Gamcorp (Melbourne) Pty Ltd A.C.N 141 076 904 A.B.N 73 015 060 240
www.gamcorp.com.au Email: melbourne@gamcorp.com.au
35 Butler St, Richmond VIC 3121. Tel: 03 9543 2211

Our Ref: 11174 – Tile/BL

12 May 2022

Broad AUS Pty Ltd
2/48 Boronia Grove,
Doncaster East VIC 3109

PV Array Frame Engineering Certification

Installation of Broad Roof Mount Solar System on Tile Roof with Broad Rail 55

Gamcorp (Melbourne) Pty Ltd, being Structural Engineers within the meaning of Australian Building Regulations, have carried out a structural design check of BROAD Roof Mount Solar System installation on tile roof within Australia. The design check is based on the information and test reports provided by Broad AUS Pty Ltd.

This certificate is **only valid** for the BROAD Roof Mount Solar System 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 JD4 seasoned timber and 1.9BMT steel. If the fixing condition is different from this condition, 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.

This certificate is based on the following structural drawing and test reports:

- Structural drawing "Rail 55.dwg" provided by Xiamen Broad New Energy Co.,Ltd, dated on 27/12/2021
- Structural drawing "Drawings of BROAD Solar roof mounting system components.PDF" received on 26/11/18
- Middle and End Panel Clamp test report by Xiamen Broad New Energy Co.,Ltd, dated 11/03/2019
- Tile Roof Hook Test report No.: XMIN1901000447ML by SGS, dated 29/01/2019

We find the Installation of Broad Roof Mount Solar System on tile roof for Australian use to be structurally sufficient based on the following conditions:

- Wind loads to AS/NZ1170.2:2021 Wind actions
- Wind region **A, B1, B2, C, D**
- Wind terrain category **2 & 3**
- Wind average recurrence interval of **200 years**
- Maximum building height **20m**
- The assessed PV Panel dimensions are **2.25m x 1.2m, 2mx1m**
- Panels to be flush-mounted to the roof surface

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- Weight of the PV panel and array frame to be 15 kg/m2
- Rails to be **Broad Rail 55**
- Refer to Note 1 for the assessed components and test reports provided
- The spacings are determined based on fixings into minimum JD4 seasoned timber or 1.9BMT steel
- Each PV Panel to be installed using **2 rails minimum**
- No PV Panel to be installed within 2 x s from edges and ridge. "s" is the maximum gap between the underside of the PV Panel and the roof surface when installed on the roof (50mm≤s≤300mm)
- 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 specified fixing, 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 spacing shown in the interface tables shall be adjusted based on the assessment and requirement of the roof structures**

Construction is to be carried out strictly in accordance with the manufacturers instructions. This work was designed by **Bianca Liu** in accordance with the provisions of Australian Building Regulations and in accordance with sound, widely accepted engineering principles. This certification is only valid till 13/05/2024 and shall seek Gamcorp for re-validation after this date.

Yours faithfully,
Gamcorp (Melbourne) Pty Ltd

L. Van Spaandonk

Principal Engineer
FIEAust CPEng NER 5038980
NT Registration: 244137ES
QLD Registration: 18703
VIC Registration: PE0001956
TAS Registration: CC7366

ISO 9001:2015 Registered Firm
Certificate No: AU1222

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Structural Design Documentation

Flush Array Frame System Spacing Table

According to AS/NZS 1170.2-2021
with Broad Rail R55 – Tile Roof
within Australia
Terrain Category 2 & 3

For: Broad AUS Pty Ltd
2/48 Boronia Grove
Doncaster East VIC 3109

Job Number: 11174
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Job No: **11174**
Client: **Broad AUS Pty Ltd**
Project: **Flush Array Frame System Spacing Table**
with Broad Rail R55 – Tile Roof
Address: **within Australia**
Wind Terrain Category: **Terrain Category 2 & 3**

Australian/New Zealand 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 1170.2:2021	Structural design actions Part 2: Wind actions
AS/NZS 1664.1:1997 (R2020)	Aluminium structures Part 1: Limit state design
AS/NZS 4600:2018	Cold-formed steel structures
AS 4100:2020	Steel structures

Designed: **BL**
Checked: **AA**
Date: **May-22**

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Client: **Broad AUS Pty Ltd**
Project: **Flush Array Frame System Spacing Table with Broad Rail R55 – Tile Roof**
Address: **within Australia**

Job: **11174**
Date: **May-22**
Designed: **BL**
Checked: **AA**

Flush Array Frame System Spacing Table for Tile Roof (mm)

Type of Rail	Broad Rail 55
Type of Interface	Tile Roof Hook
Solar Panel Dimension	2.25mx1.2m
Terrain category	**3**

h/d ≤ 0.5 *

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	--	**605**	**855**	**1460**	--	**605**	**855**	**1460**	--	**515**	**720**	**1205**	--	**450**	**630**	**1040**
B1	--	**600**	**850**	**1450**	--	**600**	**850**	**1450**	--	**510**	**715**	**1195**	--	**450**	**630**	**1040**
B2	--	**475**	**665**	**1105**	--	**475**	**665**	**1105**	--	**410**	**565**	**925**	--	--	**500**	**805**
C	--	--	**430**	**690**	--	--	**430**	**690**	--	--	--	**590**	--	--	--	**515**
D	--	--	--	**520**	--	--	--	**520**	--	--	--	**445**	--	--	--	**390**

h/d ≥ 1.0 *

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	--	**390**	**550**	**895**	--	**390**	**550**	**895**	--	--	**470**	**755**	--	--	**415**	**660**
B1	--	**390**	**545**	**890**	--	**390**	**545**	**890**	--	--	**465**	**750**	--	--	**415**	**660**
B2	--	--	**435**	**695**	--	--	**435**	**695**	--	--	--	**595**	--	--	--	**520**
C	--	--	--	**450**	--	--	--	**450**	--	--	--	--	--	--	--	--
D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

*** For intermediate values of h/d ratios, linear interpolation shall be used. Refer Note 9 for defination h and d.**

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Client: **Broad AUS Pty Ltd**
Project: **Flush Array Frame System Spacing Table with Broad Rail R55 – Tile Roof**
Address: **within Australia**

Job: **11174**
Date: **May-22**
Designed: **BL**
Checked: **AA**

Flush Array Frame System Spacing Table for Tile Roof (mm)

Type of Rail	Broad Rail 55
Type of Interface	Tile Roof Hook
Solar Panel Dimension	2.25mx1.2m
Terrain category	**2**

h/d ≤ 0.5 *

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	--	485	680	1130	--	390	545	890	--	--	485	785	--	--	455	735
B1	--	485	680	1130	--	365	540	885	--	--	485	785	--	--	455	735
B2	--	--	535	870	--	--	430	690	--	--	--	615	--	--	--	580
C	--	--	--	560	--	--	--	450	--	--	--	400	--	--	--	--
D	--	--	--	425	--	--	--	--	--	--	--	--	--	--	--	--

h/d ≥ 1.0 *

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	--	--	445	710	--	--	--	570	--	--	--	510	--	--	--	475
B1	--	--	445	710	--	--	--	565	--	--	--	510	--	--	--	475
B2	--	--	--	560	--	--	--	450	--	--	--	405	--	--	--	--
C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

*** For intermediate values of h/d ratios, linear interpolation shall be used. Refer Note 9 for defination h and d.**

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Job: **11174**
Date: **May-22**
Designed: **BL**
Checked: **AA**

Flush Array Frame System Spacing Table for Tile Roof (mm)

Type of Rail	Broad Rail 55
Type of Interface	Tile Roof Hook
Solar Panel Dimension	2mx1m
Terrain category	**3**

h/d ≤ 0.5 *

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	425	680	960	1645	425	680	960	1645	365	580	810	1355	--	510	710	1170
B1	425	675	955	1630	425	675	955	1630	365	575	805	1345	--	510	710	1170
B2	340	535	750	1245	340	535	750	1245	--	460	640	1045	--	405	560	905
C	--	355	485	780	--	355	485	780	--	--	415	660	--	--	370	580
D	--	--	370	585	--	--	370	585	--	--	--	500	--	--	--	445

h/d ≥ 1.0 *

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	--	445	620	1010	--	445	620	1010	--	380	525	850	--	340	465	740
B1	--	440	615	1000	--	440	615	1000	--	380	525	845	--	340	465	740
B2	--	355	490	785	--	355	490	785	--	--	420	665	--	--	370	585
C	--	--	--	505	--	--	--	505	--	--	--	435	--	--	--	385
D	--	--	--	390	--	--	--	390	--	--	--	335	--	--	--	--

*** For intermediate values of h/d ratios, linear interpolation shall be used. Refer Note 9 for defination h and d.**

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Project: **Flush Array Frame System Spacing Table with Broad Rail R55 – Tile Roof**
Address: **within Australia**

Job: **11174**
Date: **May-22**
Designed: **BL**
Checked: **AA**

Flush Array Frame System Spacing Table for Tile Roof (mm)

Type of Rail	Broad Rail 55
Type of Interface	Tile Roof Hook
Solar Panel Dimension	2mx1m
Terrain category	**2**

h/d ≤ 0.5 *

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	350	545	765	1275	--	445	615	1000	--	395	545	885	--	370	515	825
B1	350	545	765	1275	--	440	610	995	--	395	545	885	--	370	515	825
B2	--	435	605	980	--	355	485	780	--	--	435	695	--	--	410	650
C	--	--	395	625	--	--	--	505	--	--	--	455	--	--	--	425
D	--	--	--	475	--	--	--	385	--	--	--	345	--	--	--	325

h/d ≥ 1.0 *

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	--	360	500	800	--	--	405	640	--	--	365	570	--	--	340	535
B1	--	360	500	800	--	--	405	640	--	--	365	570	--	--	340	535
B2	--	--	400	630	--	--	--	505	--	--	--	455	--	--	--	430
C	--	--	--	415	--	--	--	335	--	--	--	--	--	--	--	--
D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

*** For intermediate values of h/d ratios, linear interpolation shall be used. Refer Note 9 for defination h and d.**

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Project: **Flush Array Frame System Spacing Table with Broad Rail R55 – Tile Roof within Australia** Date: **May-22**
Designed: **BL**
Address: Checked: **AA**

General Notes

Note 1 Following components are satisfied to use according to AS/NZS 1170.2:2021

Components	Part Number	Description
Broad Rail	Broad Rail 55	As per drawing Rail 55 provided by Xiamen Broad New Energy Co.,Ltd, dated on 27/12/2021
Mid Clamp		As per Middle and End Panel Clamp test report by Xiamen Broad New Energy Co.,Ltd, dated 11/03/2019
End Clamp		
Tile Roof Hook		As per test report No.: XMIN1901000447ML by SGS, dated 29/01/2019

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

Recommended screws

Metal Purlins/Battens	Fasteners to use
1.9mm and above	14g-10 TPI Teks screws or approved equivalent
Timber Purlins/Battens/Rafters	**Fasteners to use**
Softwood / Hardwood (35mm embedment and above)	14g-10 TPI T17 screws or approved equivalent

Note 3 Maximum uplift wind pressure is limited to 5kPa.

Note 4 Deflection is limited to Minimum of L/120 and 15mm.

Note 5 Panels to be instal

Note 6 "--" states NOT SUITABLE FOR INSTALLATION.

Note 7 Refer section 4.2.1 of AS/NZS 1170.2:2021 for terrain category definition.

Note 8 Wind regions are shown in Figure 3.1(A) of AS/NZS 1170.2:2021.

Note 9 Building height is average roof height of structure above ground. Refer Figure 1 for definition of h, d and b.

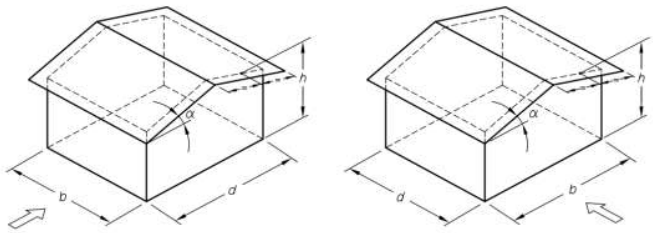
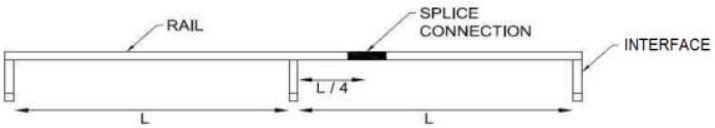


Figure 1 – h, d and b definition

Note 10 Rail splice connection must be placed a quarter length of the spacing of interface. No Splice connection should be placed at the centre of spacing or over the interface.



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Note 11 Refer Figure 2 for definition of roof zones.

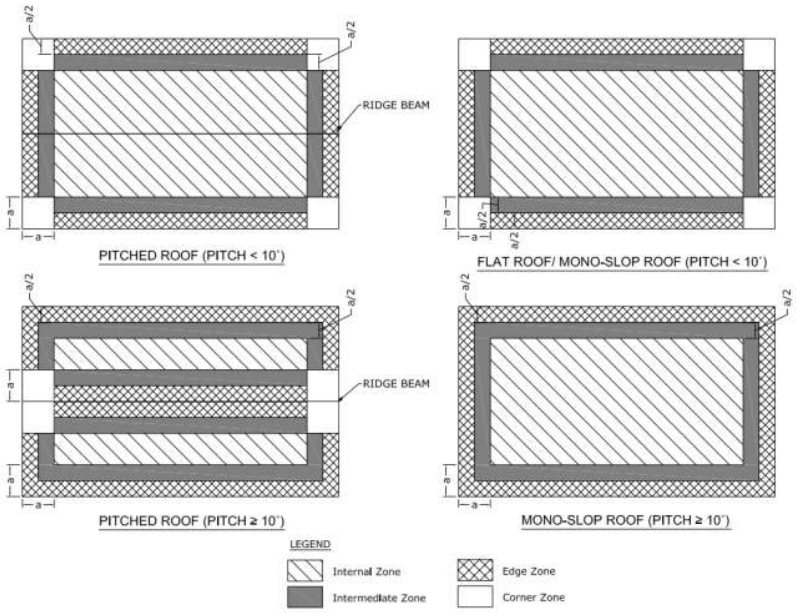

Figure2- Roof Zones Definition

In Figure 2, the value of dimension "a" is the minimum of 0.2b or 0.2d, if (h/b) or (h/d) ≥ 0.2; or 2h if both (h/b) and (h/d) < 0.2 (b & d are building dimensions and h is average roof height, see Figure 1)