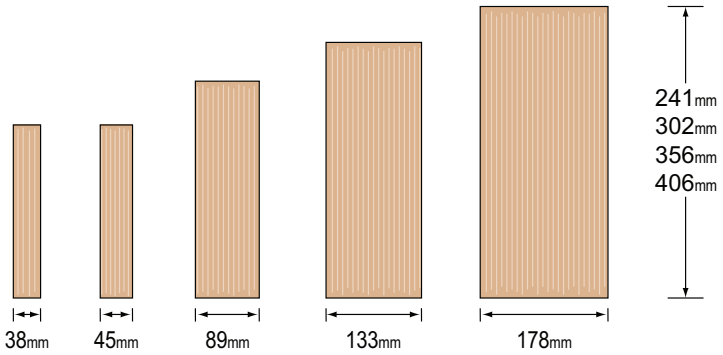
VERSA-LAM®

An Introduction to VERSA-LAM® Products

VERSA-LAM® is one of the strongest and stiffest engineered wood products approved in the UK.



VERSA-LAM® products are excellent as floor and roof framing supports or as lintels for doors, windows and garage doors and columns.

Manufactured with no camber, VERSA-LAM® LVL products provide flatter, quieter floors, and consequently, the builder can expect happier customers with significantly fewer call backs.

VERSA-LAM® Beam Specifications

Materials and Manufacture:

VERSA-LAM® SP LVL comprises laminated Southern Yellow Pine veneers, whilst VERSA-LAM® DF LVL comprises Douglas-Fir veneers. The veneers are bonded together with waterproof structural adhesives with the grain running parallel. Each veneer is 2550m long, being lap jointed internally and scarf jointed on the face plies. The joints are staggered by at least 125mm.

Quality Assurance:

VERSA-LAM® is approved for use in the UK by the British Board of Agrément and is manufactured under a factory production control system audited on a monthly basis by a third-party inspection agency.

Sizes:

Whilst VERSA-LAM® can be manufactured and supplied in billets up to 1.2mx1.2mx20m long, it is typically available in thicknesses of 38, 45, 89, 133 and 178mm, and in depths ranging from 89mm to 508mm.

Tolerances:

Tolerances in finished dimensions are:

Thickness	±1.6mm
Width	±3.2mm
Length	±3.2mm

Moisture Content:

VERSA-LAM® will arrive on-site with a moisture content of 8% to 10%. In a Service Class 1 environment (as defined in BS5268-2:2002), it will attain an equilibrium moisture content of 10%, whilst in a Service Class 2 environment, it will reach a final equilibrium moisture content of 12% to 14%. In similar environments, solid timber will reach an equilibrium moisture content of 12% and 18%, respectively, having typically been delivered to site at approximately 18% to 24% moisture content.

Treatment:

VERSA-LAM® is an untreated product with a natural durability sufficient to ensure a minimum design life of 60 years when installed in a Service Class 1 or 2 environment and not subject to mechanical damage or insect attack. Preservative treatment should not be undertaken without consulting Boise Engineered Wood Products Engineering, as this may affect the structural integrity of the product.

BBA BRITISH BOARD OF AGRÉMENT
ASSESSMENT OF PRODUCTS FOR CONSTRUCTION

VERSA-LAM® is approved for use under the UK Building Regulations by British Board of Agrément BBA Certificate No. 99/3619.

BBA certification is recognised by:

N.H.B.C.	Zurich Municipal
UKTFA	TRA
Building Contractors	Building Control Officers

VERSA-LAM® Design Properties

VERSA-LAM® is intended for use as structural members such as beams, ties, struts or structural framing (including use in components such as trusses and panels), in Service Class 1 or 2 environments as defined in BS5268-2:2002.

The following design modification factors given in BS5268-2:2002 which can be used for VERSA-LAM® are:

k_3, k_4, k_5, k_7, k_{12}, and k_{13}.

The design modification factor k_8 for load-sharing may also be used, but with a reduced value of 1.04.

For the design of tension members, design stresses should be modified by a length modification factor k_L as follows:

$$k_L = \left(\frac{2440}{L}\right)^{0.125}$$

Where L = Member length (in mm) with a minimum value = 2440mm.

Property	Value (N/mm²)	
	Service Class 1	Service Class 2
Bending parallel to grain:		
as a joist	19.0	17.1
as a plank	19.0	17.0
Tension parallel to grain	15.0	13.5
Compression parallel to grain	19.5	17.5
Compression perpendicular to grain:		
as a joist	4.4	4.0
as a plank	2.9	2.6
Sheer parallel to grain:		
as a joist	2.0	1.8
as a plank	1.3	1.2
Modulus of elasticity parallel to grain:		
mean	14,000	13,000
minimum	14,000	13,000
Modulus of elasticity perpendicular to grain	700	650
Modulus rigidity	875	812
Density @ 10% mc	630 kg/m³	630 kg/m³
@ 15% mc	690 kg/m³	690 kg/m³

Holes and Notches in VERSA-LAM® and VERSA-LAM® Rim

Holes and notches in VERSA-LAM® and VERSA-LAM® Rim should be formed in accordance with the guidelines given for solid timber members in The Building Regulations Approved Document, *"Timber Intermediate Floors for Dwellings,"* as shown below. The diagrams below are intended for use with VERSA-LAM® members that support mainly uniform load. Where the load is not uniform or large isolated point loads exist, contact Boise Engineered Wood Products Engineering for guidance.

Holes/notches that can be formed in VERSA-LAM® without recourse to structural calculation

For members that are predominantly uniformly loaded (i.e. by a series of point loads of essentially equal magnitude and spacing), the holes or notches shown in figures 1a-1c can be formed without recourse to structural calculation.

Figure 1a - Elevation on member - Notches on top edge

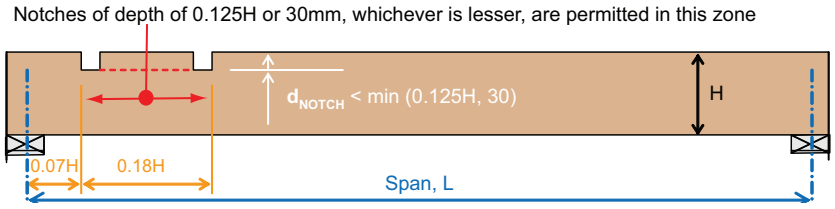


Figure 1b - Elevation on member - Holes on centreline

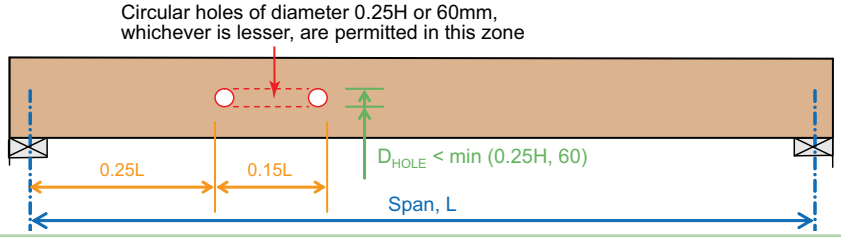
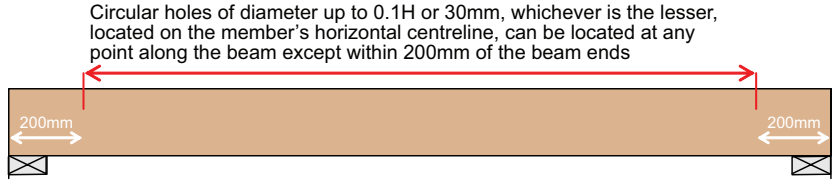


Figure 1c - Elevation on member - Small holes in centreline



Minimum spacing between holes/notches = max($3d_{NOTCH}$, $3D_{HOLE}$,100mm)

For a design method to calculate large circular holes in VERSA-LAM®, please contact Boise Engineered Wood Products Engineering on 01420 590078.

VERSA-LAM® — Products

VERSA-LAM® Products — Allowable Nail Spacing

Nailed joints in VERSA-LAM® and VERSA-LAM® Rim should be designed using the permissible nail values given in BS 5268-2: 2002 for C27 timber. Nails should be spaced in accordance with the following table.

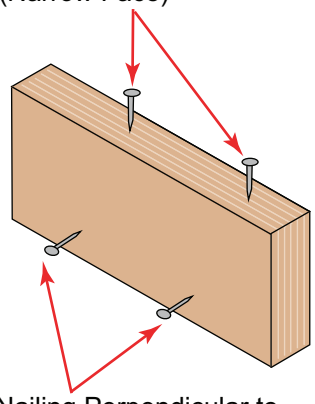
Nailing to Narrow Face (Parallel to Glue Lines)

Nail Diameter (mm)	End Distance (mm)	Edge Distance (mm)	Along Face - Parallel to Grain (mm)	Across Face - Perpendicular to Grain (mm)
3.0	60	15	60	15
3.35	67	17	67	17
3.75	75	19	75	19
4.0	80	20	80	20

Nailing to Wide Face (Perpendicular to Glue Lines)

Nail Diameter (mm)	End Distance (mm)	Edge Distance (mm)	Along Face - Parallel to Grain (mm)	Across Face - Perpendicular to Grain (mm)
3.0	48	15	48	24
3.35	54	17	54	27
3.75	60	19	60	30
4.0	64	20	64	32

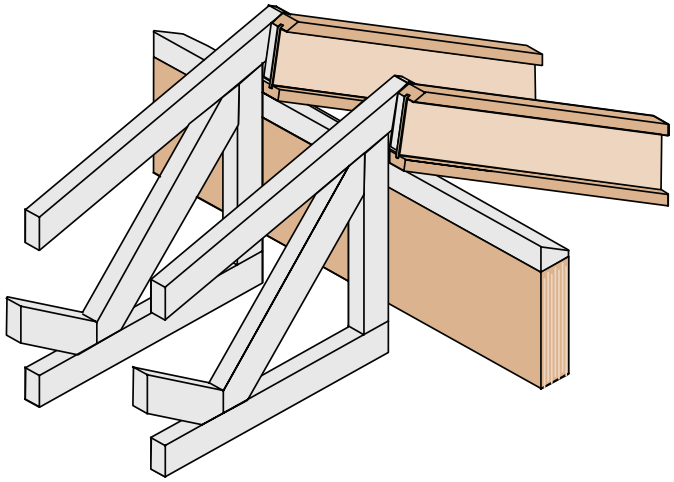
Nailing Parallel to Glue lines (Narrow Face)



Nailing Perpendicular to Glue lines (Wide Face)

VERSA-LAM® Products Used as Beams

VERSA-LAM® is ideal for use as a principal load-carrying beam in floor, roof and other timber engineering applications. Maximum allowable long-term uniformly distributed loads are tabulated on page 47 for a range of VERSA-LAM® beam sizes over a range of typical beam spans. These have been derived by application of the design principles contained in BS5268-2:2002, using the VERSA-LAM® property data contained in BBA Certificate No. 99/3619. Maximum allowable loads for other beam sizes, spans or load durations can be developed by using the same design principles, by using the BC CALC® design software or contacting Boise Engineered Wood Products Engineering directly.



BBA BRITISH BOARD OF AGRÉMENT
ASSESSMENT OF PRODUCTS FOR CONSTRUCTION

CERTIFICATE NO. 99/3619

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BBA Certification is recognized by:

NHBC
UKTFA
Building Contractors
Zurich Municipal
TRA
Building Control Officers

Allowable Loads on VERSA-LAM® Beams

Beam Span /1 (m)	Maximum Allowable Long-Term Uniformly Distributed Load (kN/m) on VERSA-LAM® Beams in Service Class 1 Conditions /2, /3															
	241mm depth /6				302mm depth /6				356mm depth /6				406mm depth /6			
	45 mm	89 mm	133 mm	178 mm	45 mm	89 mm	133 mm	178 mm	45 mm	89 mm	133 mm	178 mm	45 mm	89 mm	133 mm	178 mm
3	5.64	11.29	16.87	22.59	11.11	22.22	33.21	44.45	15.34	30.69	45.86	61.38	19.40	38.80	57.99	77.61
3.5	3.55	7.11	10.62	14.22	6.99	13.99	20.91	27.99	11.27	22.54	33.69	45.09	14.25	28.51	42.60	57.02
4	2.38	4.76	7.12	9.53	4.68	9.37	14.01	18.75	7.68	15.35	22.95	30.71	10.91	21.82	32.62	43.65
4.5	1.67	3.34	5.00	6.69	3.29	6.58	9.84	13.17	5.39	10.78	16.12	21.57	8.00	16.00	23.91	32.00
5	1.22	2.44	3.64	4.87	2.40	4.80	7.17	9.60	3.93	7.86	11.75	15.72	5.83	11.66	17.43	23.32
5.5	0.91	1.83	2.73	3.66	1.80	3.60	5.39	7.21	2.95	5.90	8.82	11.81	4.38	8.76	13.09	17.52
6	0.70	1.41	2.11	2.82	1.38	2.77	4.15	5.55	2.27	4.55	6.80	9.10	3.37	6.75	10.08	13.50
6.5	0.55	1.11	1.65	2.22	1.09	2.18	3.26	4.37	1.79	3.57	5.34	7.15	2.65	5.30	7.93	10.61
7	0.44	0.88	1.32	1.77	0.87	1.75	2.61	3.49	1.43	2.86	4.28	5.73	2.12	4.25	6.35	8.50
7.5	0.36	0.72	1.08	1.44	0.71	1.42	2.12	2.84	1.16	2.33	3.48	4.66	1.72	3.45	5.16	6.91
8	0.29	0.59	0.89	1.19	0.58	1.17	1.75	2.34	0.96	1.92	2.86	3.84	1.42	2.84	4.25	5.69
8.5	0.24	0.49	0.74	0.99	0.48	0.97	1.46	1.95	0.80	1.60	2.39	3.20	1.18	2.37	3.54	4.74

Notes :

/1 Beam spans quoted are 'engineering spans' measured between centres of bearing points.

/2 Maximum loads tabulated are for long-term loading conditions including an allowance for the beam self weight.

/3 Tabulated loads are based on a deflection limit of 0.3% of the beam span. The designer should consider the need for improved deflection criteria for principal members, or for aesthetics.

/4 VERSA-LAM® beams require effective lateral restraint to the compression edge of 600 mm maximum spacing. VERSA-LAM® beams require effective lateral restraint at all supports.

/5 For allowable loads on VERSA-LAM® beams for use in Service Class 2 conditions, contact Boise Engineered Wood Products Engineering.

/6 The depths shown are for indicative purposes only. Other depths between 89-508mm are available. Consult Boise Engineered Wood Products Engineering for maximum loads available for other depths.

/7 Thicknesses other than those shown may be available by special order.

VERSA-LAM® Beams Used as Columns

The same properties that make VERSA-LAM® perfect for beam applications also make them ideal for columns. In VERSA-LAM® columns, you will find none of the deep checks, cracks or twists that can plague solid timber columns.

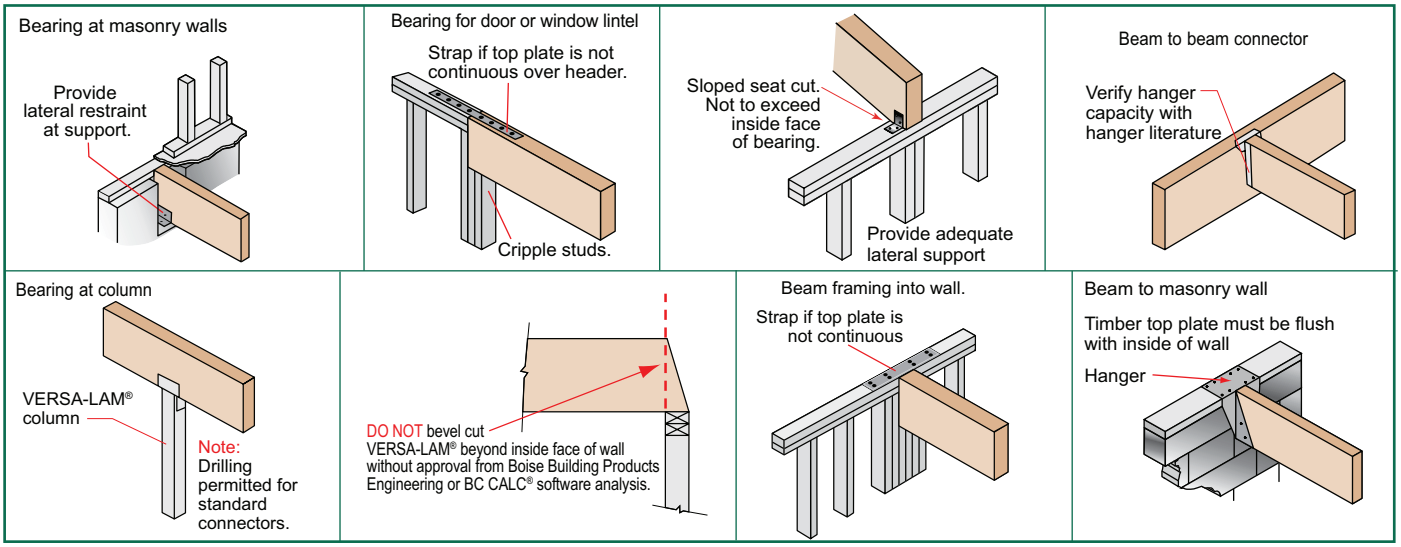
VERSA-LAM® Column Table

Length	Allowable Axial Load (kN) Long-Term Load Duration					
(m)	89 x 89	89 x 133	89 x 178	133 x 133	133 x 178	178 x 178
1.2	93.68					
1.5	79.95	119.48				
1.8	67.60	101.02	135.20			
2.1	57.00	85.18	114.00	187.96		
2.4	48.19	72.02	96.39	168.39	225.36	
2.7	40.99	61.25	81.98	150.38	201.26	
3.0	35.12	52.49	70.25	134.16	179.55	
3.3	30.34	45.34	60.68	119.75	160.27	
3.6	26.42	39.48	52.84	107.09	143.32	
3.9	23.18	34.64	46.36	96.03	128.52	
4.2	20.48	30.61	40.96	86.39	115.62	228.01
4.5	18.21	27.22	36.43	77.99	104.38	209.53
4.8		24.35	32.59	70.67	94.58	192.77
5.1			29.32	64.26	86.00	177.62
5.4				58.64	78.48	163.95
5.7				53.69	71.86	151.62
6.0				49.32	66.01	140.49
6.3				45.45	60.83	130.45
6.6				42.00	56.21	121.36
6.9					52.09	113.14
7.2						105.67

Notes:

- Table assumes that the column is braced at column ends only.
- Effective column length is equal to actual column length.
- Allowable loads are based on solid, one piece column members used in Service Class 1 conditions.
- Allowable loads relate to axially loaded columns only (no bending) and are based on the provisions given in BS5268-2:2002. The modification factor K_{12} has been calculated using an eccentricity factor of 0.01 of the slenderness ratio, as used in the equation in Annex B of BS5268-2:2002.

VERSA-LAM® Common Framing Details



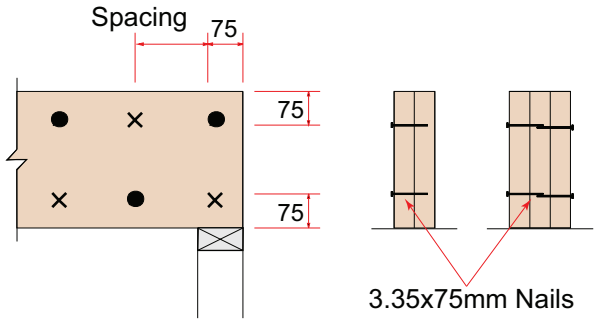
VERSA-LAM® Installation Notes

- Adequate bearing shall be provided.
- VERSA-LAM® beams are intended for use in service class 1 and 2 environments and should be kept as dry as possible during construction.
- Continuous lateral restraint required to compression edge, see note 4 on page 47.

Multiple Member Connectors

VERSA-LAM® Ply Thickness (mm)	No. of Plies	Finished Thickness (mm)	Maximum Long Term Uniform Load (kN/m)							
			3.35mm x 75mm Nails				Simpson Strong-Tie SDS Screw			
			150 c/c	300 c/c	450 c/c	600 c/c	150 c/c	300 c/c	450 c/c	600 c/c
38	2	76mm	12.32	6.16	4.11	3.08	17.13	8.56	5.71	4.28
	3	114mm	4.62	2.31	1.54	1.15	6.42	3.21	2.14	1.60
45	2	90mm	11.66	5.83	3.88	2.91	17.56	8.78	5.85	4.39
	3	135mm	4.37	2.18	1.45	1.09	6.58	3.29	2.19	1.64

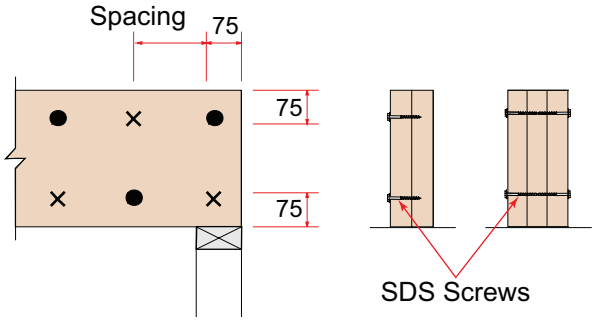
VERSA-LAM® Nailing Details



● Denotes nails from near face

× Denotes nails from far face
(2 Ply VERSA-LAM® Nail from 1 side only)

Simpson Strong-Tie SDS Screw Detail

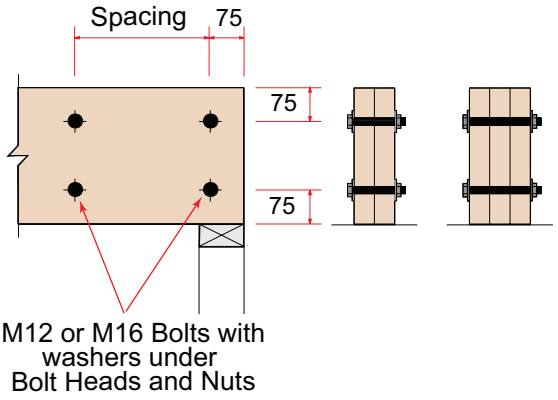


● Denotes screws from near face

× Denotes screws from far face
(2 Ply VERSA-LAM® Screw from 1 side only)

VERSA-LAM® Ply Thickness (mm)	No. of Plies	Finished Thick-ness (mm)	Maximum Long Term Uniform Load (kN/m)					
			M12 Bolts			M16 Bolts		
			300 c/c	450 c/c	600 c/c	300 c/c	450 c/c	600 c/c
38	2	76	25.74	17.16	12.87	31.53	21.02	15.76
	3	114	19.31	12.87	9.65	23.64	15.76	11.82
45	2	90	29.81	19.87	14.90	36.51	24.34	18.25
	3	135	22.35	14.90	11.17	27.38	18.25	13.69
89	2	178	48.63	32.42	24.32	69.82	46.55	34.91
	3	267	36.47	24.31	18.23	52.37	34.91	26.18
133	2	266	48.63	32.42	24.31	82.85	55.23	41.42

VERSA-LAM® Bolting Details



Notes :

1 - The tabulated maximum loads are calculated using the permissible nail and bolt values given in BS 5268-2: 2002 for C27 grade timber, assuming the loading is applied on one side of the beam (via hangers).

2 - The tabulated maximum long-term loads for nail fixings can be multiplied by load Duration Factor k_{48} (1.12 for medium-term loading and 1.25 for short-term loading).

3 - Required washer size for M12 and M16 bolts are minimum 36mm diameter x 3.0mm thick and 48mm diameter x 4.0mm thick, respectively.

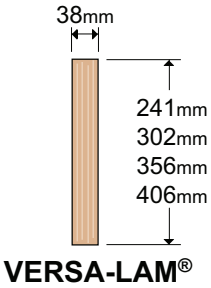
4 - The above details are suitable only for VERSA-LAM® depths of 241mm and deeper.

5 - Do not use bolts as connections where either the Moment, Bearing or Shear stress values are in excess of 85% of the permissible values.

6 - Refer to Boise Engineered Wood Products Engineering for fixing details outside those tabulated above.

VERSA-LAM® — Products

VERSA-LAM® Beams Used as Rim Material



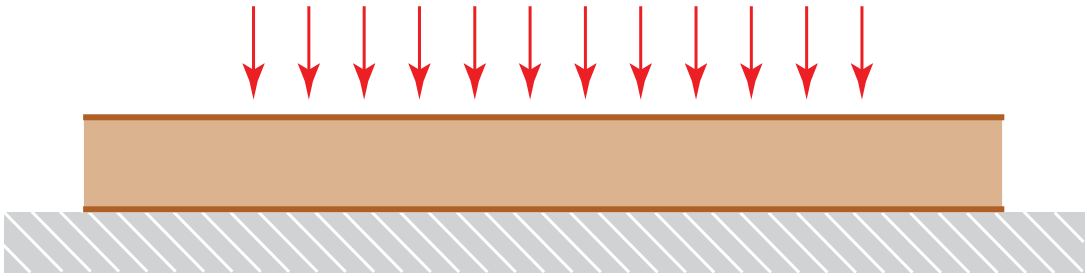
VERSA-LAM® is a laminated veneer product made from Southern Yellow Pine veneers. Based on its high compressive stresses perpendicular to grain, it makes an ideal rim joist material. This is necessary in timber frame construction to transmit vertical loads across the floor zone between external load-bearing walls. VERSA-LAM® is produced in a 38mm thickness with depths matching the BCI® Joist range and is available in 6.0m lengths. Should 38mm VERSA-LAM® not be sufficient to transmit the forces necessary, then 45mm VERSA-LAM® may also be used for the same purpose. Maximum long-term capacities for each of these products in this application are tabulated below:

VERSA-LAM® Products Used as Rim Joists / Bearers

Maximum Long-Term Load Subject to Uniform Compression Perpendicular to Grain (Service Classes 1 and 2)

Product	Maximum Load Per Metre Run (kN/m)
38mm wide VERSA-LAM® Rim	59.0
45mm wide VERSA-LAM®	68.8
89mm wide VERSA-LAM®	137.8

BCI® Joists can also be used as rim joists (see page 11).



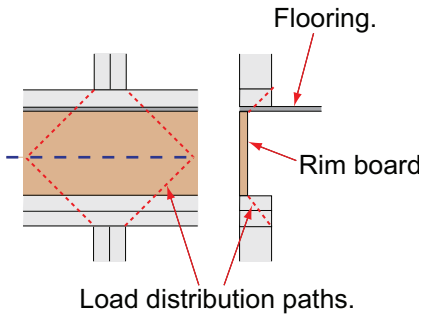
Concentrated Load Capacities of Boise Rim Products

In platform timber frame construction, point loads (e.g. from heavily loaded studs) are transferred between storeys through the floor zone on their way to the foundation. They are first imposed on the flooring layer, before being transferred through the rim material and then outwards into the timber frame panel below. The concentrated load spreads out as it passes through the rim construction, and then concentrates again as it enters the studs below.

Compression stresses induced at each interface therefore need to be checked against their maximum permissible values in each of the materials, before the limiting concentrated load capacity of the construction can be determined.

The figures on the right illustrate the load distribution path assumed in calculating the stresses induced at each material interface, and the tables below provide the maximum point load that can therefore be sustained at each interface.

It can be seen that in the majority of cases, the point load capacity of rim constructions incorporating Boise engineered wood products are dictated by the compression capacity of the flooring material to withstand such concentrated loads, rather than the rim material itself.



Flooring Thickness (mm)	38mm VERSA-LAM®											
	Cripple Stud Thickness (mm) x 89mm wide											
	38			2 x 38			3 x 38			4 x 38		
	C	F	R	C	F	R	C	F	R	C	F	R
15	**7.44**	10.94	12.04	14.88	**13.83**	15.22	22.32	**16.72**	18.39	29.76	**19.61**	21.57
18	**7.44**	11.40	12.54	14.88	**14.29**	15.72	22.32	**17.18**	18.89	29.76	**20.06**	22.07
22	**7.44**	12.01	13.21	**14.88**	14.90	16.39	22.32	**17.78**	19.56	29.76	**20.67**	22.74

Flooring Thickness (mm)	45mm VERSA-LAM®											
	Cripple Stud Thickness (mm) x 89mm wide											
	38			2 x 38			3 x 38			4 x 38		
	C	F	R	C	F	R	C	F	R	C	F	R
15	**7.44**	12.96	14.26	**14.88**	16.38	18.02	22.32	**19.80**	21.78	29.76	**23.22**	25.54
18	**7.44**	13.50	14.85	**14.88**	16.92	18.61	22.32	**20.34**	22.37	29.76	**23.76**	26.14
22	**7.44**	14.22	15.64	**14.88**	17.64	19.40	22.32	**21.06**	23.17	29.76	**24.48**	26.93

C denotes maximum capacity of C16 Timber Frame Cripple Stud / Plate.
F denotes maximum capacity of 15mm OSB and 18mm or 22mm Chipboard flooring.
R denotes maximum capacity of Rim Material.
Values in bold colour are the limiting capacities.