Pryda Timber Connectors

Bracing Guide

September 2016

A complete guide to the design, specifications and installation of Pryda Bracing
INTRODUCTION

The information in this Product Guide is provided for use in Australia by architects, engineers, building designers, builders and others. It is based upon the following criteria:

1. **No Substitution**: The products covered by or recommended in this guide must not be substituted with other products.

2. **Design Capacity Basis**: See Codes & Standards following.

3. **Supporting Constructions**: Constructions using Pryda products must be built in accordance with the NCC (BCA) or an appropriate Australian Standard. **Note**: This includes appropriate corrosion protection - See Corrosion Protection following.

4. **Correct Installation**: Installation of Pryda products must be strictly in accordance with the instructions in this guide.

5. **Current Guide Version Used**: The current version of this guide, including any amendments or additions, must be used. Users are advised to check the Pryda website, www.pryda.com.au, on a regular basis for the most current design guides.

CODES & STANDARDS

Product design capacities in this guide have been derived from:

(a) Results of laboratory tests carried out by or for Pryda Australia
(b) Engineering computations in accordance with the relevant Australian Standards, ie:

- AS/NZS1170 series Structural Design Actions.
- AS4055-2006 Wind Loads for Housing.

Design capacities tabulated in this guide apply directly for **Category 1** joints. For all other joints, reduce design capacities by using the factors as specified in **General Notes** (if applicable). Design capacities are related to the **Joint Group** of the timber as defined in AS1720 and AS1684. If the Joint Group of timber members joined together varies, the lower group must be assumed for design, for example, JD5 is lower than JD4.

DEFINITIONS

Special terms used in this guide are as defined in Australian Standards, including:

**Design Capacity**: The maximum Limit State Design load (aka "action") which the product can safely support under the specified load condition, eg, 1.2G + 1.5Q (dead+roof live). See **General Notes for details (if applicable)**

**Joint Group**: Classification of a timber according to its fastener-holding capacity. See **General Notes for details (if applicable)**

CORROSION PROTECTION

Most Pryda products are manufactured using Z275 light-gauge steel, having zinc coating of 275 gsm (total weight). This protection is adequate only for **INTERNAL** applications in most corrosive environments, except areas that are classified as heavy industrial or those subject to high humidity (eg, enclosed swimming pools). Under these circumstances, seek advice from experts as special protection will be required. **Note**: **INTERNAL areas** are those within the building envelope that are kept permanently dry.

AS1684.2-2010 and AS1684.3-2010, Australian Standards for Residential Timber Frame Construction stipulate a minimum Z275 steel for all sheet metal products used in an internal environment.

In areas outside the building envelope that are exposed to repeated wetting (EXTERNAL areas), Pryda’s stainless steel products or equivalent should be considered. Some alternatives include hot dip galvanised or powder coated steel, which are not supplied by Pryda. For more detailed information, read Pryda’s Technical Update on Corrosion Resistance of Pryda Products or contact a Pryda office.

PRODUCT CERTIFICATION

Pryda Australia warrants:

- Products in this guide are free from defects in the material and manufacturing
- Design capacities are in accordance with test results or current, relevant Australian Standards and the Building Code of Australia.
- Pryda products are structurally adequate provided they are designed, installed and used completely in accordance with this guide.

This warranty applies only to:

- Products in this guide.
- Products used in the specified applications and not damaged after manufacture and supply.
- Joints free from wood splitting, decay or other timber defects at the joint or within 150 mm of the joint.

INSTRUCTIONS FOR INSTALLATION

These notes are provided to ensure proper installation.

1. All fasteners used must be manufactured by reputable companies and be of structural quality.
2. Connectors must not be installed on timber which is split before or during installation. If the timber is likely to split as fasteners are driven, fastener holes must be pre-drilled.
3. Do not overload the joints during construction or in service.
4. Hole diameter for bolts in seasoned timber must not be more than 1.0 mm larger than the bolt diameter to achieve a snug-tight connection. Specified washers must be installed against the timber face.
5. Use proper safety equipment and due care in installing these connectors.
6. Any gaps in joints between the timber members must not exceed 3 mm.
7. Do not over-tighten screws.
# Pryda Bracing Guide

## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GENERAL NOTES</strong></td>
<td>4</td>
</tr>
<tr>
<td>Useful notes and definitions for effective reading of this guide</td>
<td></td>
</tr>
<tr>
<td><strong>PRYDA ANGLE BRACE</strong></td>
<td>5</td>
</tr>
<tr>
<td>A formed steel section brace in two sizes, <strong>Mini Brace</strong> and <strong>Maxi Brace</strong> for use as wall bracing and noggin</td>
<td></td>
</tr>
<tr>
<td><strong>PRYDA STRAP BRACE</strong></td>
<td>6</td>
</tr>
<tr>
<td>A flat, tensioned steel strap in six section sizes for all bracing uses</td>
<td></td>
</tr>
<tr>
<td><strong>PRYDA SPEEDBRACE</strong></td>
<td>8</td>
</tr>
<tr>
<td>A formed steel tension brace for roof and other bracing uses</td>
<td></td>
</tr>
<tr>
<td><strong>WALL BRACING DETAILS</strong></td>
<td>9</td>
</tr>
<tr>
<td>Details of A Types and B bracing units</td>
<td></td>
</tr>
<tr>
<td><strong>TECHNICAL INFORMATION</strong></td>
<td>12</td>
</tr>
<tr>
<td>Tension capacities for all bracing products</td>
<td></td>
</tr>
<tr>
<td><strong>PRYDA SHEAR CONNECTORS</strong></td>
<td>14</td>
</tr>
<tr>
<td>Fixed to the top plate of non-bearing bracing walls to transfer racking loads from ceiling plane</td>
<td></td>
</tr>
<tr>
<td><strong>RAMSET ANKASCREWS</strong></td>
<td>16</td>
</tr>
<tr>
<td>Concrete anchor screws for tie-down of bracing units</td>
<td></td>
</tr>
<tr>
<td><strong>APPENDIX</strong></td>
<td>17</td>
</tr>
<tr>
<td>Provides information and recommendations on design, construction and engineering matters related to the bracing of walls in timber framed construction</td>
<td></td>
</tr>
</tbody>
</table>

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**Product Information Updates**

Information contained in this product guide is subject to change. The latest updates are available from [www.pryda.com.au](http://www.pryda.com.au).
GENERAL

For more than 30 years, Pryda bracing products have been developed to be structurally sound and cost effective for the bracing of roofs, walls, floors and other parts of timber framed buildings. They are designed to meet code bracing requirements and have been laboratory tested to assure their strength.

Specification for Pryda Bracing

All Pryda bracings are manufactured from G300 - Z275 ZincForm® steel or equivalent for high strength and corrosion resistance in normal, interior uses. Higher levels of zinc coating or epoxy paints are also available to suit use in corrosive environments such as near the sea front.

Product details are tabulated in the Pryda Price List and Pryda Catalogue publications.

Which Bracing to Use?

Collectively, Pryda bracings are suited to all common bracing uses in timber framing.

<table>
<thead>
<tr>
<th>Application</th>
<th>Suitable Bracing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor joists</td>
<td>Strap Brace</td>
</tr>
<tr>
<td>Walls</td>
<td>Angle Brace, Strap Brace, Speedbrace</td>
</tr>
<tr>
<td>Roof trusses</td>
<td>Speedbrace*, Strap Brace</td>
</tr>
</tbody>
</table>

* Recommended for this use.

For bracing of walls in accordance with AS 1684 Residential Timber-framed Construction, see the Pryda Wall Bracing Unit Construction Guide available in this document (from page 8 onwards).

A guide to bracing roof trusses is included in AS4440:2004 Installation of Nailplated Timber Trusses. Speedbrace is usually preferred to Strap Brace for this use because of its special advantages.

Pryda bracings can also be used for some uncommon applications, depending on the design strength required. For this reason, Design Capacities are included in this publication.

Pryda Timber Connector Nails

For fixing of all Pryda bracings, it is essential to use galvanized Pryda Timber Connector Nails, ie, the special 35 x 3.15 mm nails developed by Pryda specifically for fixing of our products. Laboratory strength testing has shown that clouts are not adequate for this purpose as their heads may pop off under less than design load.

Machine Driven Nail Use

Where appropriate, 32 x 2.3 mm Duo-Fast C SHEG (ie, screw hardened electro galvanized) machine driven nails (code D40810) or equivalent may be used instead of the specified 35 x 3.15 mm Pryda Timber Connector Nails to fix Pryda connectors provided that:

- One additional nail than specified in the bracing details (eg, 2 instead of 1, 3 instead of 2, 5 instead of 4 etc.)
- Machine driven nails are driven at nail spacings and edge distances similar to the hole pattern, ensuring that these nails are not driven into the holes or located not closer than 5mm from the edge of a hole.

Note: Extreme care must be taken when using machine driven nails as the prevailing installation practices tend to inhibit compliance with the above requirements.

Some of other pneumatic coil screw hardened nails considered equivalent to Duo-Fast D40810 are Paslode 32 x 2.5 mm (B25110), Duo-Fast 32 x 2.5 mm (D41060), Paslode 40 x 2.5 mm (B25125) and Duo-Fast 40 x 2.6 mm (D42360).

Fixing into Steel Supporting Structure

Pryda products can be fixed into steel using Buildex Teks™ screws or similar.

Information on fixing Pryda bracing products to steel framing is available in the publication titled Design Guide – Pryda Connectors for Steel Framing.

Material Thickness

All material thicknesses referred to in this guide are the total coated thickness. This includes the zinc coating thickness, which is typically around 0.04 mm for Z275 steel.
Installation

Good installation of bracings is most essential. Pryda recommendations as specified in this guide. Particularly important are:

Nailing: Keep the nails away from ends or edges of timber to assure good nailholding.

Brace Angle: Install the brace at an angle of between 40 and 50 degrees to the horizontal if possible. Otherwise, the minimum is 30 degrees, maximum 60 degrees.

Strap Tensioning: Ensure each length of Strap Brace has a Pryda Tensioner, properly tightened prior to nailing. Tension Speedbrace by hammering it flat over each stud and wall plate.

Angle Brace Slots: Don’t overcut the slot (notch) for the brace as this will weaken the studs. 20 mm is the required maximum slot depth for both Mini and Maxi Brace. As Mini Brace has a shorter leg (16 mm), the studs can be checked 3 mm so that the brace and nails are installed flush with the stud edge (pictured). Maxi Brace must not be checked (rebated) into the stud edge because the notch depth would then exceed the 20 mm maximum specified in AS1684.

Note: Information about suitable equipment for cutting checks in the studs for Angle Brace is available from Pryda.

Max notch 20 mm

Pryda Mini Brace checked into stud so that brace and nails are flush with stud face

Maxi Brace not checked into stud

See also: Pryda Installation Guide for Prefabricated Walls with Pryda Bracing.

Sizes
Available sizes are:

<table>
<thead>
<tr>
<th>Pryda Mini Brace</th>
<th>18 x 16 x 1.2 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCT CODE</td>
<td>MB36  MB42  MB48</td>
</tr>
<tr>
<td>LENGTH</td>
<td>3.6   4.2   4.8</td>
</tr>
<tr>
<td>Tied in bundles of 10 lengths.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pryda Maxi Brace</th>
<th>20 x 18 x 1.2 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCT CODE</td>
<td>AB36  AB42  AB48</td>
</tr>
<tr>
<td>LENGTH</td>
<td>3.6   4.2   4.8</td>
</tr>
<tr>
<td>Tied in bundles of 10 lengths.</td>
<td></td>
</tr>
</tbody>
</table>

Installation

As bracing or nogging, Pryda Angle Brace can be installed either sitting on the surface of the timber framing or checked in flush with the surface using a chisel or a checking head on a circular saw. To install Angle Brace:

1. Square up the wall or temporary frame ready for bracing.
2. Use the edge of the brace to draw a straight line where the brace or nog is to go, and cut the slots. Note that the brace angle must be from 30 to 60 degrees to the horizontal and ends of the brace should be 150 mm minimum from the end of the plate.
3. Fit the brace into the slots with the vertical leg downwards for safety reasons. Fix it with one Pryda Timber Connector Nail per stud and two Pryda Timber Connector Nails per wall plate.
PRYDA TIMBER CONNECTORS
Bracing Guide

PRYDA STRAP BRACE AND TENSIONERS

Uses & Advantages

Pryda Strap Brace with Tensioner, is an easy-to-use, flat strap steel bracing for roofs, walls, ceilings and floors. Strap Brace complies with the wall bracing rules of AS1684 Residential Timber-framed Construction and has excellent advantages, including:

- Saves on-site labour time as studs do not have to be notched. The unnotched studs can often be a smaller size and hence cheaper than notched studs.
- Available in long length coils for ease of handling and minimum wastage.
- Easily and quickly tensioned using the Strap Brace Tensioner - simply by driving the hex-head screw (nutsert option) or turning the wing nut (wingnut and t-bolt option).

Pryda Strap Brace is ideal for bracing applications where timber braces are not feasible because of their thickness or because timber can’t be bent, eg, exposed beams or rafters, or trusses.

Sizes
Available sizes are:

<table>
<thead>
<tr>
<th>PRODUCT CODE</th>
<th>ARTICLE &amp; SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB082/15 **</td>
<td>25 x 0.8 mm x 15 m coil</td>
</tr>
<tr>
<td>SB082/30 **</td>
<td>25 x 0.8 mm x 30 m coil</td>
</tr>
<tr>
<td>SB083/15</td>
<td>30 x 0.8 mm x 15 m coil</td>
</tr>
<tr>
<td>SB083/30</td>
<td>30 x 0.8 mm x 30 m coil</td>
</tr>
<tr>
<td>SB083/50</td>
<td>30 x 0.8 mm x 50 m coil</td>
</tr>
<tr>
<td>SB103/30</td>
<td>30 x 1.0 mm x 30 m coil</td>
</tr>
<tr>
<td>SB103/50</td>
<td>30 x 1.0 mm x 50 m coil</td>
</tr>
<tr>
<td>SB123/30</td>
<td>32 x 1.2 mm x 30 m coil</td>
</tr>
<tr>
<td>SB083/3.5</td>
<td>30 x 0.8 mm x 3.5 m lengths</td>
</tr>
<tr>
<td>SB083/3.5W-500</td>
<td>30 x 0.8 mm x 3.5 m lengths</td>
</tr>
<tr>
<td>SB083/4.0W-500</td>
<td>30 x 0.8 mm x 4.0 m lengths</td>
</tr>
<tr>
<td>GUS083/30</td>
<td>30 x 0.8 mm x 30 m lengths (unpunched straping)</td>
</tr>
</tbody>
</table>

** SB082 product is not recommended for standard bracing units.

Strap Brace Tensioners:

<table>
<thead>
<tr>
<th>PRODUCT CODE</th>
<th>PACKING</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBT</td>
<td>Includes wing nut, bolt and washer. 30 in carton (6 per pack x 5 packs)</td>
</tr>
<tr>
<td>SBT30N (nutsert)</td>
<td>Includes bolt. 30 in carton (6 per pack x 5 packs)</td>
</tr>
<tr>
<td>SBT100</td>
<td>includes wing nut, bolt and washer. 100 per pack</td>
</tr>
<tr>
<td>SBT100N (nutsert)</td>
<td>includes bolt. 100 per pack</td>
</tr>
</tbody>
</table>

Bolt Specification: M6x30 T-bolt for SBT/SBT100 and M6x30 hex-head bolt for the nutsert type SBT30N /SBT100N.

Structural Performance

Pryda Strap Brace takes load in tension only and must therefore be used in pairs, in opposing diagonal directions. It must also be sufficiently tensioned to take the load without distortion of the frame.

Installation Of Strap Brace

Floor Bracing
Pryda Strap Brace of any size, can be used as a herring-bone bracing for floor joists - as illustrated. A tensioner is not required for this use.

1. Fix the ends of both lengths of Strap Brace to the top and bottom of the first joist with two Pryda Timber Connector Nails per joint.
2. Pull each length of Strap Brace down from the top edge of the joist or up from the bottom onto the next joist. Tension it using a screw driver or similar tool and fix with one Pryda Timber Connector Nail at each joist.

For floor systems with trusses, I-joists or deep beams, bracing is required for both: (a) stability during construction and (b) wind resistance during the life of the building. The bracing can be Pryda Strap Brace or Unpunched Strapping. It is to be fixed to the floor members and supporting structure with 35 x 3.15 mm Pryda Timber Connector Nails or power driven 2.5 mm or 2.87 mm nails (as shown opposite).

Floor Bracing at External Wall
Wall Bracing

For details of bracing units see pages 9 to 11:

1. Make sure that the wall frame is close to square.
2. For Type B units, wrap the brace over the plate. Nail the end of the Strap Brace to the top plate within 150 mm of a stud using:
   - three Pryda Timber Connector Nails for Type A units or
   - four Pryda Timber Connector Nails for Type B units.
3. Lay the Strap Brace across the frame at an angle of 45 degrees approximately (30 to 60°) and with the unfixed end on the bottom plate at within 150 mm of a stud and allowing a length of strap to wrap around the plate. Cut the strap brace to length.
4. Straighten and partially tighten the Strap Brace by pulling it down onto the bottom plate. For Type B units, wrap the brace over the plate. Fix the end of the Strap Brace to the plate within 150 mm of a stud using Pryda Timber Connector Nails with:
   - two nails for Type A units or
   - four nails for Type B units.
5. Fix the second length of Strap Brace in the same manner, diagonally opposing the first length.
6. Fit and tighten the tensioners on both braces, with the tensioner facing into the frame. Adjust the tensioner as required or until the brace is taut. Note: Do not use Strap Brace to plumb the frame.
7. Nail both braces to every stud crossed using ONE Pryda Timber Connector Nail for both Type A and Type B units.

The required minimum number of bracing units is specified in AS1684.

Roof Bracing

To brace standard trusses, rafters or roof beams:
1. Use only SB123 Strap Brace (or Speedbrace) for roof bracing. Refer to AS4440-2004 or Pryda Truss Installation Guide to establish whether single or double Strap Brace is required based on roof span, pitch and wind speed.
2. Lay out diagonal opposing lengths of Strap Brace on top of the roof framing at a maximum angle of 30 degrees (measured on plan) to the ridge line. Braces are required on both sides of the ridge line and at both ends of the roof.
3. Fix Strap Brace at both ends by wrapping one end around the top wall plate and the other end around the rafter, roof beam or top chord of a truss at the ridge, and by nailing each end using the required number of Pryda Timber Connector Nails.
4. Fit and tighten the tensioners on both braces, with the tensioner facing down into the roof space. Adjust the tensioner as required or until the brace is taut. Note: Do not use Strap Brace to plumb the frame.
5. Nail both braces to every truss or rafter crossed using two Pryda Timber Connector Nails per crossing.

For more details of requirements for roof truss bracing refer to the Pryda’s Roof Truss Installation Guide or to AS4440.

End Fixing Detail on Rafter Trusses
Refer to AS4440-2004 for Other Fixing Details.
Pryda Speedbrace, used as diagonal roof bracing, provides overall stability to the trussed roof and in conjunction with the roof battens, prevents lateral buckling of the top chords. Pryda Speedbrace is also suitable for use as wall bracing.

Advantages

Pryda Speedbrace is applied on top of the top chord, eliminating the difficulty of applying a brace to the underside of the chord as is necessary with conventional timber braces. The profile of Speedbrace allows it to be applied without the need for tensioners as the rib merely needs to be hammered flat where it crosses the timber members.

In addition, Speedbrace can be spliced easily and can be wrapped around members to provide sound and secure anchorage.

Sizes

Available sizes of Pryda Speedbrace are:

<table>
<thead>
<tr>
<th>Code</th>
<th>SDB36</th>
<th>SDB40</th>
<th>SDB50</th>
<th>SDB60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>3.6</td>
<td>4.0</td>
<td>5.0</td>
<td>6.0</td>
</tr>
</tbody>
</table>

Tied in bundles of 10 lengths.

Roof Bracing

Pryda Speedbrace can be installed as for Strap Brace, where Speedbrace crosses each truss it is hammered flat and nailed with two galvanised Pryda Timber Connector Nails at each truss crossed.

Pryda Speedbrace is spliced by overlapping lengths of brace hammering flat and nailing with the same number of galvanised Pryda Timber Connector Nails as is required at the top plate (see diagram below).

Wall Bracing

Pryda Speedbrace may also be used to brace wall frames.

Refer to AS4440 for all other fixing details.
WALL BRACING UNIT CONSTRUCTION GUIDE

Section 8 of AS1684:2010 – Residential Timber-Framed Construction specifies methods of determining the required minimum amount of permanent wall bracing, ie:

- **Simplified method** (Part 4 of AS 1684): The number of Type A bracing units included in each plan direction must comply with Table 8.2 – which depends on the overall size of the walls. Details of Type A bracing units are specified in Table 8.3 – and in this document.

- **Other constructions** (Part 2 or 3): The designer must either:
  * Calculate the design horizontal wind force (“total racking force” -kN) and the total capacity of the bracing included in each plan direction to resist this force, or
  * Look up the wind force in Appendix G of the code and ensure by calculation that the total capacity of the bracing exceeds this force.

Details of wall bracing units and their capacities (in kN/m) are specified in Table 8.18 – and in this document.

The “Simplified method” applies only to non-cyclonic wind zone N1 or N2 and to buildings of limited size – see Clause 1.6 of Part 4 of the code.

This guide provides full details of how bracing units (or “panels”) can be constructed in accordance with AS 1684 using **Pryda Bracings, Stud Ties, Strap Nails** and **Pryda Timber Connector Nails**. The details specified in AS1684 are based on the results of test on such units. Bracing capacities are for units with a lining such as plasterboard installed. During construction, additional temporary bracing may be required until the lining is fully installed. For information on the derivation of unit capacities, contact Standards Australia.

Wall Bracing Units - Details

**Mini Brace, Two Lengths, Type A Unit**

This bracing unit comprises **two sections** of the same wall with **Pryda Mini Brace** braces in opposing diagonals, as shown below. These two wall sections are considered to work together. AS1684 has a maximum wall height of 3.0 m (except at gable or skillion ends). Design capacity of these units is 0.8 kN/m for wall heights up to 2.7 m and 0.72 kN/m for 3.0 m height. The table values given below are the total capacity from both wall sections and assumes that both wall sections are of equal length.

<table>
<thead>
<tr>
<th>Wall Height (m)</th>
<th>1.8</th>
<th>1.9</th>
<th>2.0</th>
<th>2.1</th>
<th>2.2</th>
<th>2.3</th>
<th>2.4</th>
<th>2.5</th>
<th>2.6</th>
<th>2.7</th>
<th>3.0</th>
<th>3.1</th>
<th>3.2</th>
<th>3.3</th>
<th>3.4</th>
<th>3.5</th>
<th>3.6</th>
<th>3.7</th>
<th>3.8</th>
<th>3.9</th>
<th>4.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.7</td>
<td>2.7</td>
<td>2.9</td>
<td>3.0</td>
<td>3.2</td>
<td>3.3</td>
<td>3.5</td>
<td>3.6</td>
<td>3.8</td>
<td>3.9</td>
<td>4.1</td>
<td>2.4</td>
<td>2.6</td>
<td>2.7</td>
<td>2.8</td>
<td>3.0</td>
<td>3.1</td>
<td>3.2</td>
<td>3.4</td>
<td>3.5</td>
<td>3.6</td>
<td></td>
</tr>
</tbody>
</table>

The nails used must be galvanised **Pryda Timber Connector Nails**, code OSNG, size 35 x 3.15 mm.

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**Joint Detail**

- Brace: **Pryda Mini Brace**
- Fixing: Two Pryda Nails in brace ends
- One Pryda Nail at each stud

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Note: For walls higher than 2.7 m, reduce the bracing unit’s capacity in inverse proportion to the wall height, eg, for 3.6 m walls, take 2.7/3.6 = 0.75 times the capacity for 2.7 m height.

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Note: A minimum 3.6 m wall length (i.e using two 1.8 m units with Mini Brace as opposing diagonals) will be required to accommodate this type of bracing unit. Accordingly, a minimum 5.4 m wall length is required to achieve a maximum capacity of 4.1 kN (see table).
Strap Brace/Speedbrace Type A Unit (Racking Capacity = 1.5 kN/m)

This bracing unit comprises one section of the wall, with cross-over braces of Pryda Strap Brace or Pryda Speedbrace as shown below. The minimum recommended Strap Brace size (SB083) fully complies with AS1684.2:2010 and AS1684.3:2010 specifications. Maximum wall height in AS1684 is 3.0 m (except at gable or skillion ends). Design capacity is 1.5 kN/m for wall heights up to 2.7 m and 1.35 kN/m for 3.0 m height.

<table>
<thead>
<tr>
<th>Wall Height (m)</th>
<th>Bracing capacity (kN) for Bracing length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.7</td>
<td>1.9  2.0  2.1  2.2  2.3  2.4  2.5  2.6  2.7</td>
</tr>
<tr>
<td>3.0</td>
<td>2.4  2.6  2.7  2.8  3.0  3.1  3.2  3.4  3.5  3.6</td>
</tr>
</tbody>
</table>

The nails used must be galvanised Pryda Timber Connector Nails, code OSNG, size 35 x 3.15 mm.

Maxi Brace, One Length, Type A Unit (Racking Capacity = 1.5 kN/m)

This bracing unit comprises one section of the wall, with one brace of Pryda Maxi Brace, as shown below. Maximum wall height in AS1684 is 3.0 m (except at gable or skillion ends). Design capacity is 1.5 kN/m for wall heights up to 2.7 m and 1.35 kN/m for 3.0 m height.

<table>
<thead>
<tr>
<th>Wall Height (m)</th>
<th>Bracing capacity (kN) for Bracing length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.7</td>
<td>1.9  2.0  2.1  2.2  2.3  2.4  2.5  2.6  2.7</td>
</tr>
<tr>
<td>3.0</td>
<td>2.4  2.6  2.7  2.8  3.0  3.1  3.2  3.4  3.5  3.6</td>
</tr>
</tbody>
</table>

The nails used must be galvanised Pryda Timber Connector Nails (OSNG) size 35 x 3.15 mm.
Type B Unit  \( (Racking\ \text{Capacity} = 3.0\ \text{kN/m}) \)

This Type B bracing unit uses \textit{Pryda Strap Brace (SB103)} or \textit{Pryda Speedbrace}, a steel brace thicker than the one used for Type A units. \textit{Note: Pryda Strap Brace (SB083) may also be used provided the below table values are reduced by 20%}. Maximum wall height in AS1684 is 3.0 m (except at gable or skillion ends). Design capacity is 3.0 kN/m for wall heights up to 2.7 m and 2.7 kN/m for 3.0 m height.

<table>
<thead>
<tr>
<th>Wall Height (m)</th>
<th>Bracing capacity (kN) for Bracing length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8</td>
<td>1.9</td>
</tr>
<tr>
<td>2.7</td>
<td>5.4</td>
</tr>
<tr>
<td>3.0</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Note: For walls higher than 2.7 m, reduce the bracing unit’s capacity in inverse proportion to the wall height, eg, for 3.6 m walls, take \( 2.7/3.6 = 0.75 \) times the capacity for 2.7 m height.

The nails used must be galvanised \textit{Pryda Timber Connector Nails (OSNG)} size 35 x 3.15 mm.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{fig_type_b_unit}
\caption{Type B Unit (Racking Capacity = 3.0 kN/m) \textit{Note: Pryda Strap Brace (SB083) may also be used provided the above table values are reduced by 20% or adopting a capacity of 2.5 kN/m.}}
\end{figure}

Narrow Bracing Units

Pryda has developed the \textit{Pryda Wall Truss Brace (PWTB)} to cater for narrow wall lengths, adopting a similar profile to a floor truss. Three types of units are available, PWTB1/PWTB2 to resist up to 5.0 kN/m and PWTB3 to resist up to 14.0 kN/m racking loads. For detailed information on the PWTBs, refer \textit{Design Guide on Pryda Wall Truss Brace}.

Also available is a series of \textit{Narrow Bracing Units} using Strapbrace/Speedbrace. Details of these units are available in a separate publication titled \textit{Pryda Design Guide for Narrow Wall Bracing Units}.
PRYDA TIMBER CONNECTORS
Bracing Guide

TECHNICAL INFORMATION

Pryda’s recommendations for materials, installation and design loads are given in the following topics.

Materials

All Pryda bracings are manufactured from G300 -Z275 ZincForm® steel or equivalent for high strength and corrosion resistance in normal, interior uses.

The Pryda Bracing products included in these units are:

<table>
<thead>
<tr>
<th>Brace Product</th>
<th>Details</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini Brace</td>
<td>18 x 16 x 1.2 mm Angle Brace</td>
<td>MB36, MB42, MB48</td>
</tr>
<tr>
<td>Maxi Brace</td>
<td>20 x 18 x 1.2 mm Angle Brace</td>
<td>AB36, AB42, AB48</td>
</tr>
<tr>
<td>Speedbrace</td>
<td>37 x 1.0 mm</td>
<td>SDB36, SDB40, SDB50, SDB60</td>
</tr>
<tr>
<td>Strap Brace</td>
<td>30 x 0.8 mm, 30 x 1.0 mm, 32 x 1.2 mm</td>
<td>SB083, SB103, SB123</td>
</tr>
</tbody>
</table>

Warning: For the construction of bracing units don’t use Hoop Iron and beware of 0.6 mm thickness (or thinner) non-engineered bracing. The latter material may be offcuts of Zincalume or Colorbond which are roofing materials having little or none of the sacrificial protection to cut edges which is a feature of the Galvabond (or equivalent) material used for Pryda products. This protection is required for good corrosion resistance in contact with mortar.

All nails used for bracing units must be hand-hammered galvanised 35 x 3.15 mm Pryda Timber Connector Nails (OSNG). Pryda will not support the use of other nails unless they meet the requirements for machine driven nails in page 4.

DESIGN CAPACITIES

Pryda tests and computations have established the following Limit State Design capacities for Pryda bracings.

For the brace to develop tabulated tension or compression capacities, it must be anchored adequately at each end. In the case of Speedbrace or Strap Brace product, it is necessary to bend the brace around the anchor points to achieve the designated tension capacities. Angle Braces on the other hand are often governed by the end fixing capacity (nail capacities) as they cannot be bent at anchor points.

Tension Capacities:

<table>
<thead>
<tr>
<th>Code</th>
<th>Cross Section</th>
<th>Design Tension Capacity (ΦNj) kN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angle Brace (Mini and Maxi Brace)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MB</td>
<td>18 x 16 x 1.2 mm</td>
<td>7.8</td>
</tr>
<tr>
<td>AB</td>
<td>20 x 18 x 1.2 mm</td>
<td>9.5</td>
</tr>
<tr>
<td>Speedbrace</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDB</td>
<td>37 x 1.0 mm</td>
<td>8.7</td>
</tr>
<tr>
<td>Strap Brace</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SB082</td>
<td>25 x 0.8 mm</td>
<td>3.5</td>
</tr>
<tr>
<td>SB083</td>
<td>30 x 0.8 mm</td>
<td>5.2</td>
</tr>
<tr>
<td>SB103</td>
<td>30 x 1.0 mm</td>
<td>6.8</td>
</tr>
<tr>
<td>SB123</td>
<td>32 x 1.2 mm</td>
<td>9.4</td>
</tr>
</tbody>
</table>

Compression Capacities:

<table>
<thead>
<tr>
<th>Stud Spacing (mm)</th>
<th>Maxi Brace Design Compression Capacity (ΦNj) (kN) at:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Parallel to Brace</td>
</tr>
<tr>
<td>450</td>
<td>3.7</td>
</tr>
<tr>
<td>600</td>
<td>2.7</td>
</tr>
</tbody>
</table>

Note: As noted previously the design capacity of Angle Brace is limited by the number of nails at the ends. Using 35 x 3.15 mm Pryda Timber Connector Nails, the wind capacity will be limited to 1.8 kN (2 nails) or 2.8 kN (3 nails) in JD4 timber.
Fixing at the Top of Internal Bracing Units

At the top of internal bracing units, the wall must be fixed to the roof structure in order to transfer wind load from the roof to the walls – see Clause 8.3.6.9 of AS1684:2010 Part 2. Without this connection, these bracing units cannot act as part of the bracing system. For trussed roofs, the connection must allow a clearance for settlement of the trusses over time. The connection must have a shear capacity at least equivalent to the bracing capacity of the unit. Table 8.22 specifies suitable connections and their shear capacities.

Pryda has introduced a new product Pryda Shear Connectors (PSC) to help builders meet the requirements of AS1684. Complete details on the PSC is given in pages 14 and 15.

Fixing at the Bottom of Bracing Units (Tie-downs) – AS1684:2010 Requirements

AS1684-2010 Residential Timber Framed Construction - Parts 2, 3 and 4 specify requirements for bracing of walls (Section 8) which include fixing at the bottom of bracing walls (aka: bracing units, bracing panels).

Fixing Requirements for Bracing Walls- Simplified Interpretation

The following table interprets Clause 8.3.6.10 of AS1684:2010.

<table>
<thead>
<tr>
<th>Case</th>
<th>Bracing Wall Type</th>
<th>Fixing Requirements – General</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nominal bracing</td>
<td>Nominal fixing only – as per Table 9.4</td>
</tr>
<tr>
<td>2</td>
<td>Up to 3.4 kN/m capacity, included in Table 8.18</td>
<td>Nominal fixing only – as per Table 9.4 (see note below)</td>
</tr>
<tr>
<td>3</td>
<td>3.4 to 6.0 kN/m capacity, included in Table 8.18</td>
<td>As specified in Table 8.18</td>
</tr>
<tr>
<td>4</td>
<td>3.4 to 6.0 kN/m capacity, not included in Table 8.18</td>
<td>Determine uplift force from Table 8.23 and fixing detail from Table 8.24 or other tie-down fixing specification – or: - refer Ramset™ Ankascrews™ capacities in page 15 - use engineering design</td>
</tr>
<tr>
<td>5</td>
<td>6.0 kN/m or greater capacity, included in Table 8.18</td>
<td>As specified in Table 8.18. Where intermediate bottom plate fixings are not specified in Table 8.18, additional intermediate bottom plate fixings of minimum 1/ M10 bolt or 2/No. 14 Type 17 screws at maximum 1200 mm centres are required.</td>
</tr>
<tr>
<td>6</td>
<td>6.0 kN/m or greater capacity, not included in Table 8.18</td>
<td>As for case 4 above, with intermediate fixings</td>
</tr>
</tbody>
</table>

Note:
- Table 8.18 of AS1684.2:2010 nominates that bracing systems with a racking capacity of 3.4 kN/m require only nominal fixing of the bottom plate to the concrete slab/floor joists. This reduced requirement has been established from whole house testing programs, along with post-wind damage assessments of the performance of bracing in housing.
- The nominal fixing requirement for bottom plate to concrete slab as per Table 9.4 is “One 75 mm masonry nail (hand-driven at slab edge), screw or bolt at not more than 1200 mm centres”

Useful AS1684:2010 Clauses and Tables on Wall Bracing

1. Clause 8.3.6.10 Fixing of bottom of bracing walls
2. TABLE 8.18 STRUCTURAL WALL BRACING
3. TABLE 8.23 UPLIFT FORCE AT ENDS OF BRACING WALLS
4. TABLE 8.24 FIXING OF BOTTOM OF BRACING WALLS
5. TABLE 9.4 NOMINAL FIXINGS FOR TIMBER MEMBERS

AS1684 is subject to amendments and fabricators are advised to keep informed of amendments.
PRYDA SHEAR CONNECTORS

Connectors capable of transferring racking loads to bracing walls.

(a) Trusses perpendicular to wall

Pryda Shear Connector (PSC) in application (always used in pairs)

(b) Trusses parallel to wall

Application & Features

Pryda Shear Connectors (PSC) are used to transfer racking loads from the ceiling diaphragm to non-load bearing bracing walls.

These connectors allow vertical movement of trusses (to release creep deflection) and ensures that truss camber dissipation is uninhibited by over-driven nails.

PSC are fixed to top of bracing walls and can be used as a direct substitute for a pair of nail fixed timber blocks as specified in Table 8.22 AS 1684.2:2010 and AS1684.3:2010.

Table A provide design information on how PSC may be specified.

PSC should always be used in pairs as illustrated above.

Installation Instructions

1. All trusses are to be installed in accordance with the requirements of AS4440.

2. Discard any damaged product.

3. It is preferable (but not essential) to fix the Pryda Shear Connectors (PSC) after the roof cladding has been fixed and prior to the application of the ceiling material.

4. The PSC are to be installed in opposing pairs on the same bottom chord of a truss.

5. Ensure the connectors are located adjacent to each other and directly over the internal, non-load bearing bracing wall to which they are to be fixed.

6. Fix each connector to the truss bottom chord with the specified number of nails so that the connector is flush up against the vertical face and under side of the truss bottom chord.

7. Ensure the long leg of each connector passes under the bottom chord and is located directly over the underlying top plate.

8. Press vertically downwards on the free end of the long leg of the connector until it contacts the top face of the underlying top plate.

9. Fix the long leg down to the underlying top plate with the specified number of nails.

10. Repeat where marked on truss & wall frame layout.

Specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>1.0 mm G300 –Z275 Galvanised</td>
</tr>
<tr>
<td>Dimensions</td>
<td>30 mm wide x 300 mm (flat length)</td>
</tr>
<tr>
<td>Fixing to Truss</td>
<td>3/3.15 dia. x 35 Pryda Timber Connector nails or equivalent per connector</td>
</tr>
<tr>
<td>Fixing to Wall Plate</td>
<td>4 or 5/35 x 3.15 Pryda Timber Connector nails or equivalent per connector</td>
</tr>
</tbody>
</table>
Design Data

Table A provides the number of connections (a pair of PSC) required for standard braced wall lengths

**TABLE A – Pryda Shear Connector Selection Chart**

<table>
<thead>
<tr>
<th>BRACING TYPE</th>
<th>Wall Lengths (mm)</th>
<th>No. of pairs of Pryda Shear Connectors</th>
<th>No. of nail fixing onto top plate per connector**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 kN/m</td>
<td>1800</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2400</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2700</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>3.0 kN/m</td>
<td>1800</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2400</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2700</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>6.0 kN/m</td>
<td>600</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>900</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>1200</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>1500</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

** If nails are machine driven using 32 x 2.3 Duo-Fast SHEG or equivalent, provide one additional nail to the table values and ensure nails are driven away from holes.

Note: When specifying requirement for non-standard braced wall lengths, assume a pair of PSC (with 5 nails) is capable of resisting a maximum 2700 mm (for 1.5 kN/m capacity) and 1500 mm (for 3.0 kN/m capacity) wall lengths.
Tie-down Anchors

Suitable tie-down anchors for wall bracing units are:

<table>
<thead>
<tr>
<th>Application</th>
<th>Suitable Anchors</th>
</tr>
</thead>
<tbody>
<tr>
<td>External walls</td>
<td>Ramset™ AnkaScrews™ or equivalent&lt;br&gt;Ramset™ Chemset™ Injection 100 and 800 series or equivalent&lt;br&gt;Ramset™ Chemset™ Spin Capsules or equivalent</td>
</tr>
<tr>
<td>Internal walls</td>
<td>Ramset™ AnkaScrews™ and other Chemset™ Anchors as above&lt;br&gt;Ramset™ Dynabolt™ Anchors or equivalent&lt;br&gt;Ramset™ Trubolt™ Anchors or equivalent</td>
</tr>
</tbody>
</table>

For Design capacities and installation instructions on the above anchors, visit Ramset at www.ramset.com.au or contact Ramset direct.

Ramset™ AnkaScrews™ M12 x100 (AS12100H) is available from Pryda.

Design Capacities of Ramset™ AnkaScrews™

Ramset™ AnkaScrews™ through 35 mm thick bottom plates

<table>
<thead>
<tr>
<th>Part Code</th>
<th>Anchor Size</th>
<th>Effective Anchor Depth for 35 mm Bottom Plate (nominal)</th>
<th>Uplift Capacity (ΦNj) (kN)</th>
<th>Minimum Concrete Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>External Walls</td>
<td>Internal Walls</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>70 mm</td>
<td>90 mm</td>
</tr>
<tr>
<td>AS12100H</td>
<td>M12 x 100</td>
<td>60</td>
<td>5.2</td>
<td>5.8</td>
</tr>
<tr>
<td>AS12150H</td>
<td>M12 x 150</td>
<td>110</td>
<td>13.1</td>
<td>14.3</td>
</tr>
</tbody>
</table>

Ramset™ AnkaScrews™ through 45 mm thick bottom plates

<table>
<thead>
<tr>
<th>Part Code</th>
<th>Anchor Size</th>
<th>Effective Anchor Depth for 45 mm Bottom Plate</th>
<th>Uplift Capacity (ΦNj) (kN)</th>
<th>Minimum Concrete Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>External Walls</td>
<td>Internal Walls</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>70 mm</td>
<td>90 mm</td>
</tr>
<tr>
<td>AS12100H</td>
<td>M12 x 100</td>
<td>50</td>
<td>3.9</td>
<td>4.3</td>
</tr>
<tr>
<td>AS12150H</td>
<td>M12 x 150</td>
<td>100</td>
<td>11.3</td>
<td>12.5</td>
</tr>
</tbody>
</table>

Design capacities in the above tables are based on:
- Minimum Grade 20 concrete.
- Minimum anchor edge distances – external walls of 35 mm for 70 mm wall frames, 45 mm for 90 mm frames.
- Minimum anchor edge distances – internal walls ≥ 120 mm.
- Washers of sufficient capacity, as tabulated in the following table, must be installed between the anchor head and bottom wall plate.
- The final tie-down capacity is limited by the minimum of Anchor and the washer capacities.

Minimum Washer Sizes for Tie-down Anchors

<table>
<thead>
<tr>
<th>Square Washer Size (mm)</th>
<th>Round Washer Size (mm)</th>
<th>Washer Type and Pryda Code</th>
<th>Capacity (ΦNj) (kN) for Joint Group:</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 x 50 x 3.0</td>
<td>55 dia x 3.0</td>
<td>Standard OW12/56S</td>
<td>JD5</td>
</tr>
<tr>
<td>65 x 65 x 5.0</td>
<td>75 dia x 5.0</td>
<td>Heavy Duty OW12/65S</td>
<td>JD4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>JD5</th>
<th>JD4</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.4</td>
<td></td>
<td>10.5</td>
</tr>
<tr>
<td>20.8</td>
<td>26.1</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX
This appendix to the Pryda Bracing Guide provides information and recommendations on design, construction and engineering matters related to the bracing of walls in timber framed construction. It has been prepared by Pryda engineers in response to questions from Pryda licensed frame manufacturers.

HOW DOES BRACING WORK?
Bracing is an essential part of any building. To design and install bracing that “works” (is effective in resisting the loads caused by the wind), it is essential to understand how bracing works. Otherwise serious building problems can arise. The following topics are intended to simply explain the basic concepts of bracing systems.

Bracing is a System
It is most important to realise that Pryda bracings and other types of bracings “work” as part of a bracing system which comprises:
1. The bracing.
2. The fixing of the bracing to the frame, especially the end fixing (ie, nails).
3. Any straps required as part of the bracing unit.
4. The parts of the frame to which the bracing is fixed, ie, wall plates, studs, including any joints in the wall plates (see note below).
5. The connection of the braced part of the frame to the supporting structure, eg, fixing of the bracing unit to the floor system.
6. The parts of the building which transmit the applied wind load down to the footings and ground.

These elements of the bracing system are like links in a chain and all must be strong enough to take the wind load or the whole system may collapse. For example, if the braces are not adequately fixed or if the bracing unit is not properly tied down, the bracing system may fail.

Bracing Must Work in All Directions
Because wind can blow in any direction, the bracing system must also be effective in all directions. Therefore, bracing must be installed in walls along the length of the building and walls across the width - as well as in the roof. Also, in any wall diagonal bracing should be at both diagonals if possible, to resist the wind in both directions along the wall.

The external corners of the building should be braced to avoid distortion of the building under wind at an angle to wall directions.

Note: As far as is practicable, a unit should be placed at each corner of the exterior walls. The other units are to be distributed fairly evenly through the interior walls. AS1684 clause 6.3.6.9 requires that interior bracing walls be fixed to the ceiling or roof frame to transfer shear loads - see Table 8.22 of the code.

Bracing Must Be Spread Throughout the Whole Building
Wind can, of course, blow on any part of the building, including the roof. Bracing must therefore, as much as possible, be installed throughout the whole building to provide adequate wind resistance in all parts of the frame. Bracing in internal walls transfers to the floor structure not only internal wall pressure, but also horizontal wind load on the roof. That is one reason why internal bracing units must be connected to the roof.
The Higher the Building, the Greater the Wind Load

The force in the bracing system for the lower storey of two storey buildings is much greater than in the upper storey or in a single storey building due to:

1. The wind causing the load on the lower storey blows on 1 ½ storeys plus the roof, compared to ½ storey plus the roof.
2. The speed of the wind, and therefore its force, increases with height above ground. For example, the wind force at 10 m height is rated as 18% greater than at 4 m.

Therefore, bracing in the lower storey of two storey constructions is required to be about 60% stronger than for the upper storey or single storey. Two storey constructions with a substantial area of exterior windows or doors in the lower storey, especially with open-plan areas, can be impossible to adequately brace by conventional methods; special engineering design and/or changes to the layout may be required.

Single Storey or Upper Storey Walls:
Area of elevation (causing load on bracing) is the vertical area above mid-height of the wall frame.

Lower Storey Walls:
Area of elevation (causing load on bracing) is the vertical area above mid-height of the lower wall frame.

Bracing Must Be Straight and Not Cut
Bracing must be straight (not bent) and not cut as any bends, kinks, distortions or any cutting can weaken the bracing substantially. Do not cross-over Angle Brace (Mini or Maxi Brace).

Keep Nails Away From Edges And Ends Of Timber
Nails driven too close to the edge or ends of studs or wall plates can cause splitting of the timber and therefore, a substantial loss of strength in the joints. Ideally, maintain the recommended minimum end and edge distances.

Layout & Spacing of Bracing Units

To locate the wall bracing units:

- On the building plan drawing, determine the lengths of external and internal walls available for installation of bracing units.
- In accordance with AS1684.2:2010:
  (a) Locate a bracing unit near each corner of the building.
  (b) Distribute bracing units as evenly as possible throughout the building.

Note: Maximum spacing between units is 9.0 m for N1 and N2; see AS1684.2:2010 Cl. 8.3.6.7 otherwise.
Locating a Bracing Unit Near Each Corner of the Plan

Clause 8.3.6.6 *Location and distribution of bracing* of AS1684 Part 2 specifies: “Bracing shall initially be placed in external walls and where possible at the corners of the building.” Figure 1. below is an example of this first step. Note that in the bottom wall at the right corner, there isn’t enough wall length at the corner to fit in a bracing unit. Consequently, a unit is located in the closest available location, to the left.

Figure 1. Bracing Location – Step 1

Distributing Bracing Units as Evenly as Possible Throughout the Building

Clause 8.3.6.6 of AS1684 Part 2 also specifies: *Bracing shall be approximately evenly distributed and shall be provided in both directions*. Figure 2. below shows even distribution of bracing units throughout the internal walls in both directions.

Figure 2. Bracing Location – Final Step
Design of “Difficult” Buildings

Some timber framed buildings are “difficult” to adequately brace because:

1. They do not have enough braceable wall lengths to include all the required bracing units. 
   Note: This is due to the presence of many window or door openings and particularly common in two-storey houses with large open areas in the ground floor.

2. The spacing between braceable wall lengths is greater than the specified maximum.

For such buildings, Clause 8.3.6.7 of AS1684 Part 2 specifies: Where bracing cannot be placed in external walls because of openings or the like, a structural diaphragm ceiling may be used to transfer racking forces to bracing walls that can support the loads. Parallel chord trusses installed in the horizontal plane, commonly known as “Wind Trusses” are sometimes adopted to facilitate this. Alternatively, wall frames may be designed for portal action. Structural ceilings, wind trusses and portal frames require engineering design. Advice can be obtained from Pryda engineers or a consulting engineer.

Guide to Handling Wall Bracing Jobs