

Gamcorp (Melbourne) Pty Ltd A.C.N 141 076 904 A.B.N 73 015 060 240  
[www.gamcorp.com.au](http://www.gamcorp.com.au) Email: [melbourne@gamcorp.com.au](mailto:melbourne@gamcorp.com.au)  
Suite 4, 346 Ferntree Gully Rd, Notting Hill VIC 3149. Tel: 03 9543 2211

Our Ref: 9171-Pierced Fix Roof 02/AdA  
25 January 2021

Innosearch Pty Ltd  
22 Charlotte St  
Merrylands NSW 2160

## **PV Array Frame Engineering Certification**

### **RE: AS/NZ 1170.2 Certification for Tilt Mounted System on Tin Roof (Pierced Fix Roof)**

Gamcorp (Melbourne) Pty Ltd, being Structural Engineers within the meaning of Australian Building Regulations, have carried out a structural design check of Tilt Mounted System on Tin Roof (Pierced Fix Roof) within Australia. The design check is based on the information and test reports provided by Innosearch Pty Ltd.

Components of the system covered in this certificate shown in the table below:

| Component       | Part No                                                    |
|-----------------|------------------------------------------------------------|
| Rail            | PV001                                                      |
| Rail Splice     | PV-NUT01&B                                                 |
| Tilt Mount Set  | Adjustable Rear Leg (15°-30°), Front Leg for Tilt Mounting |
| Inter Clamp Kit | PV-CLA01&A                                                 |
| End Clamp Kit   | PV-CLA40&A                                                 |

This certificate is **only valid** for Tilt Mounted System on Tin Roof (Pierced Fix Roof) itself. The roof structure or the building structure and PV panels shall be assessed separately and accordingly.

This certificate is **only valid** when fixing into minimum 1.9BMT steel or minimum JD4 seasoned timber. If the fixing condition is different from those conditions, interface spacing shall be reviewed and validated.

This certificate is **only valid** as a whole. Any information extracted from this certificate is not valid if standing alone.

Gamcorp (Melbourne) Pty Ltd A.C.N 141 076 904 A.B.N 73 015 060 240  
[www.gamcorp.com.au](http://www.gamcorp.com.au) Email: [melbourne@gamcorp.com.au](mailto:melbourne@gamcorp.com.au)  
Suite 4, 346 Ferntree Gully Rd, Notting Hill VIC 3149. Tel: 03 9543 2211

We find the Installation of Tilt Mounted System on Tin Roof (Pierced Fix Roof) for Australian/New Zealand use to be structurally sufficient based on the following conditions:

- Wind loads to AS/NZ1170.2:2011(R2016) Wind actions
- Wind region **A, B, C, D, W**
- Wind terrain category **2 & 3**
- Wind average recurrence interval of **200 years**
- Maximum building height **20m**
- The maximum assessed PV panel dimensions are **1840mm x 998mm & 2274mm x 1134mm**
- Weight of the PV panel and array frame to be 15 kg/m<sup>2</sup>
- Material of Rails to be **AL6005-T5**
- The spacings are determined based on fixings into minimum JD4 seasoned timber and 1.9mm thick steel purlins
- Each PV panel to be installed using **2 rails** minimum in all circumstances
- Installation of PV panels to be done in accordance with the PV panels installation manual
- The certification **excludes** assessment of roof structure and PV panels

***Refer to attached summary table for interface spacing (Unit: mm)***

**NOTES:**

- **The recommended spacing nominated in this certification is based on the capacity of the array frame and the fixing of array frames to the roof, not the roof structure and PV panels. It is the responsibility of the installer to adopt the most critical spacing.**
- **If any of the above conditions cannot be met, the structural engineer must be notified immediately.**
- **The capacity of tilt leg was obtained from test report no. 50394672 001, dated 21.08.2020 and provided by TUV Rheinland.**
- **The spacing shown in the interface tables shall be adjusted based on the assessment and requirement of the roof structures.**

Gamcorp (Melbourne) Pty Ltd A.C.N 141 076 904 A.B.N 73 015 060 240  
[www.gamcorp.com.au](http://www.gamcorp.com.au) Email: [melbourne@gamcorp.com.au](mailto:melbourne@gamcorp.com.au)  
Suite 4, 346 Ferntree Gully Rd, Notting Hill VIC 3149. Tel: 03 9543 2211

Construction is to be carried out strictly in accordance with the manufacturers instructions. This work was designed by **Acha De Alwis** in accordance with the provisions of relevant Building Regulations and in accordance with sound, widely accepted engineering principles. This certificate is only valid till 22/01/2023. Gamcorp should be contacted for future validation. Contact Gamcorp for customised system or if the site conditions are not covered by this assessment.

Yours faithfully,  
Gamcorp (Melbourne) Pty Ltd

A handwritten signature in black ink, appearing to read 'Jianzeng Geng'.

Jianzeng Geng  
Technical Director  
FIEAust CPEng NER 3108316  
NT Registration: 239858ES  
QLD Registration: 18455  
VIC Registration: EC 39483  
TAS Registration: CC7263

Attachments:

- Summary table for interface spacing, Tilt mount - Tin Roof (Pierced Fix Roof);



# gamcorp

Relationships built on trust

Gamcorp (Melbourne) Pty Ltd  
Consulting Structural & Civil Engineers  
A.C.N 141 076 904  
A.B.N 73 015 060 240

[www.gamcorp.com.au](http://www.gamcorp.com.au)  
[melbourne@gamcorp.com.au](mailto:melbourne@gamcorp.com.au)

## Structural Design Documentation

**Tilt Array Frame System Spacing Table For Tin Roof  
(Pierced Fix Roof)  
According to AS/NZS 1170.2-2011 (R2016)  
with Rail PV001  
within Australia/New Zealand  
Terrain Category 2 & 3**

For: Innosearch Pty Ltd  
22 Charlotte St  
Merrylands NSW 2160

Job Number: 9171 – 02  
Date: 25 January 2021



**COPYRIGHT:** The concepts and information contained in this document are the property of Gamcorp (Melbourne) Pty Ltd. Use or copying of this document in whole or in part without the written permission of Gamcorp constitutes an infringement of copyright.

**LIMITATION:** This report has been prepared on behalf of and for the exclusive use of Gamcorp (Melbourne) Pty Ltd's Client, and is subject to and issued in connection with the provisions of the agreement between Gamcorp (Melbourne) Pty Ltd and its Client. Gamcorp (Melbourne) Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

**Job No:** 9171 - 02  
**Client:** Innosearch Pty Ltd  
**Project:** Tilt Array Frame System Spacing Table For Tin Roof  
(Pierced Fix Roof)  
with Rail PV001  
**Address:** within Australia/New Zealand

**Australian Standards**

AS/NZS 1170.0:2002 – Structural design actions, Part 0: General principles  
AS/NZS 1170.1:2002 (R2016) – Structural design actions, Part 1: Permanent, imposed  
and other actions  
AS/NZS 1170.2:2011 (R2016) – Structural design actions, Part 2: Wind actions  
AS/NZS 1664.1:1997 – Aluminium structures - Limit state design  
AS 4100:1998 (R2016) – Steel Structures  
AS/NZS 4600:2018 – Cold-formed Steel Structures

**Wind Terrain Category:** WTC 2 & 3

**Designed:** AdA  
**Checked:** HS

**Date:** Jan-21

**Tilt Array Frame System Spacing Table For Tin Roof  
 (Pierced Fix Roof) - mm**

Type of Rail PV001  
 Type of Interface Tilt Roof Set  
 Solar Panel Dimension 1.840m x 0.998m  
 Terrain category 2

Tilt angle to roof surface ( $\alpha$ ) –  $\alpha \leq 15^\circ$

| Wind Region | Building Height – H (m) |      |                  |          |        |      |                  |          |         |      |                  |          |         |      |                  |          |
|-------------|-------------------------|------|------------------|----------|--------|------|------------------|----------|---------|------|------------------|----------|---------|------|------------------|----------|
|             | H≤5                     |      |                  |          | 5<H≤10 |      |                  |          | 10<H≤15 |      |                  |          | 15<H≤20 |      |                  |          |
|             | Corner                  | Edge | Interme<br>diate | Internal | Corner | Edge | Interme<br>diate | Internal | Corner  | Edge | Interme<br>diate | Internal | Corner  | Edge | Interme<br>diate | Internal |
| A           | 620                     | 945  | 1285             | 1710     | 505    | 775  | 1050             | 1590     | 460     | 695  | 945              | 1455     | 435     | 660  | 895              | 1375     |
| B           | --                      | 635  | 855              | 1320     | --     | 520  | 705              | 1075     | --      | 470  | 635              | 970      | --      | 445  | 595              | 915      |
| C           | --                      | --   | 445              | 680      | --     | --   | 365              | 555      | --      | --   | --               | 500      | --      | --   | --               | 475      |
| D           | --                      | --   | --               | 435      | --     | --   | --               | 360      | --      | --   | --               | --       | --      | --   | --               | --       |
| W           | 470                     | 715  | 970              | 1500     | --     | 590  | 795              | 1225     | --      | 530  | 715              | 1100     | --      | 505  | 680              | 1040     |

Tilt angle to roof surface ( $\alpha$ ) –  $15^\circ < \alpha \leq 30^\circ$

| Wind Region | Building Height – H (m) |      |                  |          |        |      |                  |          |         |      |                  |          |         |      |                  |          |
|-------------|-------------------------|------|------------------|----------|--------|------|------------------|----------|---------|------|------------------|----------|---------|------|------------------|----------|
|             | H≤5                     |      |                  |          | 5<H≤10 |      |                  |          | 10<H≤15 |      |                  |          | 15<H≤20 |      |                  |          |
|             | Corner                  | Edge | Interme<br>diate | Internal | Corner | Edge | Interme<br>diate | Internal | Corner  | Edge | Interme<br>diate | Internal | Corner  | Edge | Interme<br>diate | Internal |
| A           | --                      | 470  | 630              | 965      | --     | --   | 520              | 790      | --      | --   | 465              | 710      | --      | --   | 445              | 675      |
| B           | --                      | --   | 425              | 645      | --     | --   | --               | 530      | --      | --   | --               | 480      | --      | --   | --               | 455      |
| C           | --                      | --   | --               | 335      | --     | --   | --               | --       | --      | --   | --               | --       | --      | --   | --               | --       |
| D           | --                      | --   | --               | --       | --     | --   | --               | --       | --      | --   | --               | --       | --      | --   | --               | --       |
| W           | --                      | --   | 480              | 730      | --     | --   | --               | 600      | --      | --   | --               | 545      | --      | --   | --               | 515      |

**Tilt Array Frame System Spacing Table For Tin Roof**  
**(Pierced Fix Roof) - mm**

Type of Rail: PV001  
 Type of Interface: Tilt Roof Set  
 Solar Panel Dimension: 1.840m x 0.998m  
 Terrain category: 3

Tilt angle to roof surface ( $\alpha$ ) –  $\alpha \leq 15^\circ$

| Wind Region | Building Height – H (m) |      |              |          |            |      |              |          |             |      |              |          |             |      |              |          |
|-------------|-------------------------|------|--------------|----------|------------|------|--------------|----------|-------------|------|--------------|----------|-------------|------|--------------|----------|
|             | H ≤ 5                   |      |              |          | 5 < H ≤ 10 |      |              |          | 10 < H ≤ 15 |      |              |          | 15 < H ≤ 20 |      |              |          |
|             | Corner                  | Edge | Intermediate | Internal | Corner     | Edge | Intermediate | Internal | Corner      | Edge | Intermediate | Internal | Corner      | Edge | Intermediate | Internal |
| A           | 745                     | 1145 | 1565         | 1810     | 745        | 1145 | 1565         | 1810     | 645         | 990  | 1345         | 1735     | 575         | 885  | 1200         | 1665     |
| B           | 505                     | 765  | 1040         | 1605     | 505        | 765  | 1040         | 1605     | 435         | 665  | 895          | 1385     | --          | 590  | 800          | 1230     |
| C           | --                      | 400  | 535          | 825      | --         | 400  | 535          | 825      | --          | 345  | 465          | 710      | --          | --   | 415          | 630      |
| D           | --                      | --   | 345          | 530      | --         | --   | 345          | 530      | --          | --   | --           | 455      | --          | --   | --           | 405      |
| W           | 570                     | 870  | 1180         | 1635     | 570        | 870  | 1180         | 1635     | 495         | 750  | 1020         | 1550     | 440         | 670  | 905          | 1395     |

Tilt angle to roof surface ( $\alpha$ ) –  $15^\circ < \alpha \leq 30^\circ$

| Wind Region | Building Height – H (m) |      |              |          |            |      |              |          |             |      |              |          |             |      |              |          |
|-------------|-------------------------|------|--------------|----------|------------|------|--------------|----------|-------------|------|--------------|----------|-------------|------|--------------|----------|
|             | H ≤ 5                   |      |              |          | 5 < H ≤ 10 |      |              |          | 10 < H ≤ 15 |      |              |          | 15 < H ≤ 20 |      |              |          |
|             | Corner                  | Edge | Intermediate | Internal | Corner     | Edge | Intermediate | Internal | Corner      | Edge | Intermediate | Internal | Corner      | Edge | Intermediate | Internal |
| A           | --                      | 565  | 765          | 1175     | --         | 565  | 765          | 1175     | --          | 490  | 660          | 1010     | --          | 440  | 590          | 900      |
| B           | --                      | --   | 515          | 785      | --         | --   | 515          | 785      | --          | --   | 445          | 675      | --          | --   | --           | 605      |
| C           | --                      | --   | --           | 405      | --         | --   | --           | 405      | --          | --   | --           | 350      | --          | --   | --           | --       |
| D           | --                      | --   | --           | --       | --         | --   | --           | --       | --          | --   | --           | --       | --          | --   | --           | --       |
| W           | --                      | 430  | 580          | 885      | --         | 430  | 580          | 885      | --          | --   | 505          | 770      | --          | --   | 450          | 685      |

**Tilt Array Frame System Spacing Table For Tin Roof  
 (Pierced Fix Roof) – mm**

Type of Rail PV001  
 Type of Interface Tilt Roof Set  
 Solar Panel Dimension 2.274m x 1.134m  
 Terrain category 2

Tilt angle to roof surface ( $\alpha$ ) –  $\alpha \leq 15^\circ$

| Wind Region | Building Height – H (m) |      |                  |          |        |      |                  |          |         |      |                  |          |         |      |                  |          |
|-------------|-------------------------|------|------------------|----------|--------|------|------------------|----------|---------|------|------------------|----------|---------|------|------------------|----------|
|             | H≤5                     |      |                  |          | 5<H≤10 |      |                  |          | 10<H≤15 |      |                  |          | 15<H≤20 |      |                  |          |
|             | Corner                  | Edge | Interme<br>diate | Internal | Corner | Edge | Interme<br>diate | Internal | Corner  | Edge | Interme<br>diate | Internal | Corner  | Edge | Interme<br>diate | Internal |
| A           | --                      | 685  | 1040             | 1595     | --     | 585  | 845              | 1315     | --      | 450  | 690              | 1180     | --      | 345  | 655              | 1115     |
| B           | --                      | 515  | 695              | 1070     | --     | 310  | 570              | 870      | --      | --   | 515              | 785      | --      | --   | 485              | 740      |
| C           | --                      | --   | --               | 550      | --     | --   | --               | 450      | --      | --   | --               | 405      | --      | --   | --               | 385      |
| D           | --                      | --   | --               | --       | --     | --   | --               | --       | --      | --   | --               | --       | --      | --   | --               | --       |
| W           | --                      | 450  | 685              | 1215     | --     | --   | 575              | 990      | --      | --   | 450              | 890      | --      | --   | 345              | 755      |

Tilt angle to roof surface ( $\alpha$ ) –  $15^\circ < \alpha \leq 30^\circ$

| Wind Region | Building Height – H (m) |      |                  |          |        |      |                  |          |         |      |                  |          |         |      |                  |          |
|-------------|-------------------------|------|------------------|----------|--------|------|------------------|----------|---------|------|------------------|----------|---------|------|------------------|----------|
|             | H≤5                     |      |                  |          | 5<H≤10 |      |                  |          | 10<H≤15 |      |                  |          | 15<H≤20 |      |                  |          |
|             | Corner                  | Edge | Interme<br>diate | Internal | Corner | Edge | Interme<br>diate | Internal | Corner  | Edge | Interme<br>diate | Internal | Corner  | Edge | Interme<br>diate | Internal |
| A           | --                      | --   | --               | 710      | --     | --   | --               | 585      | --      | --   | --               | 465      | --      | --   | --               | 390      |
| B           | --                      | --   | --               | 525      | --     | --   | --               | 320      | --      | --   | --               | --       | --      | --   | --               | --       |
| C           | --                      | --   | --               | --       | --     | --   | --               | --       | --      | --   | --               | --       | --      | --   | --               | --       |
| D           | --                      | --   | --               | --       | --     | --   | --               | --       | --      | --   | --               | --       | --      | --   | --               | --       |
| W           | --                      | --   | --               | 465      | --     | --   | --               | --       | --      | --   | --               | --       | --      | --   | --               | --       |

**Tilt Array Frame System Spacing Table For Tin Roof**  
**(Pierced Fix Roof) - mm**

Type of Rail: PV001  
 Type of Interface: Tilt Roof Set  
 Solar Panel Dimension: 2.274m x 1.134m  
 Terrain category: 3

Tilt angle to roof surface ( $\alpha$ ) –  $\alpha \leq 15^\circ$

| Wind Region | Building Height – H (m) |      |             |          |        |      |             |          |         |      |             |          |         |      |             |          |
|-------------|-------------------------|------|-------------|----------|--------|------|-------------|----------|---------|------|-------------|----------|---------|------|-------------|----------|
|             | H≤5                     |      |             |          | 5<H≤10 |      |             |          | 10<H≤15 |      |             |          | 15<H≤20 |      |             |          |
|             | Corner                  | Edge | Intermedate | Internal | Corner | Edge | Intermedate | Internal | Corner  | Edge | Intermedate | Internal | Corner  | Edge | Intermedate | Internal |
| A           | 570                     | 930  | 1265        | 1715     | 570    | 930  | 1265        | 1715     | 320     | 745  | 1085        | 1625     | --      | 650  | 970         | 1510     |
| B           | 295                     | 620  | 840         | 1300     | 295    | 620  | 840         | 1300     | --      | 535  | 725         | 1120     | --      | 480  | 645         | 995      |
| C           | --                      | --   | 435         | 665      | --     | --   | 435         | 665      | --      | --   | 370         | 575      | --      | --   | --          | 510      |
| D           | --                      | --   | --          | 425      | --     | --   | --          | 425      | --      | --   | --          | 345      | --      | --   | --          | --       |
| W           | --                      | 615  | 955         | 1485     | --     | 615  | 955         | 1485     | --      | 550  | 720         | 1275     | --      | --   | 640         | 1130     |

Tilt angle to roof surface ( $\alpha$ ) –  $15^\circ < \alpha \leq 30^\circ$

| Wind Region | Building Height – H (m) |      |             |          |        |      |             |          |         |      |             |          |         |      |             |          |
|-------------|-------------------------|------|-------------|----------|--------|------|-------------|----------|---------|------|-------------|----------|---------|------|-------------|----------|
|             | H≤5                     |      |             |          | 5<H≤10 |      |             |          | 10<H≤15 |      |             |          | 15<H≤20 |      |             |          |
|             | Corner                  | Edge | Intermedate | Internal | Corner | Edge | Intermedate | Internal | Corner  | Edge | Intermedate | Internal | Corner  | Edge | Intermedate | Internal |
| A           | --                      | --   | 575         | 950      | --     | --   | 575         | 950      | --      | --   | 345         | 775      | --      | --   | --          | 660      |
| B           | --                      | --   | 305         | 635      | --     | --   | 305         | 635      | --      | --   | --          | 545      | --      | --   | --          | 490      |
| C           | --                      | --   | --          | --       | --     | --   | --          | --       | --      | --   | --          | --       | --      | --   | --          | --       |
| D           | --                      | --   | --          | --       | --     | --   | --          | --       | --      | --   | --          | --       | --      | --   | --          | --       |
| W           | --                      | --   | --          | 630      | --     | --   | --          | 630      | --      | --   | --          | 560      | --      | --   | --          | 355      |

### General Notes

Note 1 Following components are satisfied to use according to AS/NZS 1170.2-2011(R2016)

| Components           | Part Number                                                   | Description                                    |
|----------------------|---------------------------------------------------------------|------------------------------------------------|
| Rail                 | PV001                                                         | As per drawing& test report provided by client |
| Splice               | PV-NUT01&B                                                    |                                                |
| Standard Tilt System | Adjustable Rear Leg (15°-30°),<br>Front Leg for Tilt Mounting |                                                |

Note 2 Spacing calculated based on 1.9mm steel purlin or 35mm screw embedment length into timber (JD4 seasoned timber).

Note 3 Recommended screws

|                        |                                              |
|------------------------|----------------------------------------------|
| Metal Purlins/Battens  | 14g-10 TPI Tek screws or approved equivalent |
| Timber Purlins/Battens | 14g-10 TPI T17 screws or approved equivalent |

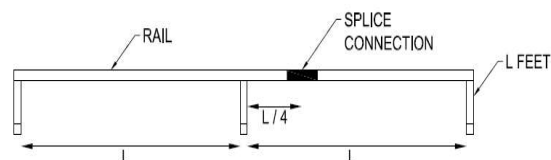
Note 4 Maximum uplift wind pressure is limited to 5 kPa. "---" states more uplift pressure.

Note 5 Tilt angle is measured from roof surface.

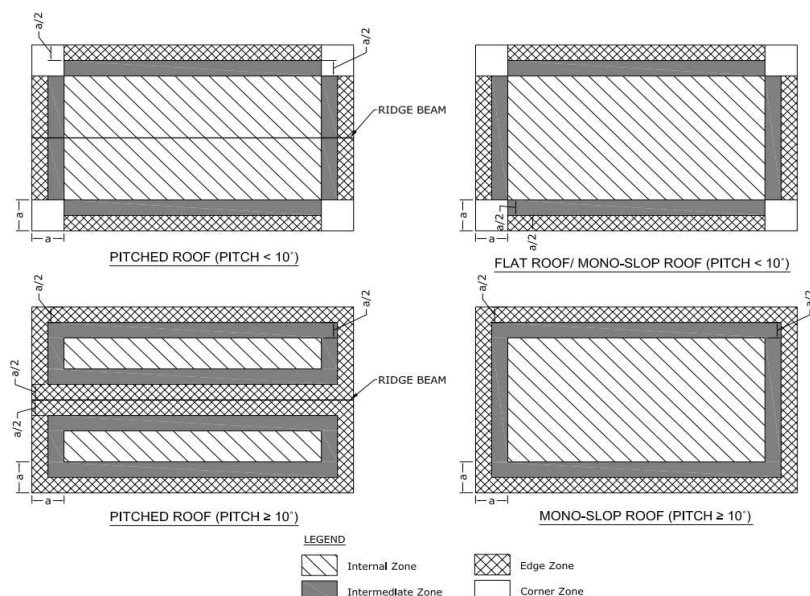
Note 6 Deflection is limited to Minimum of L/120 and 15mm

Note 7 Terrain Category 2 (TC2) refers to open terrain, including grassland, with well-scattered obstructions having heights generally from 1.5 m to 5 m, with no more than two obstructions per hectare, e.g. farmland and cleared subdivisions with isolated trees and uncut grass.  
 Terrain Category 3 (TC3) refers to terrain with numerous closely spaced obstructions having heights generally from 3 m to 10 m. The minimum density of obstructions shall be at least the equivalent of 10 house-size obstructions per hectare, e.g. suburban housing, light industrial estates or dense forests.

Note 8 The optimised location of rail splice connection is at quarter length of the spacing of the interface. No Splice connection should be placed at the centre of spacing or over the interface.



Note 9 Refer Figure 1 for definition of roof zones.



**TILT ROOF SET**

Figure 1 - Roof Zones Definition

In Figure 1, the value of dimension "a" is the minimum of 0.2b, 0.2d and h. (b & d are building dimensions and h is its height)