designed as an alternative to sacrificial stairwell joists, the OCKWELLS Stairwell Hatch System provides a reusable GRP platform over stairwell openings. For further information contact your JJJ-Joist distributor.

**OCKWELLS**

[www.ockwells.co.uk](http://www.ockwells.co.uk)
Section 3

Glulam and LVL

Glue laminated timber (Glulam) is a high grade beam product that is an ideal choice for high strength and stiffness applications for heavily loaded members.

Laminated Veneer Lumber (LVL) is an advanced wood product suitable for a wide range of structural applications. Available in two specifications; JJ-LVL-Beam and JJ-LVL-Rim, LVL is exceptionally strong for the most demanding of applications.
Introduction
JJ-Beam (Glulam) is a high specification engineered timber product 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.

Typical Glulam Sections

JJ-Beam is supplied as part of the JJI-Joist system. It is available in depths that match the JJI-Joist range (Table 1) and three standard widths. See table below for standard range.

<table>
<thead>
<tr>
<th>Section Depth</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>✔</td>
</tr>
<tr>
<td>45</td>
<td>✔</td>
</tr>
<tr>
<td>90</td>
<td>✔</td>
</tr>
</tbody>
</table>

Table 5. JJ-Beam product range

Characteristic values for JJ-Beam
JJ-Beam should be designed to Eurocode 5 and requires the use of characteristic values as shown in Table 6.

<table>
<thead>
<tr>
<th>Characteristic Values</th>
<th>JJ-Beam</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bending strength</td>
<td></td>
<td>32 N/mm²</td>
</tr>
<tr>
<td>Tension strength</td>
<td></td>
<td>19.5 N/mm²</td>
</tr>
<tr>
<td>Lamination strength</td>
<td></td>
<td>0.45 N/mm²</td>
</tr>
<tr>
<td>Compression strength</td>
<td></td>
<td>26.5 N/mm²</td>
</tr>
<tr>
<td>Shear strength</td>
<td></td>
<td>3 N/mm²</td>
</tr>
<tr>
<td>Modulus of elasticity</td>
<td></td>
<td>13700 N/mm²</td>
</tr>
<tr>
<td>Modulus of elasticity</td>
<td></td>
<td>11100 N/mm²</td>
</tr>
<tr>
<td>Depth</td>
<td></td>
<td>420 N/mm²</td>
</tr>
<tr>
<td>Density</td>
<td></td>
<td>410 kg/m³</td>
</tr>
</tbody>
</table>

Table 6. Characteristic Values for JJ-Beam

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.

<table>
<thead>
<tr>
<th>Service Class</th>
<th>Load Duration Class</th>
<th>Material</th>
<th>γM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Permanent</td>
<td>Glulam</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td>Long term</td>
<td>LVL</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Table 9. γM material factors for JJ-Beam and JJ-LVL
Note for Table 9:
1. Values provided in BS EN 1995-1-1
Introduction

Laminated Veneer Lumber (LVL) is an advanced wood product suitable for a wide range of structural applications, from new build to repair. LVL as a material is exceptionally strong with a great load bearing capacity, homogeneous quality and good workability. JJ-LVL-Beam and JJ-LVL-Rim is available in 12m lengths and in a range of sizes.

Typical LVL Sections

![Image of LVL Section](image)

Characteristic values for JJ-LVL-Beam and JJ-LVL-Rim

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

<table>
<thead>
<tr>
<th>Characteristic Values</th>
<th>JJ-LVL-Rim</th>
<th>JJ-LVL-Beam</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bending strength</td>
<td>edgewise, parallel to grain</td>
<td>f_ek</td>
<td>32</td>
</tr>
<tr>
<td>Tension strength</td>
<td>parallel to grain</td>
<td>f_tk</td>
<td>26</td>
</tr>
<tr>
<td>Compression strength</td>
<td>parallel to grain</td>
<td>f_ck</td>
<td>26</td>
</tr>
<tr>
<td>Shear strength</td>
<td>edgewise, parallel to grain</td>
<td>f_vk</td>
<td>6</td>
</tr>
<tr>
<td>Modulus of elasticity</td>
<td>parallel to grain</td>
<td>E_0</td>
<td>10500</td>
</tr>
<tr>
<td>Shear modulus</td>
<td>edgewise, parallel to grain</td>
<td>G_0e</td>
<td>2800</td>
</tr>
<tr>
<td>Density</td>
<td>characteristic</td>
<td>p</td>
<td>840</td>
</tr>
</tbody>
</table>

Table 10. Characteristic Values

Notes for Table 10:
1. nd= Parameter not declared by manufacturer
2. Properties valid for products within 24-75mm thickness
3. Properties declared in certificates 0809-CPR-1203 and 0809-CPR-1214

LVL product range

JJ-LVL-Beam and JJ-LVL-Rim is available in depths to suit the JJI-Joist range (Table 1) and four standard widths depending on the grade. See table below for our standard range.

<table>
<thead>
<tr>
<th>Section Depth</th>
<th>JJ-LVL-Rim</th>
<th>JJ-LVL-Beam</th>
</tr>
</thead>
<tbody>
<tr>
<td>195</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>230</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>235</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>245</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>300</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>350</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>400</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Table 11. LVL product range

LVL vertical load capacities when fully supported

<table>
<thead>
<tr>
<th>Width [mm]</th>
<th>Characteristic load per metre run (kN/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>270</td>
</tr>
<tr>
<td>39</td>
<td>234.0</td>
</tr>
<tr>
<td>45</td>
<td>270.0</td>
</tr>
<tr>
<td>75</td>
<td>450.0</td>
</tr>
</tbody>
</table>

Table 12. JJ-LVL-Beam and JJ-LVL-Rim vertical load characteristic capacities

Notes for Table 12:
1. Values for point load can be calculated as P=UDL x (L_b+60)/1000 where L_b is the contact length of the load applied in mm
2. The beam is considered fully restraint, effects of buckling have been ignored
3. Factor K_{c,90} has been taken as 1, however, allowance may be made for load spreading of sole plates and bottom rails at the designers discretion

Design values for domestic flooring applications

Tables of calculated design values for JJ-Beam, JJ-LVL-Rim and JJ-LVL-Beam in all available sections and sizes can be provided on request, please contact James Jones and Sons.
Alternative sizes, grades and profiles

One of the benefits of partnering with two of Europe’s largest engineered timber manufacturers is being able to offer an extensive range of Glulam and LVL products direct from their manufacturing bases in mainland Europe.

**Glulam**

Binderholz is a full-range supplier for glulam products, manufactured in accordance with EN 14080:2013, with beams and profiles available to the following strength classes for both visual and non-visual applications:

GL24c, GL24h, GL28c, GL28h, GL30c, GL30h, GL32c and GL32h

**Glulam special profiles and treatments**

We are able to offer a range of special architectural profiles including sloped and curved beams, plus a broad spectrum of secondary beam processing (notches, holes, etc). For a full list of products, grade and quality information please visit our website: [www.jamesjones.co.uk/glulam](http://www.jamesjones.co.uk/glulam)

**LVL**

Partnering with Stora Enso allows us to offer their full range of LVL products. Manufactured in accordance with EN 14374, Stora Enso LVL is available in S, X and T grades in various billet sizes. For further information on LVL use and material and structural properties, please visit our website: [www.jamesjones.co.uk/lvl](http://www.jamesjones.co.uk/lvl)
Storage on site

Glulam and LVL 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.

Glulam and LVL 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 Glulam and LVL should be protected from the weather to avoid excessive changes in moisture content, and associated dimensional changes.

Service holes in Glulam and LVL

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.

Service hole diagram

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-LVL member 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

Larger holes and complex loading

PD6933-1-2012 provides a calculation method for larger holes up to 0.4 x depth of the joist. This method can be use for multi span beams and complex loading conditions.

Treatment and durability

Our Glulam and LVL products are untreated. When used in a Service Class 1 or 2 environment they 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.

Check for compatibility before applying any preservative coating/treatment.

JJ-LVL-Beam can be supplied with an optional water-borne wood oil weather guard coating called Teknoshield. For further information contact your JJI-Joist distributor.

Fire resistance and treatment

For the purpose of calculating the fire resistance of Glulam and LVL members, detailed guidance on charring rate calculation procedures can be found in EN 1995-1-2.
Fixing of multiply JJ-Beam and JJ-LVL-Beam Members

Multiply JJ-Beam and JJ-LVL 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. 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 2 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 most cost effective and 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 and 3 ply 75mm members.

Tables 13 a and b give maximum medium term design line loads that can be carried if the following fixing details are used.

### Table 13a. Maximum Medium Term Design Line Load (kN/m) for Multiply JJ-Beam Members Loaded from One Face

<table>
<thead>
<tr>
<th>Fixing Ref</th>
<th>Section Makeup - JJ-Beam</th>
<th>2 ply</th>
<th>3 ply</th>
<th>4 ply</th>
<th>5 ply</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ply Thickness (mm)</td>
<td>38</td>
<td>45</td>
<td>38</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Overall width (mm)</td>
<td>76</td>
<td>90</td>
<td>114</td>
<td>135</td>
</tr>
<tr>
<td>A</td>
<td>2 rows of 3.1mm nails (300 centres)</td>
<td>7.49</td>
<td>7.68</td>
<td>5.62</td>
<td>5.76</td>
</tr>
<tr>
<td>B</td>
<td>3 rows of 3.1mm nails (300 centres)</td>
<td>11.24</td>
<td>11.52</td>
<td>8.43</td>
<td>8.64</td>
</tr>
<tr>
<td>C</td>
<td>2 rows of M12 bolts (600 centres)</td>
<td>25.29</td>
<td>27.01</td>
<td>18.97</td>
<td>20.26</td>
</tr>
<tr>
<td>D</td>
<td>2 rows of M12 bolts (400 centres)</td>
<td>37.93</td>
<td>40.52</td>
<td>28.45</td>
<td>30.39</td>
</tr>
<tr>
<td>E</td>
<td>2 rows of M12 bolts (300 centres)</td>
<td>50.58</td>
<td>54.02</td>
<td>37.93</td>
<td>40.52</td>
</tr>
</tbody>
</table>

Notes for Table 13a and b:
1. The values in the tables above are applicable to members loaded to one face only in floor applications
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. 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 2 ply 45mm member would require a 108mm bolt

### Table 13b. Maximum Medium Term Design Line Load (kN/m) for Multiply JJ-LVL-Beam Members Loaded from One Face

<table>
<thead>
<tr>
<th>Fixing Ref</th>
<th>Section Makeup - JJ-LVL</th>
<th>2 ply</th>
<th>3 ply</th>
<th>4 ply</th>
<th>5 ply</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ply Thickness (mm)</td>
<td>39</td>
<td>45</td>
<td>39</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Overall width (mm)</td>
<td>78</td>
<td>90</td>
<td>117</td>
<td>135</td>
</tr>
<tr>
<td>A</td>
<td>2 rows of 3.1 nails (300 centres)</td>
<td>8.21</td>
<td>8.35</td>
<td>6.16</td>
<td>6.26</td>
</tr>
<tr>
<td>B</td>
<td>3 rows of 3.1 nails (300 centres)</td>
<td>12.32</td>
<td>12.53</td>
<td>9.24</td>
<td>9.40</td>
</tr>
<tr>
<td>C</td>
<td>2 rows of M12 bolts (600 centres)</td>
<td>28.44</td>
<td>30.33</td>
<td>21.33</td>
<td>22.74</td>
</tr>
<tr>
<td>D</td>
<td>2 rows of M12 bolts (400 centres)</td>
<td>42.66</td>
<td>45.49</td>
<td>32.00</td>
<td>34.12</td>
</tr>
<tr>
<td>E</td>
<td>2 rows of M12 bolts (300 centres)</td>
<td>56.89</td>
<td>60.65</td>
<td>42.66</td>
<td>45.49</td>
</tr>
</tbody>
</table>

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.

**Nailing Pattern for 2 Ply JJ-Beam and JJ-LVL-Beam Members**

- = Fixings from front face + = fixings from rear face

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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.

**NAILING PATTERN FOR 3 PLY JJ-BEAM AND JJ-LVL BEAM 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.

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

**Point loads**

Multiply JJ-Beam and JJ-LVL 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 14 a and b give maximum medium term isolated design point loads that can be carried if the following fixing details are used.

**NAILING PATTERN FOR 2 PLY JJ-BEAM AND JJ-LVL BEAM MEMBERS WITH AN ONCOMING POINT LOAD**
### Fixing Ref.

<table>
<thead>
<tr>
<th>Ply Thickness (mm)</th>
<th>2 ply</th>
<th>3 ply</th>
<th>4 ply</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>45</td>
<td>90</td>
<td>38</td>
</tr>
<tr>
<td>Overall width (mm)</td>
<td>76</td>
<td>90</td>
<td>180</td>
</tr>
</tbody>
</table>

### Nailing Pattern for 3 Ply JJ-Beam and JJ-LVL-Beam Member with an Incoming Point Load

- **F** = Fixings from front face
- **G** = Fixings from rear face

### Bolt Pattern for JJ-Beam and JJ-LVL-Beam Members (Up to 4 Ply) with an Incoming Point Load

### Table 14a. Maximum Medium Term Isolated Design Point Load (kN) for Multiply JJ-Beam Members Loaded from One Face

<table>
<thead>
<tr>
<th>Fixing Ref.</th>
<th>Section Makeup</th>
<th>2 ply</th>
<th>3 ply</th>
<th>4 ply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ply Thickness (mm)</td>
<td>39</td>
<td>45</td>
<td>75</td>
<td>39</td>
</tr>
<tr>
<td>Overall width (mm)</td>
<td>78</td>
<td>90</td>
<td>150</td>
<td>117</td>
</tr>
<tr>
<td><strong>F</strong> Nail Detail</td>
<td>14.78</td>
<td>15.04</td>
<td>-</td>
<td>11.09</td>
</tr>
<tr>
<td><strong>G</strong> Bolt Detail</td>
<td>34.13</td>
<td>36.39</td>
<td>45.70</td>
<td>25.60</td>
</tr>
</tbody>
</table>

### Table 14b. Maximum Medium Term Isolated Design Point Load (kN) for Multiply JJ-LVL Members Loaded from One Face

Notes for Table 14a and b:
1. The values in the tables above are applicable to members loaded to one face only in floor applications.
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 2 ply 45mm member would require a 108mm bolt.

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Section 4

Floor design

Since their introduction into the UK in 1999, I-Joists have become the floor system of choice for the majority of the major house builders and JJI-Joists are the market leader. The JJI Design system ensures that the optimum combination of performance and price is achieved first time every time.
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/screwed 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 6.4.19. 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:

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

Most heat loss through a ground floor occurs around the floor perimeter and so the inclusion 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.
Domestic floor span tables

The domestic intermediate floor span table below is based on the following design criteria:

- Dead Load including partition allowance is 1.35kN/m² for apartments or 0.75kN/m² for houses
- 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 EN1995-1-1 (Eurocode 5)
- Adequate lateral restraint to the top flange of the joists is assumed to be provided by the floor deck.

Further details are provided in the notes below the table

<table>
<thead>
<tr>
<th>Joist Type</th>
<th>Apartments</th>
<th>Houses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Joists Centres (mm)</td>
<td>Joists Centres (mm)</td>
</tr>
<tr>
<td>Joists Centres (mm)</td>
<td>Dead Load up to 1.35kN/m²</td>
<td>Dead Load up to 0.75kN/m²</td>
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<tr>
<td>400</td>
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<td>600</td>
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<td>JJI-235A+</td>
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<td>JJI-235C</td>
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<td>JJI-450D</td>
<td>7616</td>
<td>7323</td>
</tr>
</tbody>
</table>

Table 15. Maximum Engineering Span for Domestic Intermediate Floors

Notes for Table 15:
1. This table serves as guidance only. For a more detailed JJI-Joist appraisal contact a JJI-Joist distributor. The calculated spans are engineering spans in mm
2. This table has been calculated for domestic intermediate floors (Service Class 1)
3. Load combinations equations 6.10aSTR 6.10bSTR (EN1990) have been used in this table
4. The effect of partition load has been included where the self-weight of the floor does not exceed 1.0kN/m² for apartments or 0.4kN/m² for houses
5. The calculated spans are engineering spans for simply supported joists with a medium term imposed load (qk=1.5kN/m², Qk=2.0kN)
6. Adequate lateral restraint is provided by the floor deck (22mm chipboard and 15mm plasterboard)
7. It is assumed that load can be shared between floor joists (Ksys=1.1)
8. Joists design values have been calculated using Kmod factors from table 3.1 (EN1995) and γM,osb=1.3,γM,timber=1.2
9. Final deflection limit has been taken as L/250. No additional instantaneous deflection limit has been applied
10. The unit load deflection limit is 1.8mm for spans below 4000 and 16500/L for spans over 4m
11. Fundamental frequency has been limited to 8Hz
12. The modal dampening ratio is 0.02
13. The floor width has been taken as 4m for velocity response checks
14. To achieve stated span, adequate bearing will be required. Web stiffeners may be necessary
15. Permissible web holes to be drilled in accordance to Joistmaster software or hole chart
Example of JJI-Joist floor system

**F1** CONTINUOUS JJI-JOIST ON WALL

- **Continuous Joist**
- Minimum 89mm bearing length
- Any type of load bearing support

Web stiffeners may be required, see F22

**F2** SPLIT JJI-JOIST ON WALL

- 3mm gap at top of splice block
- 18 x 200mm plywood splice block one side only, fix with 6 no. 3.35 x 65mm nails clenched over
- Minimum joist bearing 45mm

Either blockwork or JJI-Joist blocking is required

Where split joist(s) of different widths meet on the wall a double row of blocking is required to suit joist widths

See notes and details for temporary erection bracing and procedure

When 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 4 for hole installation chart
F3 WALL AT 90° TO JJI-JOISTS

- Wall sole plate nailed to each joist
- Partition wall
- Floor decking

The floor designer is responsible for ensuring the joist design is adequate to support the wall.

F4 NON-LOAD BEARING WALL PARALLEL TO JJI-JOISTS

- Non-load bearing wall
- Wall sole plate nailed to each nogging/dwang
- Floor decking
- Nogging/dwang
- 38 x 75mm nogging/dwang or JJI-C flange at maximum 600 c/c attached with 2 no. 3.35 x 65mm 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

- JJI-Joist or Glulam/LVL blocking
- Load bearing wall aligned under wall above

Refer to F detail notes - timber frame (see page 30)

F6 TERMINATING JJI-JOIST ON WALL

- Minimum bearing 45mm
- Either blockwork or JJI-Joist blocking is required
- Any type of load bearing support
- Suitable detailing required if used on an external wall

F7 JJI-JOIST BEARING IN BLOCK WALL

- Nogging/dwang (min 38 x 45mm) securely fixed with 3.35 x 65mm skew nailing or approved clip
- Minimum bearing 90mm
- 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 J&S
- Restraint straps will be required for greater than 2 storeys*
*Straps required on all floors

F8 MASONRY WALL RESTRAINT JJI-JOIST PARALLEL DETAIL 1

- Refer to approved connector manufacturer’s guidelines for installation instructions
- Refer to strap supplier for width requirement
- Nogging/dwang (can be vertically aligned full depth JJI-Joist blocking) securely fixed with 3.35 x 65mm skew nailing or approved clip
- Galvanised restraint strap at maximum 2.0m centres, over a minimum of 3 joists
- Blocking between JJI-Joist and wall
- Refer to F detail notes - timber frame (see page 30)

**RESTRAINT STRAPS ARE THE RESPONSIBILITY OF THE BUILDING DESIGNER**
RESTRAINT STRAPS ARE THE RESPONSIBILITY OF THE BUILDING DESIGNER

**F9 | MASONRY WALL RERAINT JJI-JOIST PARALLEL DETAIL 2**

- Block wall
- 5 x 30mm galvanised restraint strap at maximum 2.0m centres over a minimum of 3 joists
- Do not notch the JJI-Joist flange under any circumstances
- Strap through slot in web at level to suit block course
- Min 0.5d
- Blocking between JJI-Joist and wall

**F10 | WALL RESTRAINT, BLOCK WALL HANGER SUPPORT**

- External masonry wall requires restraint
- 675mm of cured masonry before hanger loaded, see approved connector manufacturer's H&S guidelines
- Twisted offset restraint strap fixed to side of joist and built into masonry bed joint at appropriate centres
- Nogging/dwang (min 38 x 45mm or JJI-Joist blocking) securely fixed with 3.35 x 65mm skew nailing or approved clip
- Web fillers may be required. Refer to joist design and/or approved connector manufacturer's guidelines

**F11 | JJI-JOIST BEARING ON EXTERNAL WALL**

- Glulam/LVL
- Additional blocking may be required to Engineer's specification, to improve Sound, Structural performance and Fixing
- Refer to F detail notes - timber frame (see page 30)

**F12 | JJI-JOIST BEARING ON EXTERNAL WALL**

- JJI-Joist
- Additional blocking may be required to Engineer's specification, to improve Sound, Structural performance and Fixing
- Only applicable where a maximum of one storey is built above
- Refer to F detail notes - timber frame (see page 30)

**F13 | JJI-JOIST PARALLEL TO EXTERNAL WALL**

- JJI-Joist
- Only applicable where a maximum of one storey is built above
- Refer to F detail notes - timber frame (see page 30)

**F14 | SINGLE JJI-JOIST TO JJI-JOIST**

- Ensure the minimum nails fixed through hanger into incoming joist
- Backer block fixed to BOTH SIDES of principle joist. Refer to detail F21
- Approved face or top fix hanger secured through specified nail holes (refer to approved connector manufacturer's guidelines)

**F-details**

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**F15 | SINGLE JJI-JOIST TO MULTIPLE JJI-JOIST**

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

**F16 | SINGLE JJI-JOIST TO JJI-JOIST (LIGHT LOAD)**

Approved metalwork secured through all nail holes (refer to approved connector manufacturer’s guidelines).

**F17 | MULTIPLE JJI-JOIST TO MULTIPLE JJI-JOIST**

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

**F18 | JJI-JOIST TO ENGINEERED TIMBER**

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

**F19 | FILLER BLOCK – DOUBLE OR TREBLE JJI-JOIST**

Example Nail clenched over

Step 1 Double

Step 2 Treble

(Treble ‘D’ Not Allowed)

Provide filler blocks at all ends and bearings of joist and at points of incoming loads (see F15). Alternatively provide continuous filler block when repeated loads are applied (see detail F40).

**F20 | FILLER AND BACKER BLOCK TABLE**

<table>
<thead>
<tr>
<th>JJI-Joist Depth (mm)</th>
<th>Filler and backer block depth (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>195</td>
<td>100</td>
</tr>
<tr>
<td>220</td>
<td>125</td>
</tr>
<tr>
<td>235</td>
<td>145</td>
</tr>
<tr>
<td>245</td>
<td>150</td>
</tr>
<tr>
<td>300</td>
<td>200</td>
</tr>
<tr>
<td>350</td>
<td>125+125</td>
</tr>
<tr>
<td>400</td>
<td>150+150</td>
</tr>
<tr>
<td>450</td>
<td>200+150</td>
</tr>
</tbody>
</table>

**JJI-Joist Flange Type**

<table>
<thead>
<tr>
<th>Backer block/web/stiffner thickness (mm)</th>
<th>Filler block thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>19</td>
</tr>
<tr>
<td>B+</td>
<td>27</td>
</tr>
<tr>
<td>C</td>
<td>32</td>
</tr>
<tr>
<td>D</td>
<td>44</td>
</tr>
</tbody>
</table>

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**

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

All filler 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.

<table>
<thead>
<tr>
<th>Flange Spec</th>
<th>Backer Block</th>
<th>Filler Block</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>B+</td>
<td>65</td>
<td>90</td>
</tr>
<tr>
<td>C</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>D</td>
<td>90</td>
<td>90</td>
</tr>
</tbody>
</table>

Minimum nail diameter 3.1mm

**F22 | WEB STIFFENER**

- 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

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

Minimum nail diameter 3.1mm

**F23 | COMPRESSION BLOCK**

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

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

- Minimum 3 no. 35 x 72mm compression blocks cut 2mm taller than JJI-Joist

Alternatively use Glulam/LVL blocking pieces.

**F24 | CANTILEVER**

Cantilever closer required.

Back span of cantilever must be at least 3 times the cantilever length.

1.2m maximum cantilever length.

Any type of load bearing support.

**F25 | STAIR STRINGER CONNECTION**

Backer block fixed as detail F21

Stair trimmer (possibly 1 ply or engineered timber)

Stringer fixed to trimmer as building designer’s detail

Filler block fixed as detail F19

**F26 | JJI-JOIST SUPPORTED ON STEEL/CORBEL WALL**

JJI-Joist blocking required for lateral stability.

Timber wall plate

Steel angle bracket or masonry corbel
F27 | LOAD BEARING WALL PARALLEL TO JJI-JOIST RUN

- Load bearing or shear wall parallel to joist span
- Fix sole plate of wall to joist at centres specified by building designer
- Add JJI-Joist or Glulam/LVL parallel with joist run under load bearing wall

F28 | NEWEL POST TO JJI-JOIST TRIMMER

- Backer block fixed to loaded side of principal JJI-Joist. Refer to detail F21
- Filler block fixed as detail F19
- Cut and recess newel to fit over trimmer to staircase manufacturer’s details

F29 | JJI-JOIST TO STEEL BEAM FACE FIXING

- Beam top level
- Continuous timber packing fixed to building designer’s detail
- Beam soffit level
- Ensure the minimum 4 no. nails fixed through hanger into incoming joist
- Approved face fixed hangers fixed through all nail holes
- Refer to approved metalwork supplier’s literature for further information

F30 | JJI-JOIST TO STEEL BEAM/MASONRY

- 675mm of cured masonry before hanger loaded, see approved connector manufacturer’s H&S guidelines
- Brick course may be required where steel is shallower than incoming joist
- Approved masonry hanger built into bed joint
- Do not fix joist 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

F31 | JJI-JOIST TO STEEL BEAM TOP FIXING

- Timber packing piece fitted 3mm proud of inside face of steel flange
- Approved top fix hanger secured through specified nail holes
- Timber packing fixed to building designer’s detail
- Bottom of flange must rest against bottom flange of steel beam
- Do not fix joist to steel lintels unless approved by lintel manufacturer
- Refer to approved metalwork supplier’s literature for further information

F32 | JJI-JOIST BEARING ON PARTY WALL

- Minimum thickness of Glulam/LVL rimboard to be dictated by fire requirements
- Dimension X not to exceed half the member width
- Timber/Plywood/Rockwool void fillers
- Refer to F detail notes - timber frame (see page 30)
1. See Tables 3, 7 and 12 for vertical load capacities
2. Rimboard thickness to timber frame kit manufacturer’s Consulting Engineer’s specification/approval
3. Rimboard fixed to bearing with 3.35 x 65mm nails at 150mm c/c
4. Secure rimboard to JJI-Joist with 2 no 3.35 x 65mm ring shank nails, one each to top and bottom flanges
5. Fix JJI-Joist to bearing with 2 no. 3.35 x 65mm 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
F39 | ENHANCED HANGER 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 manufacturer’s literature for further information)

Approved face or top fix hanger secured through specified nail holes

F40 | CONTINUOUS FILLER BLOCKS
- = nails from rear face
- = nails from front face

300 300
300 300

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 JJI-JOIST TO JJI-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 JJI-JOISTS
Refer to approved metalwork supplier’s technical literature for specification and installation guidelines

F43 | FIXING DOUBLE JJI-JOISTS
Refer to approved metalwork supplier’s technical literature for specification and installation guidelines

F45 | MASONRY RESTRAINT HANGER DETAIL 1
Nogging/dwang (min 38 x 45mm) securely fixed with 3.35 x 65mm skew nailing or approved clip

Refer to approved metalwork supplier’s technical literature for specification and installation guidelines

FOR F44 SEE PAGE 22

RESTRAINT STRAPS ARE THE RESPONSIBILITY OF THE BUILDING DESIGNER
**F46**  MASONRY RESTRAINT HANGER DETAIL 2

Nogging/dwang (min 38 x 45mm) securely fixed with 3.35 x 65mm skew nailing or approved clip

Refer to Simpson Strong-Tie's technical literature for specification and installation guidelines

**F47**  SST END CAP AIRTIGHTNESS DETAIL

Nogging/dwang (min 38 x 45mm) securely fixed with 3.35 x 65mm skew nailing or approved clip

Refer to Simpson Strong-Tie's technical literature for specification and installation guidelines

**F48**  ITW GRIPPER AIRTIGHTNESS DETAIL

Nogging/dwang (min 38 x 45mm) securely fixed with 3.35 x 65mm skew nailing or approved clip

Refer to ITW's technical literature for specification and installation guidelines

**F49**  JJI-JOIST BEARING ON EXTERNAL WALL LOW LOAD

18mm external grade structural plywood  
JJI-Joist, Glulam/LVL blocking offcuts

Web of blocking material must be fully supported

Alternatively use Glulam/LVL blocking in lieu of JJI-Joists  
JJI-Joist blocking offcuts can be of any joist width

**F50**  JJI-JOIST PARALLEL TO EXTERNAL WALL LOW LOAD

18mm external grade structural plywood  
JJI-Joist, Glulam/LVL blocking offcuts

Web of blocking material must be fully supported

**F51**  JJI-JOIST PARALLEL DETAIL – SPROCKETS

Glulam/LVL or other engineered timber  
JJI-Joist blocking sprockets

Refer to F detail notes - timber frame (see page 30)

**RESTRAINT STRAPS ARE THE RESPONSIBILITY OF THE BUILDING DESIGNER**
Section 5

Roof design

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 direct 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. EN 1991-1-3 and EN 1991-1-4 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 11).
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/firring 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 L/250 as defined in the UK national annex to ECS 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.
Cold roof vs warm roof design

A traditional cold roof design positions the insulation layer between or below the JJI-Joist rafters. This places parts of the roof structure above the insulation in a cold environment, with the potential for condensation when warm air permeates through. Adequate roof space ventilation must be provided to remove this air.

A warm roof is a modern alternative to a cold roof. A warm roof design places the insulating layer above the JJI-Joist rafters, or above and between the JJI-Joist rafters. A warm roof designs will make the entire structure of the building warm in order to avoid cold bridging (an element of the building that allows heat or energy loss).

**COLD ROOF**

1. Deck/roof covering
2. Insulation
3. JJI-Joist rafter
4. Ceiling lining

**WARM ROOF**

1. Deck/roof covering
2. Insulation
3. Vapour control layer/sub-deck
4. JJI-Joist rafter
5. Ceiling lining
JJI-Joist flat rafters

The following span table is for JJI-Joists in flat rafter applications, joists designed using the principles of Eurocode 5 limit state design code (BS EN1995-1-1). Alternative span tables, including those to BSS2662-2 can be found on our website.

<table>
<thead>
<tr>
<th>Joist Type</th>
<th>Dead Load up to 0.5kN/m²</th>
<th>Dead Load up to 0.75kN/m²</th>
<th>Dead Load up to 1kN/m²</th>
<th>Dead Load up to 1.5kN/m²</th>
</tr>
</thead>
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<tr>
<td></td>
<td>Joists Centres (mm)</td>
<td>Joists Centres (mm)</td>
<td>Joists Centres (mm)</td>
<td>Joists Centres (mm)</td>
</tr>
<tr>
<td></td>
<td>300 400 480 600</td>
<td>300 400 480 600</td>
<td>300 400 480 600</td>
<td>300 400 480 600</td>
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Table 16. Maximum engineering span for JJI-Joist flat rafters

Notes for Table 16:
1. This table serves as guidance only. For a more detailed JJI-Joist appraisal contact a JJI-Joist Distributor. The calculated spans are engineering spans in mm.
2. This table has been calculated for cold flat roof (Service Class 2), category H (access only for maintenance).
3. Load combinations equations 6.10aSTR 6.10bSTR (EN1990) have been used in this table.
4. Loads include imposed loads q=0.6kN/m², Q=0.9kN and snow load 0.75kN/m². No wind allowance has been considered in this table.
5. The calculated spans are engineering spans for simply supported joists.
6. It has been assumed that adequate lateral restraint is provided to top and bottom flanges.
7. It is assumed that load can be shared between floor joists (Kmom=1.1).
8. Joists design values have been calculated using Kmod factors from table 3.1 (EN1995) and γM,timber=1.3, γM,wind=1.2
9. Final deflection limit has been taken as L/250. No additional instantaneous deflection limit has been applied
10. There is no allowance for overhangs within this table.
11. To achieve stated span, adequate bearing will be required. Web stiffeners may be necessary.
12. Permissible web holes to be drilled in accordance to Joistmaster software.

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**Span tables-pitched roof**

**JJI-Joist pitched rafters**

The following span table is for JJI-Joists in pitched rafter applications, joists designed using the principles of Eurocode 5 limit state design code (BS EN1995-1-1). Alternative span tables, including those to BS5268-2 can be found on our website.

**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 JJI-Joist 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.

<table>
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<tr>
<th>Joist Type</th>
<th>Dead Load up to 0.5kN/m²</th>
<th>Dead Load up to 1kN/m²</th>
<th>Dead Load up to 0.5kN/m²</th>
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</table>

Table 17. Maximum engineering span for JJI-Joist rafters (400 and 600 centres)

Notes for Table 17:

1. This table serves as guidance only. For a more detailed JJI-Joist appraisal contact a JJI-Joist Distributor. The calculated spans are engineering spans in mm.
2. This table has been calculated for cold pitched roof (Service Class 2), category H (access only for maintenance).
3. Load combinations equations 6.10aSTR, 6.10bSTR (EN1990) have been used in this table.
4. Loads for roof with 15º and 30º pitch include imposed loads q=0.6kN/m², Q=0.9kN and snow load 0.75kN/m².
5. Loads for roof with 45º pitch include imposed loads q=0.3kN/m², Q=0.6kN and snow load 0.75kN/m².
6. No wind allowance has been considered in this table.
7. The calculated spans are engineering spans measured on plan for simply supported joists.
8. It has been assumed that adequate lateral restraint is provided to top and bottom flanges.
9. It is assumed that load can be shared between floor joists (K=1.1).
10. Joists design values have been calculated using Kmod values from table 3.1 (EN1995) and γM,osb=1.3,γM,timber=1.2
11. Final deflection limit has been taken as L/250. No additional instantaneous deflection limit has been applied.
12. There is no allowance for overhangs within this table.
13. To achieve stated span, adequate bearing will be required. Web stiffeners may be necessary.
14. Permissible web holes to be drilled in accordance to Joistmaster software.
15. Figures followed by L denote engineering spans limited by maximum manufactured length of 12m.
Example of JJI-Joist roof system

**R1 | JJI-JOIST BEARING LENGTHS**

Minimum end bearing  
Minimum intermediate bearing

45mm*  
89mm*

*Minimum bearing required by JOIST DESIGN. Consult building/roof designer for building stability requirements

**R2 | BIRDSMOUTH CUT**

Permitted at low end of JJI-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°**

Maximum overhang to be 1/3 of adjacent span. If overhang to be modified use detail R5

R4 | **ADJUSTABLE SEAT CONNECTOR FOR PITCHES 15°–45°**

Maximum overhang to be 1/3 of adjacent span. If overhang to be modified use detail R5

R5 | **LOOSE TIMBER OVERHANGS**

Solid timber overhang for soffit supports

Filler

Bevelled solid timber block

Bevelled web stiffeners on both sides if joist birdsmouthed over wallplate

R6 | **DOWNSTAND RIDGE BEAM**

Double bevelled support plate

Restraint strap (ITW or Simpson Strong-Tie)

JJI-Joist/Glulam/LVL ridge beam or support wall/steel beam

JJI-Joist/Glulam/LVL blocking panels

(For ventilation guidance, see R10)

R7 | **FLUSH RIDGE BEAM**

RestRAINT strap

Approved sloped hanger

Glulam/LVL ridge beam

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

R8 | **OPENING IN ROOF**

Filler block fixed in accordance with F15 and F21

Backer block fixed in accordance with F15 and F21

Full depth face fix hanger (see detail F14 and F21)
R9 | GABLE LADDER

Double joist may be required when L exceeds JJI-Joist spacing (S)
Outrigger notched and nailed around JJI-Joist flange, spacing not to exceed 600mm

Gable wall panel

Maximum overhang same as rafter spacing

Solid timber blocking pieces to suit or blockwork built up

R10 | BLOCKING AND VENTILATION HOLES

Maximum permissible ventilation hole in JJI-Joist blocking

Maximum permissible ventilation V-cut for Glulam/LVL blocking

Braced by Simpson HSA or ITW TJS straps

Maximum permissible hole zone for round, square or rectangular holes

Vertical Glulam/LVL blocking panels may be site trimmed to match JJI-Joist depth at outer edge of wall or positioned on wall to match JJI-Joist depth

R11 | FLUSH PURLIN BEAM

Restraint strap

Glulam/LVL purlin or equivalent

Framing anchor

Twisted restraint strap

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

Roof connectors to be determined by roof designer

R12 | JJI-JOIST RAFTER FIXING TO WALL PLATE

Full depth face fix hanger (see detail F18)

Approved angle bracket connector fixed to both sides of joist

R13 | JJI-JOIST RAFTER TERMINATING ON DOWNSTAND RIDGE BEAM

Double bevelled support plate

Fixing of rafter to support plate to building designer's specification

JJI-Joist/ Glulam/LVL ridge beam or support wall

R14 | JJI-JOIST RAFTER TERMINATING ON DOWNSTAND STEEL BEAM

Bevelled bearing timber attached to to of steel as per building designer’s specification

Approved restraint strap

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

One strap required on each side of the rafter bottom flange

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Section 6

Wall design

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. The lightweight nature of JJI-Joists permits the construction of larger panels than might otherwise be possible reducing the number of site lifts required.

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.

For further information on thermal performance of JJI-Joists structures please contact James Jones & Sons.
W1 | GROUND FLOOR TO WALL JUNCTION

- JJI-Joist stud
- Holding down strap
- Bottom rail
- Soleplate
- DPC

W2 | INTERMEDIATE FLOOR TO WALL JUNCTION

- JJI-Joist
- Rim board
- Additional bracing may be required
- JJI-Joist stud
- Bottom rail

W3 | EXTERNAL WALL CORNER JUNCTION

- Interior face
- JJI-Joist stud
- Exterior face

W4 | EXTERNAL WALL, INVERTED CORNER

- JJI-Joist stud
- Interior face
- Exterior face

W5 | STRUCTURAL OPENING

- JJI-Joist lintel
- Backer blocks or lining boards
- Cripple stud
- JJI-Joist stud
- Insulation omitted for clarity
- Glulam/LVL/EWP bottom rail

W6 | INTERNAL TO EXTERNAL WALL JUNCTION

- Exterior face
- Interior face
- Traditional timber frame stud wall
- Internal wall
James Jones & Sons Ltd is one of the UK’s largest and most progressive timber companies with core activities in sawmilling, JJI-Joist and pallet manufacture. We operate five sawmills in Scotland; an engineered wood manufacturing plant in the north of Scotland and have pallet and packaging operations at twelve sites across the UK. We produce high quality, British grown sawn timber for the construction, pallet, packaging, fencing and agricultural sectors and pallets and packaging for blue chip domestic and exporting businesses. In addition, we are the market leaders in the supply of JJI-Joists to many of the UK’s top house builders.
Our Timber Systems Division is the UK’s largest manufacturer of FSC® certified I-Joists, branded as JJI-Joists.

Certification/Approvals:
JJI-Joists are an accepted building material within the European construction industry due to third party accreditation and certification.