

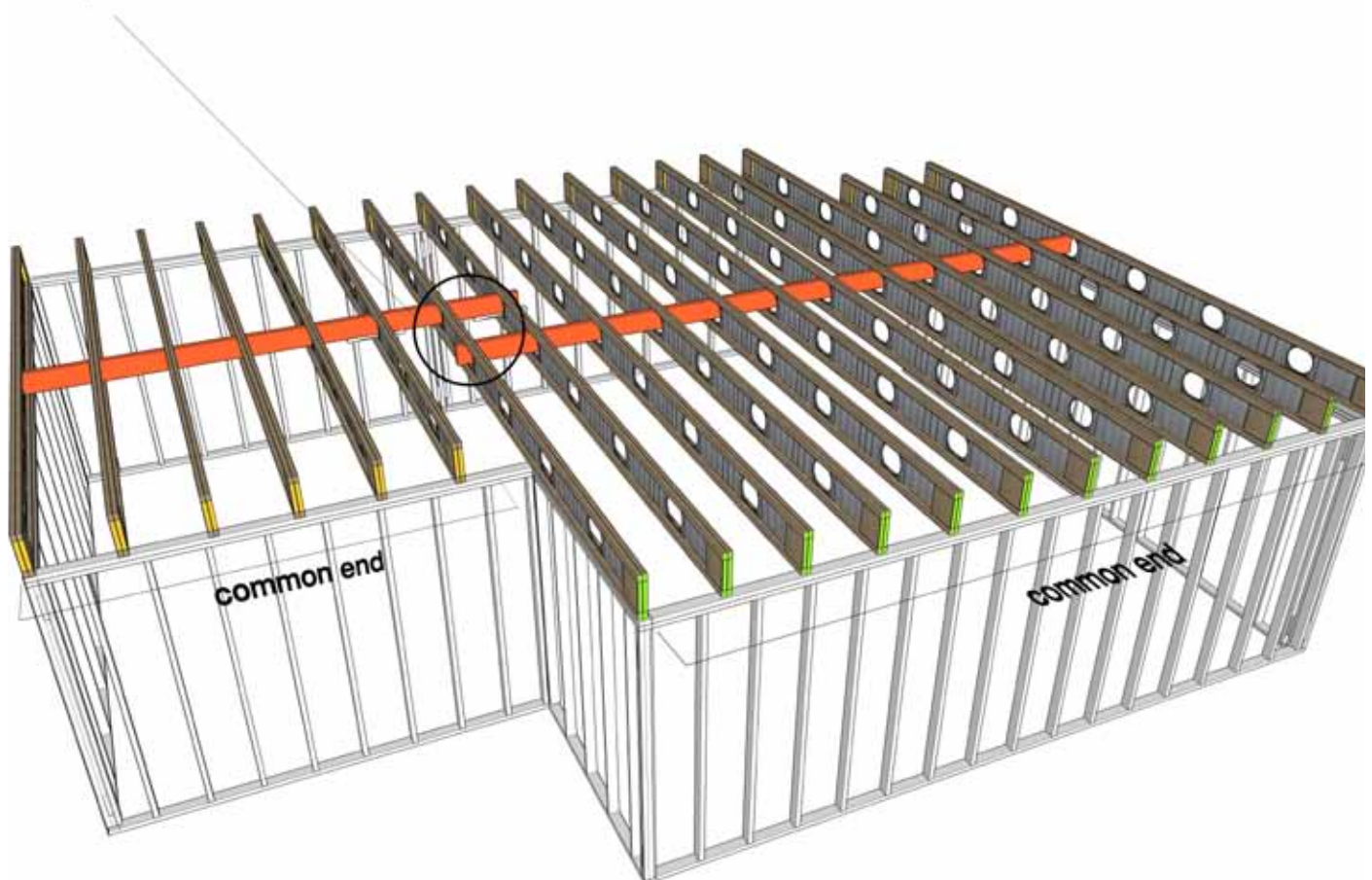
5.1. GENERAL NOTES

- Conventional framing practices can also apply to Tecbeam installations: however, to gain maximum benefit from using the Tecbeam system, builders are strongly advised to take advantage of its unique features by adopting the following guidelines.
- To meet the requirements of the Building Code of Australia (BCA), all works must comply with AS 1684.2-1999 and where applicable with TECBEAM Installation Guidelines.
- For details not covered in this manual, please refer to either: TECBEAM Australasia P/L, local TECBEAM fabricator or a registered structural engineer.

5.2. WEB HOLE ALIGNMENT - for installation of strongbacks (SB) and services

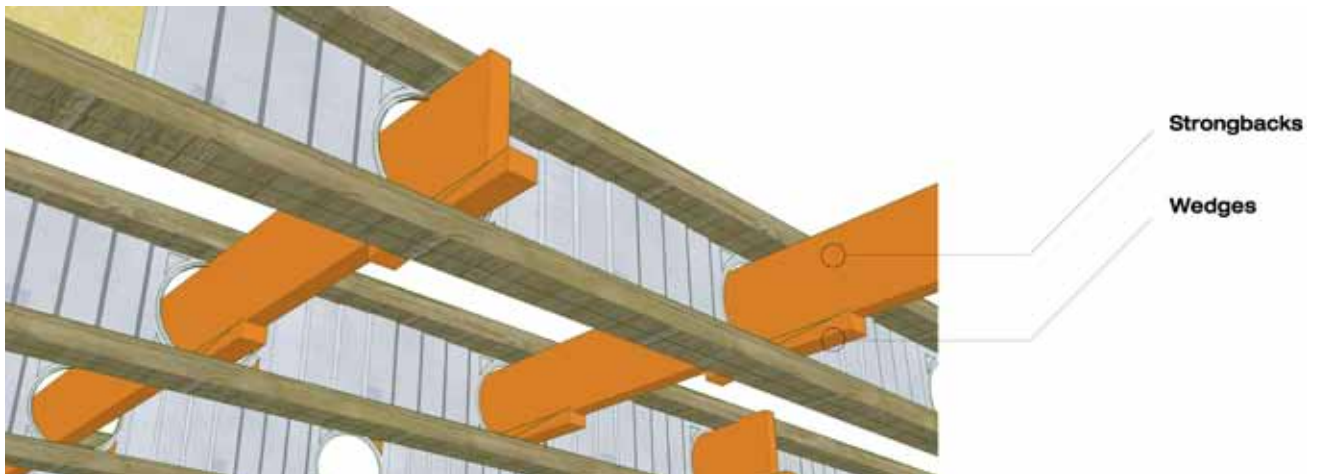
- To achieve alignment of web holes, for the installation of strongbacks and services, Tecbeam joists have been colour marked at one end, called the COMMON END. Refer to the Floor Framing Plan for set out reference lines (RL)

Strongbacks



5.3. STRONGBACKS (SB)

- Strongbacks have been proven to:
 - a) significantly reduce floor vibration
 - b) load share a concentrated load
 - c) are more effective than solid blocking
 - d) act as internal support beams



5.3.1 General

- Before Securing wedges, ensure strongbacks are below 15% Moisture Content so as to avoid squeaky floors
- Minimum MGP10 grade
- If higher comfort levels from floor vibration are required, use MGP12, F17, LVL or increase the number of strongbacks

Recommended Sizes

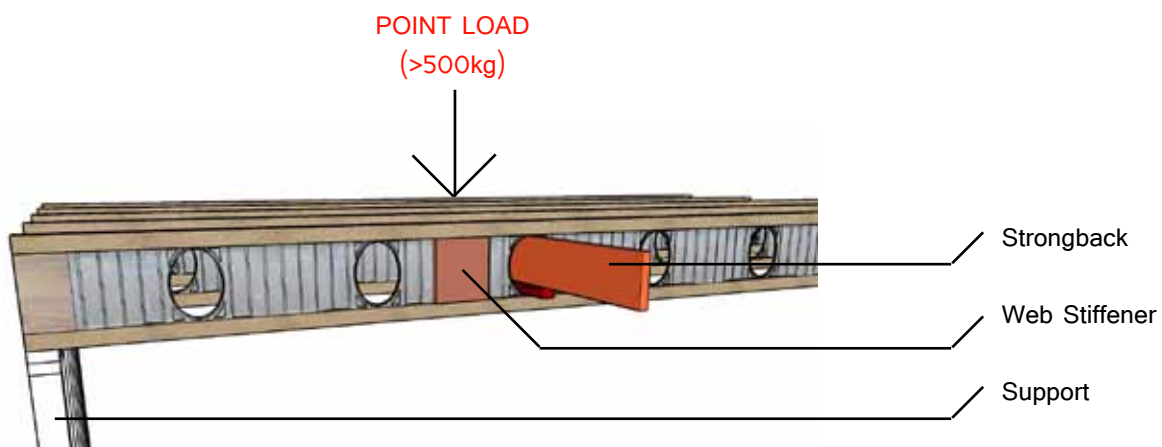
- T25 series - 140 x 45
- T30 series - 190 x 45 or 200 x 45 LVL
- T35 series - 190 x 45 or 200 x 45 LVL
- For higher loading, steel sections can be used as strongback or internal beams; refer to TECBEAM Australasia or a structural engineer

Restrictions

- For maximum efficiency, avoid cutting holes with a diameter greater than one third the depth of the strongback.
- For long joist span tables, plan the location of services and position strongbacks to avoid as much cutting as possible, so floor vibration is kept under control.

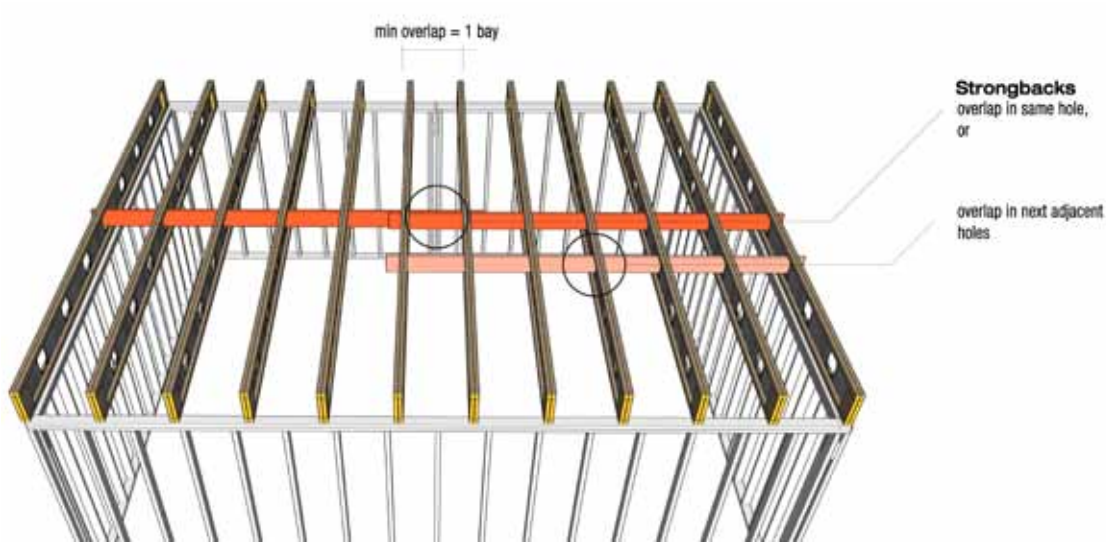
5.3.2 Installation

- Strongbacks must be secured tight with a pair of wedges at each joist; it is recommended wedges are glued and nailed. See 5.3.4 Wedges.
- Where a point load occurs, locate a strongback through the web hole closest to the point load and long enough to fix through at least two joists each side of the joist carrying the load.



5.3.2 Installation (continued)

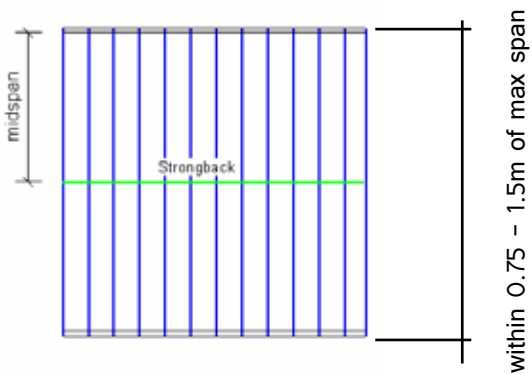
- Install strongbacks with a minimum lap of one (1) bay
- Laps in strongbacks may be installed in a) the same hole or b) the next adjacent hole
- Min. strongbacks lengths: 2100mm for 450 ctrs and 2400mm for 600 ctrs



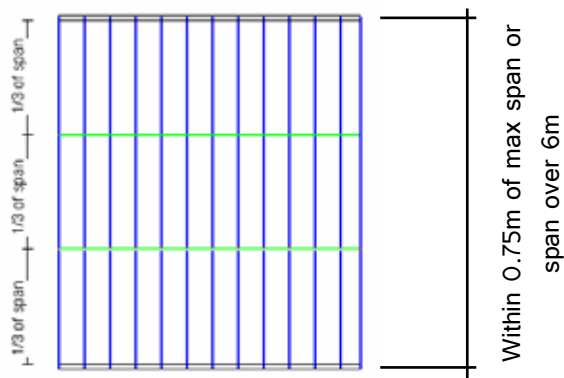
5.3.3 Specifications

For Vibration Control - Minimum recommendations

- Install one row of strongbacks mid span where the joists are within 0.75m to 1.5m of the tabulated span



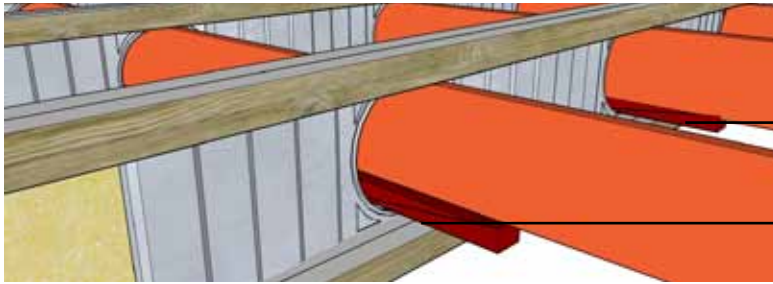
- Where the joist span is over 6m or within 0.75m of the tabulated span, install two rows of strongbacks, placed at approximately the one third points of the joist span



- For continuous spans - add a Strongback in the shorter span even if it is less than the spans indicated above.

5.3.4 Wedges

- Wedges are used to secure the strongback to each joist. Loose or poorly fitted wedges may result in the floor squeaking.
- It is recommended that wedges are installed in pairs, hammered hard against the opposing wedge then glued & nailed.
- Must be dry with a Moisture Content <15% before fixing.

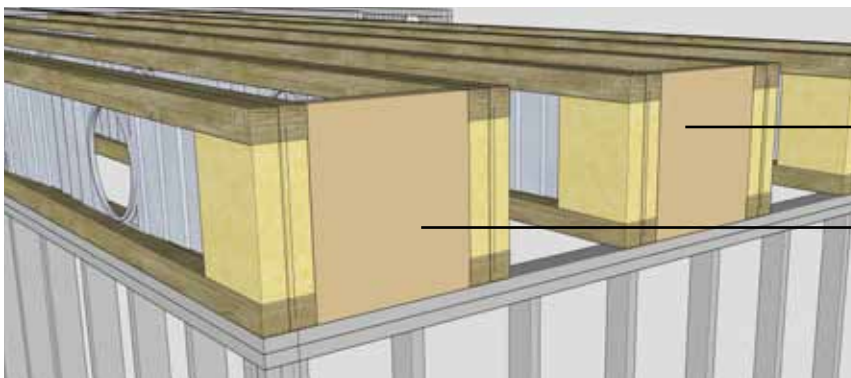


Timber Wedges glued and nailed or screw fixed, centred about the web.

(Alternative: wedges can be fixed on top of web)

5.4. BLOCKING & BRACING (in the floor plane)

- TECBEAM joists do not require intermediate blocking where there is either full floor sheeting and ceiling lining, or strongbacks (Note: Strongbacks are more effective than solid blocking).
- Install blocking in the following locations:
 - a) at cantilevers along the support line and in alternate bays at the outer end if no trimmer is indicated,
 - b) along all support lines - maximum spacing 1.8m,
 - c) in continuous spans - along intermediate supports,
 - d) under partition walls running parallel to the joists.



Blocking in alternate bays

5.5. PLYWOOD LOAD SPREADERS (or RIMBOARDS)

- Where joists are offset from loadbearing studs, Plywood Load Spreaders (or rimboards) can be used instead of extra studs, wall plate blocking or a double top plate.

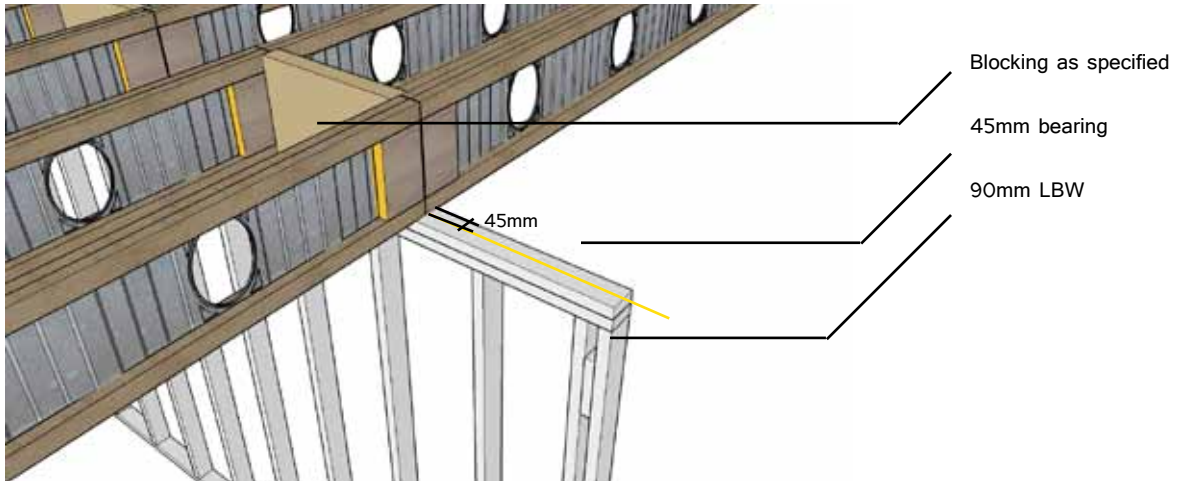


Rim Board nailed at ends of Tecbeam

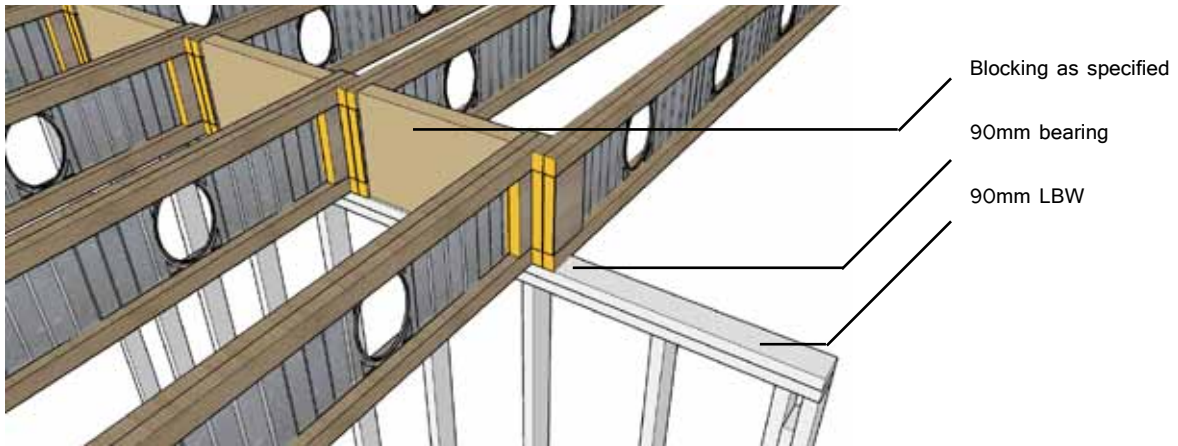
- Load spreaders should be minimum 12mm F11 construction plywood, cut to the exact joist depth and fitted tight between the wall plate and flooring
- Install joists with a 15mm setback from the outside face of the wall frame. Fix each offset joist with a minimum 8/40 x 2.8mm nails.
- Load Spreaders should span at least three studs or minimum 1350mm.
- Offset Joists carrying loads in addition to normal residential floor loads, may require extra fixings - refer to structural engineer.
- Plywood Load Spreaders also provide in-floor-plane bracing, eliminating end blocking, or cross strapping.
- When used as end bracing only, the 15mm setback is not required; fix with a minimum of four nails per joist.

5.5. BEARING SUPPORT

- Recommended minimum bearing length: 45mm



Alternately, Tecbeam joists can be staggered at internal load bearing walls for full 90mm bearing



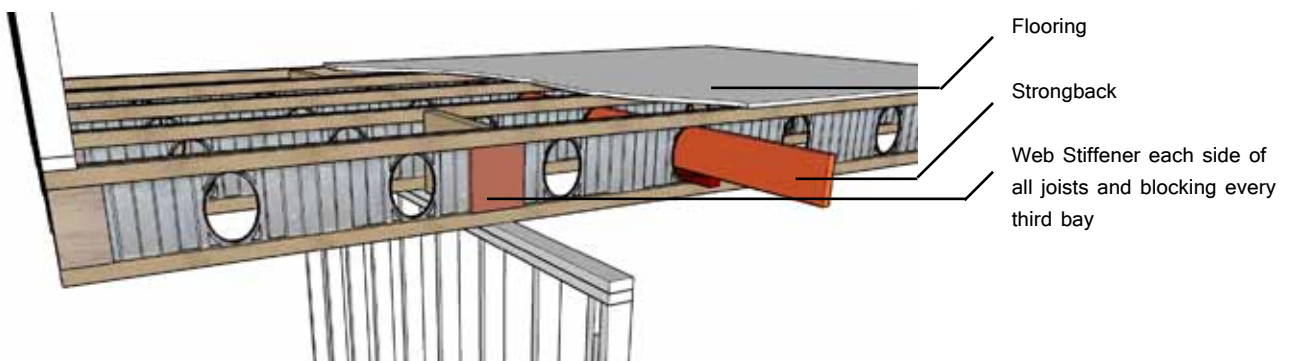
5.7. WEB STIFFENERS (or WEB BLOCKS)

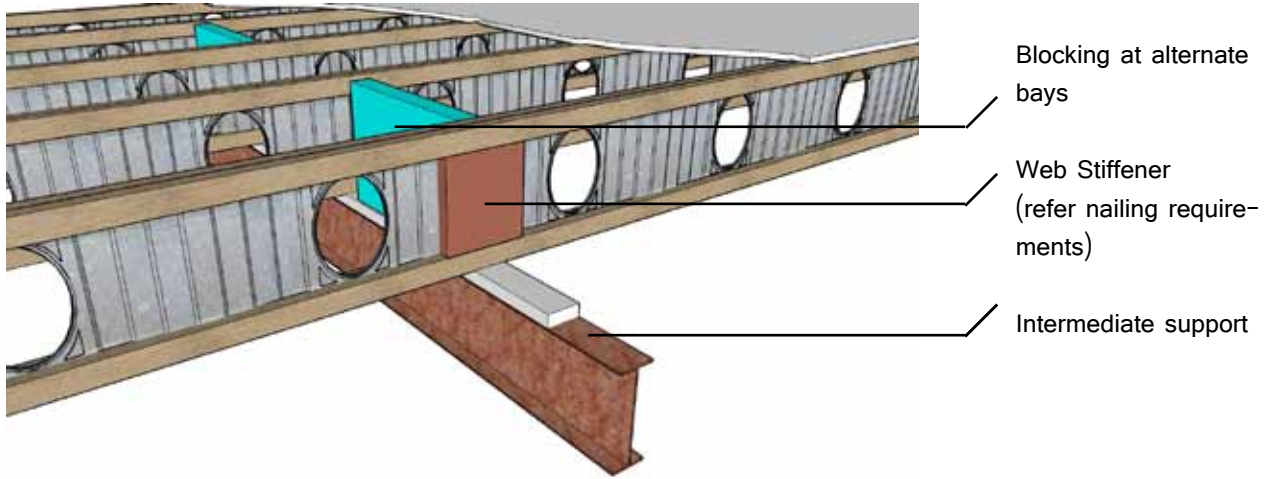
- are required to transfer shear loads into or out of the steel web
- are used to brace the web in high load cases
- Minimum Size: 70 x 35 seasoned timber, tight fitting between timber flanges on each side of the web and nailed together
- Minimum nailing: T25 - 65 x 2.7mm
T30 - 65 x 2.7mm

5.7.1 Minimum Requirements:

Web stiffeners are required at:

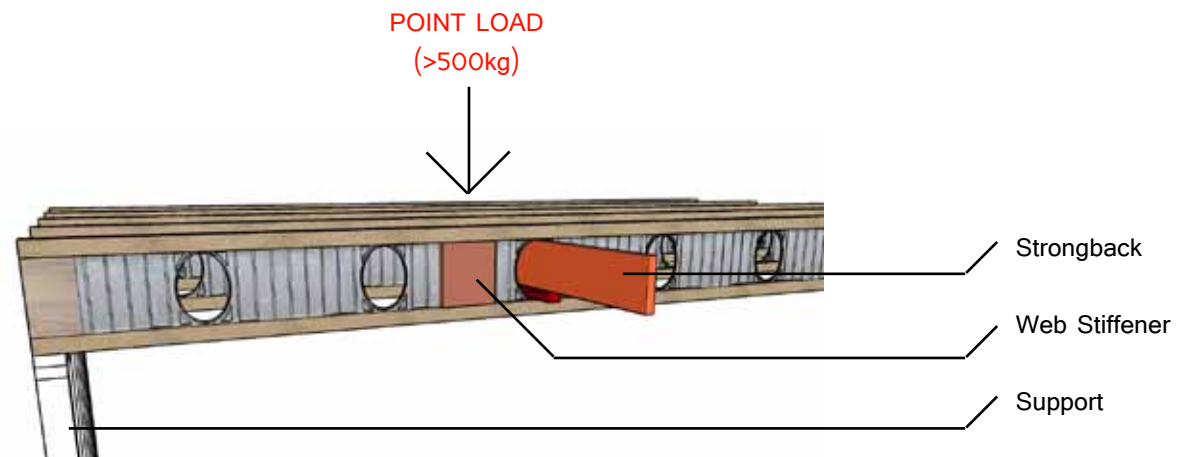
- a) the ends of all joists
- b) support line for cantilevers
- c) supporting walls, beams or posts in continuous spans





5.7.1 Minimum Requirements (continued):

d) under point loads exceeding 500kg



e) perimeter walls

- Under perimeter load bearing walls, a single TECBEAM joist fitted with extra web stiffeners replaces two solid timber joists
- Recommended web stiffener spacing
 - Metal Rooves - 1350mm ctrs
 - Tile Rooves - up to 10m span 900mm ctrs
 - Heavier Loads - 600mm ctrs



Note: If a web hole occurs over the support, add a pair of web stiffeners as close to the support as possible but covering the steel web sufficiently to fix the minimum nailing required through the web.

5.8. INTERNAL WALLS (Non-load bearing)

Crossing Floor Joists - For a single wall within the middle half of the joist span and also within 300mm of the tabulated span, one of the following measures is required:

- add an extra joist every 1800mm ctrs or
- reduce joist spacing, e.g. 600mm to 450mm ctrs, 450mm to 350mm ctrs, or
- upgrade to next joist size

Note: for additional walls crossing the joists, check with TECBEAM Australasia or a structural engineer

Parallel to Floor Joists - Where a wall covers over 65% of the joist span, check the following:

- Joists @ 600 ctrs - if the span is within 500mm of the tabulated span, add an extra joist under the wall
- Joists @ 450 ctrs - if the span is within 900mm of the tabulated span, add an extra joist under the wall

Notes:

1. Install a strongback at midspan 2100mm long to even out deflections
2. Support walls located between joists with either short strongbacks or solid blocking @ 1800mm ctrs

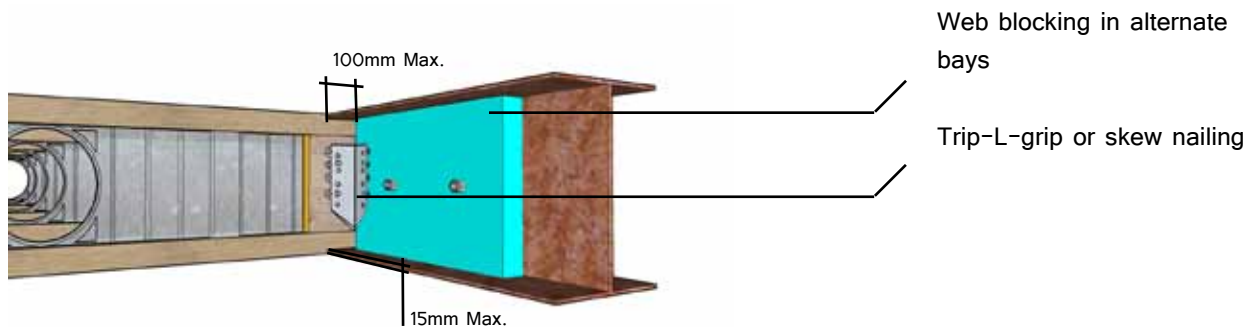
5.9. TRIMMING, NOTCHING, or DOCKING

- Trimming, notching or docking is permissible only at end supports
- The "Common End" has a pair of either 140mm or 190mm wide web stiffeners fitted with the steel web setback 70mm or 90mm respectively. This feature allows for the timber only trimming, notching, or docking

5.9.1 Restrictions on Notching:

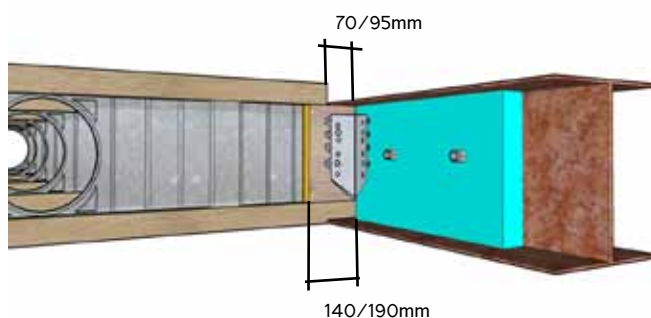
Bottom Flanges

Tecbeam joist bottom flanges can be notched up to 15mm and no longer than 100mm. If greater notching is required, refer to TECBEAM Australasia, or a structural engineer.



Top Flanges

Can be notched to the full depth of the flange and half the width of the stiffener.

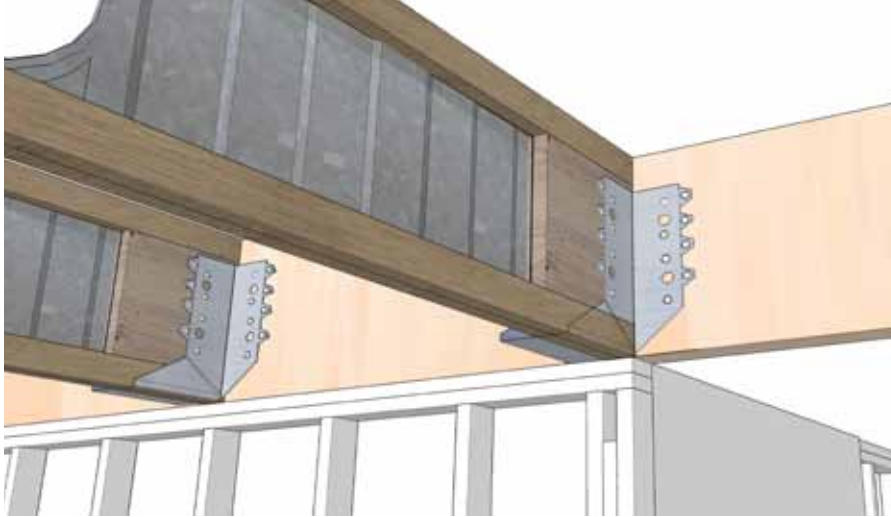


5.10. CONNECTION AND FIXING DETAILS

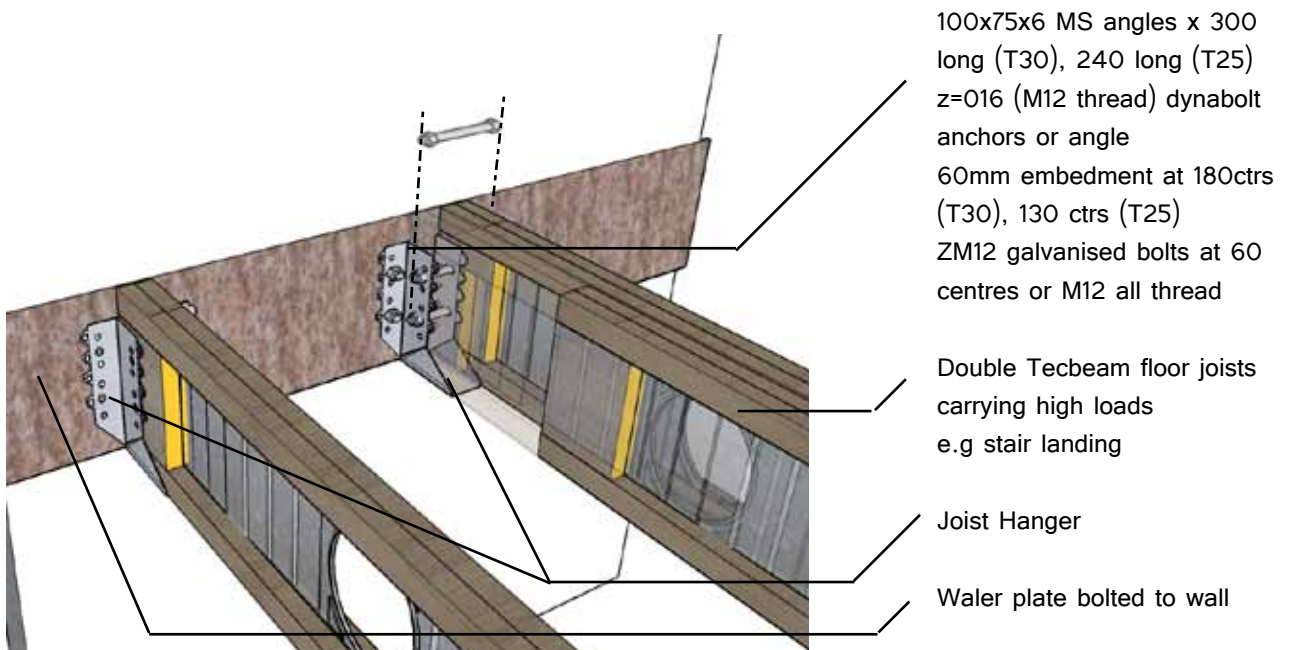
- Generally, standard timber framing connectors and framing methods are suitable with TECBEAM joists.
- For higher load capacity applications, heavy duty connectors maybe necessary (refer to a structural engineer)

5.10.1 Connection to Timber Beams

- Under normal floor loads, Standard Joist hangers are used to connect TECBEAM joists to timber beams.



- Where TECBEAM joists carry higher loads e.g. double joist at stair void, a combination of a joist hanger on one joist and a steel angle bracket fixed with 2M12 bolts on the other joist can be used. See detail below and refer to Tecbeam Standard Details.

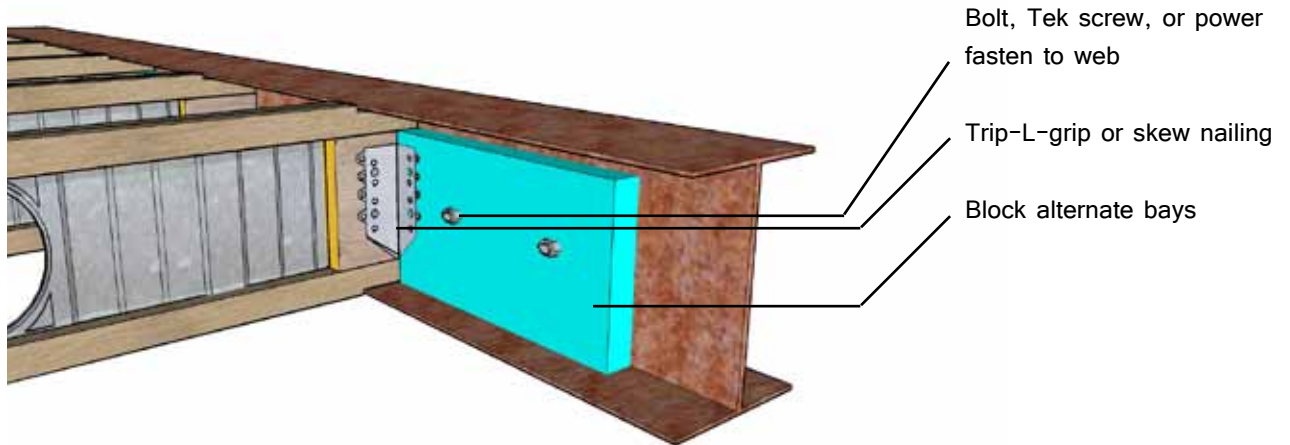


5.10.2 Connection to Steel Beams

A. Notching - install against the beam web and bearing on the flange.

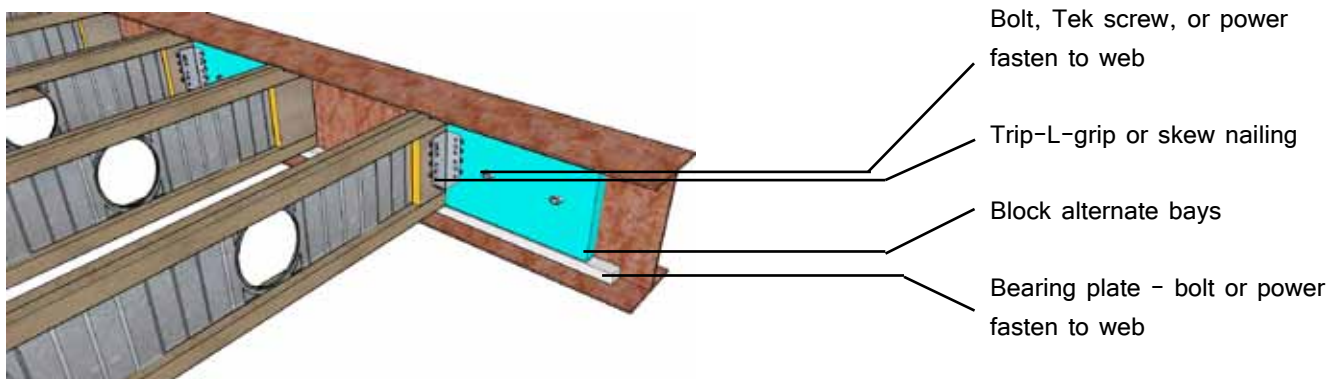
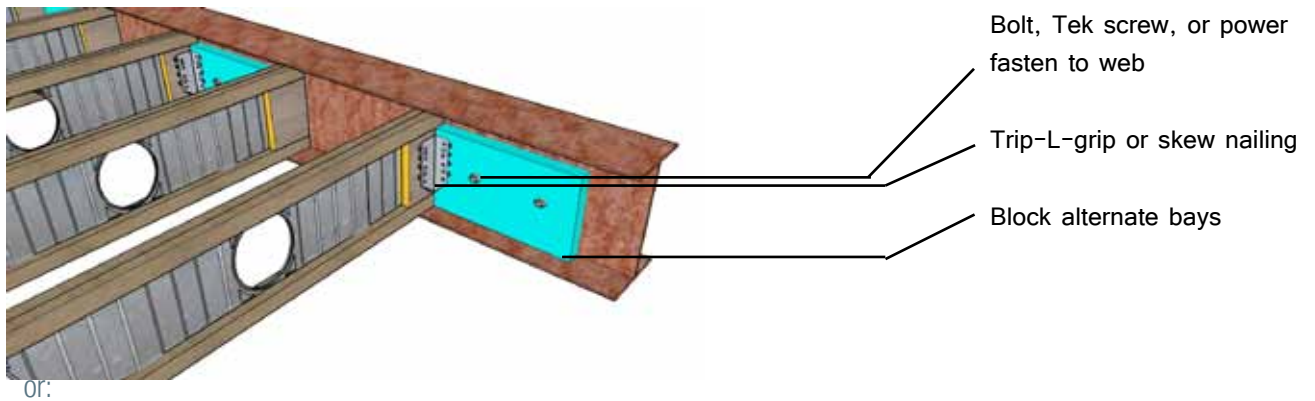
A.1. Steel beams with a height similar to Tecbeam joists -minimises any notching required

- Notch the joist inside the steel beam (refer notching limitations) with the joists bearing on the bottom flange of the steel beam
- Install solid timber blocking in alternate bays
- Fix blocking securely to the web of the steel beam by bolting, Tek screws or Ramset power fasteners



A.2. Larger Steel beams

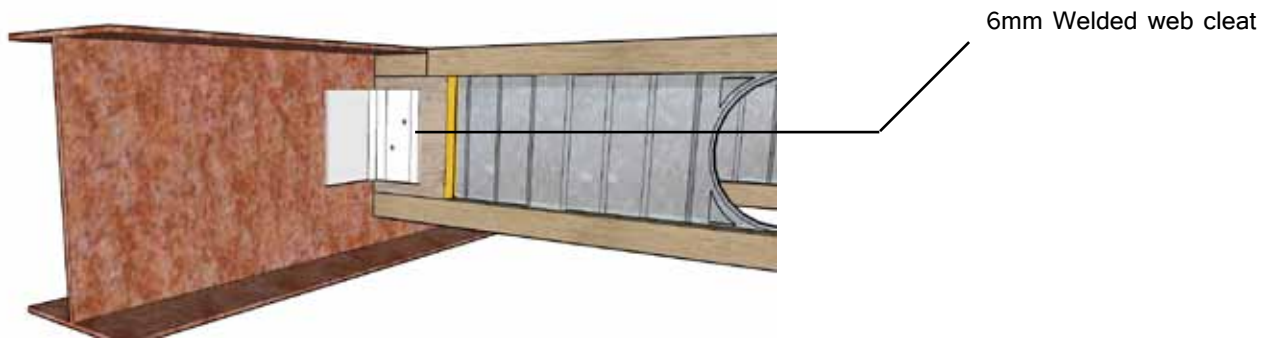
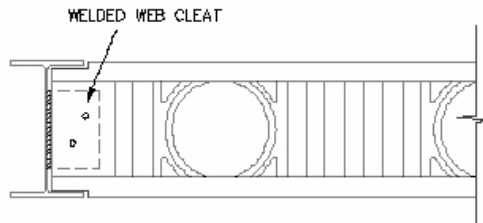
- Refer detail below
- Fixings similar to A.1.



B. Beam Cleats - use where it is not practical to bear on the flange.

- Weld steel cleats, or fix angles to the beam web and install bolts through the joist web stiffener as shown.
- Bolts indicated are for normal floor loads only

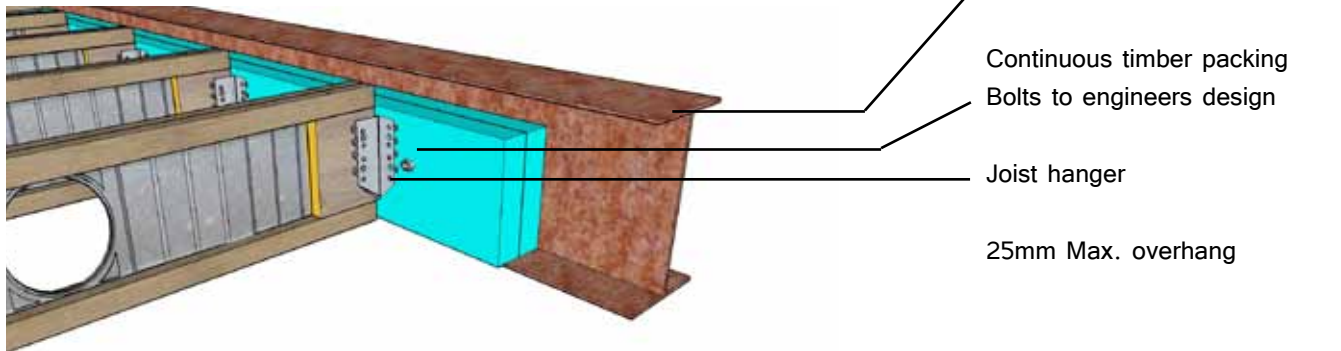
Joist	Bolts	Minimum		
		a	b	c
T25	2M10	70	50	25
T30, T35	2M12	85	80	30



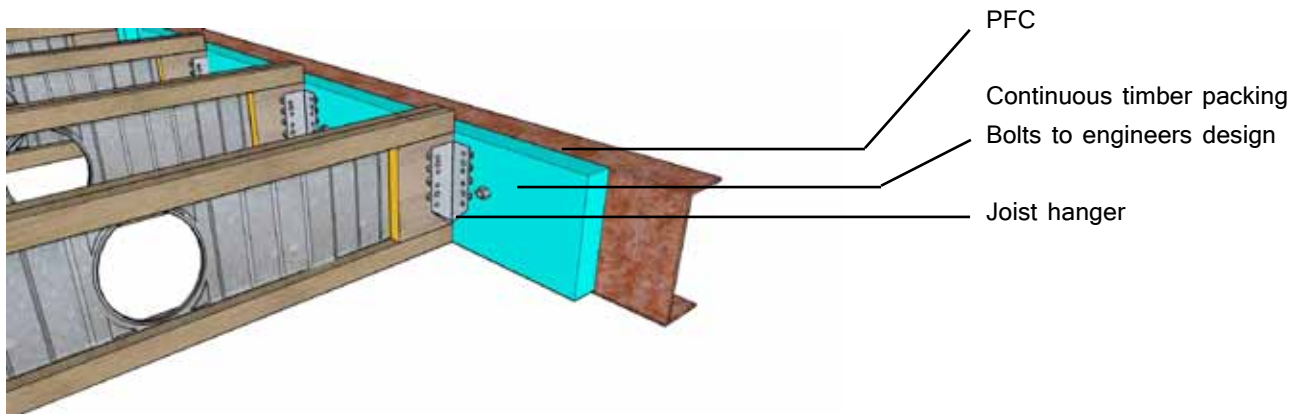
C. Continuous solid timber packing

- Pack the steel beam with continuous solid timber
- Bolt packing to steel beam web to engineer's specifications and fix joist hangers
- Ensure the steel beam is braced against rotation caused by the offset loading

'I' Beam



or (PFC):

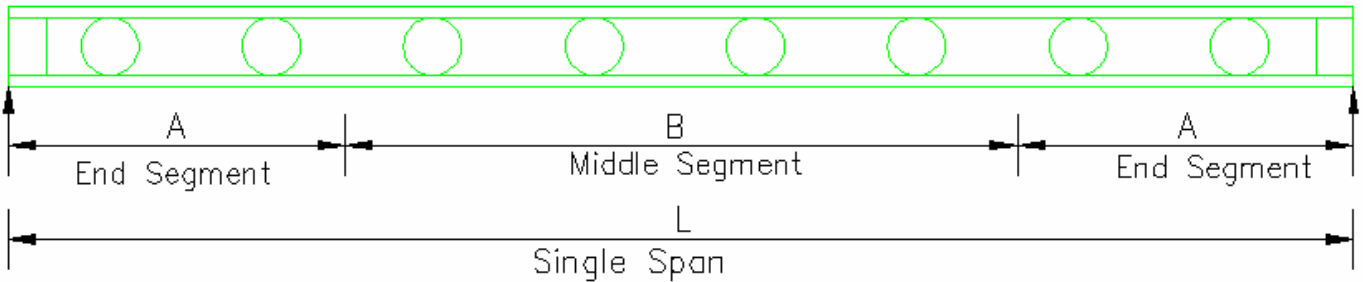


5.11. EXTRA WEB HOLES

- If extra web holes are required, the following are guidelines for permissible on-site modifications:

CONDITIONS:

1. For uniform RESIDENTIAL floor loads only*
 - Maximum Dead Load 0.7kPa (including internal partitions)
 - Maximum Live Load 2.0kPa
1. No load bearing walls (LBWs) on the span
2. Cutting flanges is NOT allowed
3. Flange size overall 90 x 45 (for flanges 70 x 45, the rectangular hole length is reduced, refer to TECBEAM Australasia P/L, local TECBEA fabricator or a structural engineer)
4. Cut holes neatly, square and rectangular holes to have rounded corners (Pre-drill minimum: 10mm dia)



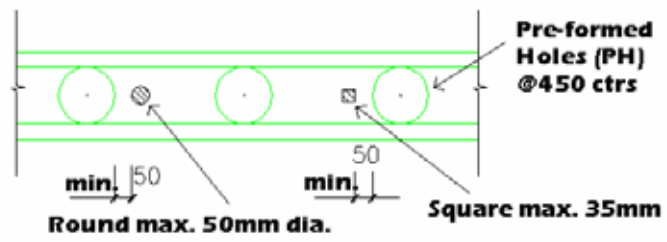
- Single span "L" is the TECBEAM tabulated span for 1.5 & 2.0kPa loading
- Middle segment "B" is 0.5L
- End segments "A" are equal to or $<0.5B$
- If the actual beam length is less than "B", there is no segment "A"

* For setback LBWs, continuous spans, and higher floor loading, refer to TECBEAM Australasia, local TECBEAM fabricator or a structural engineer.

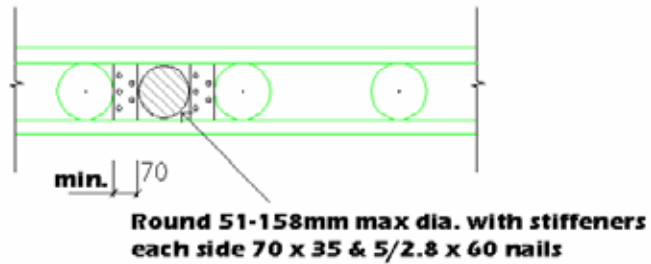
5.11 Extra Web Holes (continued)

T25

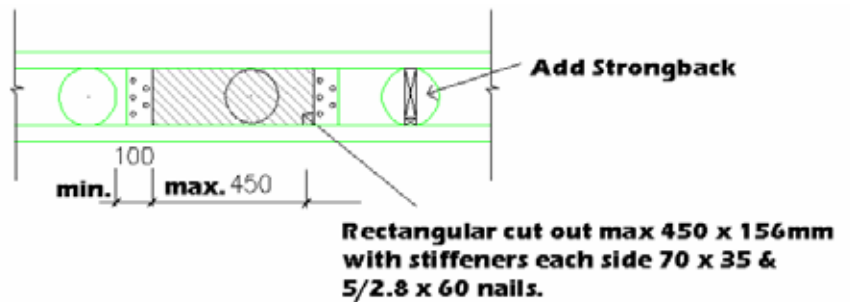
A & B
No Stiffening



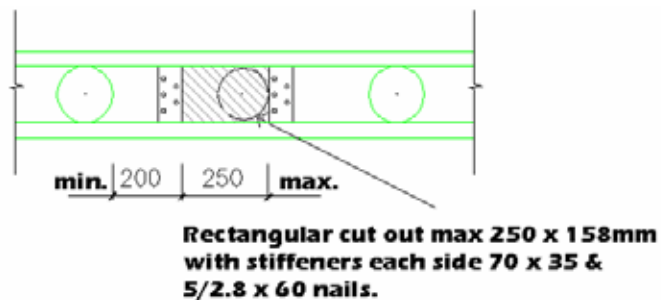
A & B



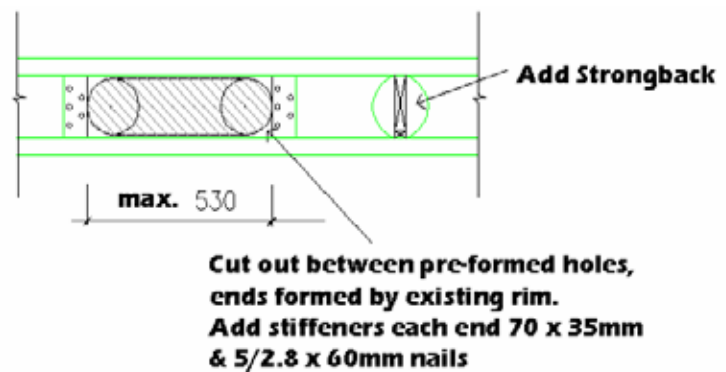
B



A



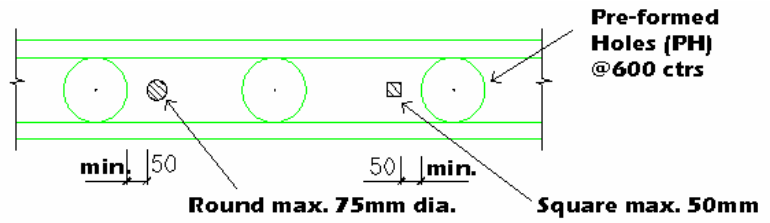
B



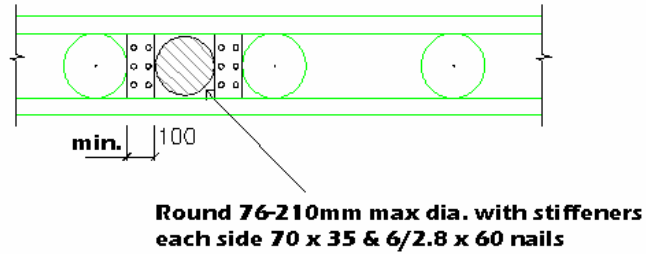
5.11 Extra Web Holes (continued)

T30

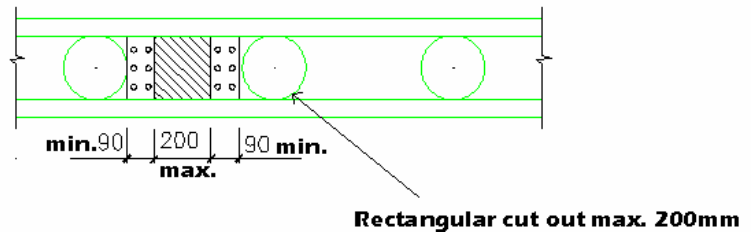
A & B
No Stiffening



A & B

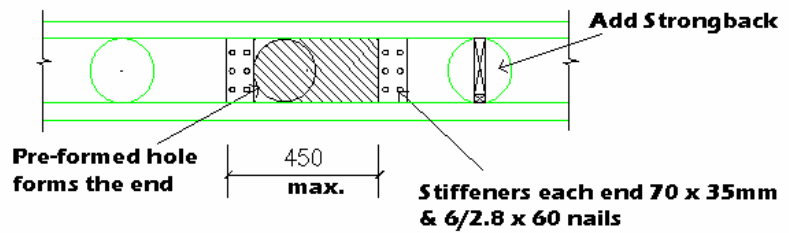


A

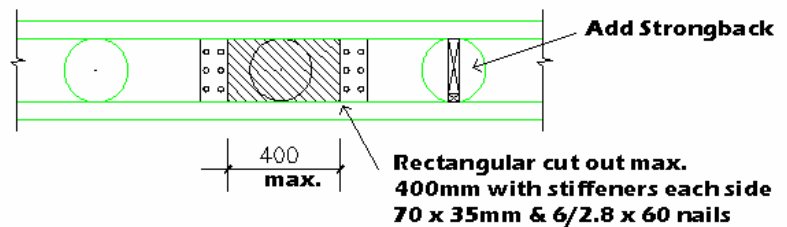


Rectangular cut out max. 200mm with stiffeners each side 70 x 35 & 6/2.8 x 60 nails

B



B



LOGAN PROJECT SERVICES PTY LTD

ABN 49 006 685 347

STRUCTURAL & CIVIL
33 Wangara Road
Cheltenham VIC
3192 Australia

Tel: 61 3 9583 1757
Mobile: 0414 918 155
Fax: 61 3 9583 1259
Email: logan.lps@gmail.com

CERTIFICATION OF 'TECBEAM' COMPOSITE 'I' BEAMS FOR USE AS STRUCTURAL MEMBERS IN BUILDINGS

Building Code of Australia Compliance

The product 'TECBEAM', complies with the requirements of the Building Code of Australia, when designed and installed in accordance with the relevant Australian Standards, and also with the manufacturer's current Design Guidelines, Installation Guidelines, Span Tables, and Section Properties (available from Tecbeam Australasia Pty Ltd or at www.tecbeam.com.au).

The Product

'TECBEAM' is a structurally engineered composite 'I' beam, with seasoned timber flanges fastened to a continuous press-formed galvanized sheet steel web with stiffening ribs and holes; designed in Australia by Tecbeam Australasia Pty Ltd and manufactured under license.

The published engineering properties:- first and second moment of area, flexural and shear stiffness, beam shear and bending capacity, have been determined from test results on full size samples and from the timber properties given in AS1720.1. The published values are based on the average of the tests, and are appropriate where several members share the loads as in floor and roof joists. Moment capacity has been determined using the first moment of area and the stress grade of the flange material. Where a single member is used to carry a significant load, a modification factor of 0.8, applied to the section properties, is recommended.

Floor Joist Applications

The published span tables have been derived from: the relevant design criteria given in AS1684.1:1999 and AS1720.1:1997; and the design loadings specified in AS1170.1:2002.

The product is suitable for use as a structural building element in the following applications:

- floor joists including; support of load bearing walls (non masonry), storage (up to 10kPa loading), concrete topped floors, car parking, sports floors, etc,
- floor beams single, double or multiple TECBEAMS linked by one or more strong backs passing through the web holes and securely wedged in place,
- moment connections to columns or walls to form sway bracing frames,
- roof framing; rafters, purlins, hanging beams, ceiling joists, etc,
- wall framing; studs, girts, etc,
- other applications such as: A-frame and portal frame construction, portable buildings, temporary structures, formwork, etc can be designed using the beam section properties, or refer to Tecbeam Australasia Pty Ltd or a registered structural engineer.

B R Logan
1176

CPEng, BE(Civil), Dip CE, MIE Aust, NPER-3, RBP(Vic) EC-

August 2009