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General Certification for Grace Solar Flush Mounted System on Tin and Tile Roof with GS-XR-VA-L Rail

For: XIAMEN GRACE SOLAR NEW ENERGY TECHNOLOGY CO. LTD
(BYMEA Group) Building C/D, Vanke Yunxi
Huli Dist, Xiamen, Fujian Province
China

Job No.: 15178

Date: 15/08/2024

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Document Control						
Report Title		General Certification for Grace Solar Flush Mounted System on Tin and Tile Roof with GS-XR-VA-L Rail				
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Client		XIAMEN GRACE SOLAR NEW ENERGY TECHNOLOGY CO.LTD		**Client Contact**	Alisa Zhang	
Rev	**Date**	**Revision Details**	**Prepared By**	**Author**	**Verifier**	**Approver**
0	15/08/2024	First Issue	BL/LvS	BL	AA	LvS
Current Revision		0				

Approval			
Author Signature	biancaliu	Approver Signature	
Name	Bianca Liu	Name	L. Van Spaandonk
Title	Structural Engineer	Title	Principal Engineer

Our Ref: 15178-GS-XR-VA-L/BL
15 August 2022

XIAMEN GRACE SOLAR NEW ENERGY TECHNOLOGY CO. LTD

(BYMEA Group) Building C/D, Vanke Yunxi
Huli Dist, Xiamen, Fujian Province
China

RE: General Certification for Grace Solar Flush Mounted System on Tin and Tile Roof with GS-XR-VA-L Rail

Gamcorp Pty Ltd, being Structural Engineers within the meaning of Australian Building Regulations, have carried out a structural design check of Tin and Tile Roof Mount Flush Array Frame System installation with GS-XR-VA-L rail within Australia. The design check has been based on the information and test reports provided by XIAMEN GRACE SOLAR NEW ENERGY TECHNOLOGY Co. Ltd.

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

Component	**Part No.**
GS Rail	GS-XR-VA-L
Tin Interface Kit 5#	GS-IK-LD05
Stainless Steel Hook 1#	GS-IK-01
Universal Panel Clamp Kit	GS-AC
Inter Clamp Kit	GS-IC-F40; GS-IC-F32.5; GS-IC-F37.5; GS-IC-F30;
End Clamp Kit	GS-EC-F35/40/46; GS-EC-A02; GS-EC-F30; GS-EC-F32

We find the Installation of Flush Mounted System on Tin and Tile Roof for Australian use to be structurally adequate and compliant with NCC 2022 and all relevant Australian Standards listed below - for installation in Australia, provided the conditions listed within this certificate are adhered to:

- NCC and relevant standards:
  - Section B of Vol1, NCC 2022;
  - AS/NZS1170.0:2002 – Structural design actions, Part 0: General principles;
  - AS/NZS1170.1:2002 (R2016) – Structural design actions, Part 1: Permanent, imposed and other actions;
  - AS/NZS1170.2:2021 – Structural design actions, Part 2: Wind actions:
    - Wind region **A, B1, B2, C & D**
    - Wind terrain category **1, 2 & 3**
    - Wind average recurrence interval of **200 years**

- Maximum building height **20m**
- The PV panel dimensions to be **1700mm x 1000mm**, **2300mm x 1200mm**
- Maximum weight of the PV panel and array frame to be **15 kg/m^2**
- Rails to be **GS-XR-VA-L** rails
- Material of rails and other components to be **AL/6005-T5** UNO
- 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

- No PV panel to be installed within 2xs from edges and ridge. "s" is the maximum gap between the underside of the 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 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.**
- **Tile hook uplift capacity has been based on test report No. 291-050 dated 18 November 2013 by Building Research Establishment Ltd.**
- **The spacing shown in the interface tables shall be adjusted based on the assessment and requirement of the roof structures.**

This certificate is **only valid** for Grace Solar Flush Mounted System on the Tin & Tile roof with GS-XR-VA-L rail. The roof structure or the building structure shall be assessed separately and accordingly.

This certificate is **only valid** when fixing into minimum 1.9mm thick steel purlin or JD4 seasoned timber. If the fixing condition is different from this 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.

Construction is to be carried out strictly in accordance with the manufacturer's 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 **01/09/2026**. Gamcorp should be contacted for future validation. Contact Gamcorp for a customised system or if the site conditions are not covered by this assessment.

Yours faithfully,
Gamcorp Pty Ltd

L. Van Spaandonk

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

Attachments:
- Summary table for interface spacing - flush mount installation on tin roof with GS-XR-VA-L rail
- Summary table for interface spacing - flush mount installation on tile roof with GS-XR-VA-L rail

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Gamcorp Pty Ltd
A.C.N 665 643 658 A.B.N 86 665 643 658
www.gamcorp.com.au solar@gamcorp.com.au
37 Butler St, Richmond VIC 3121
Tel: +61 3 9543 2211

Structural Design Documentation

Flush Array Frame System Spacing Table

According to AS/NZS 1170.2-2021
with GS-XR-VA-L Rail – Tin Roof
PV Panel Sizes - 1.7mx1m, 2.3mx1.2m
within Australia
Terrain Category 1, 2 & 3

For: XIAMEN GRACE SOLAR TECHNOLOGY CO. LTD.
(BYMEA Group) Building C/D, Vanke Yunxi
Huli Dist, Xiamen, Fujian Province
China

Job Number: 15178
Date: 14 August 2024

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Gamcorp Pty Ltd
A.C.N 665 643 658 A.B.N 86 665 643 658
www.gamcorp.com.au solar@gamcorp.com.au
37 Butler St, Richmond VIC 3121
Tel: +61 3 9543 2211

Job No: **15178**
Client: **XIAMEN GRACE SOLAR TECHNOLOGY CO. LTD.**
Project: **Flush Array Frame System Spacing Table with GS-XR-VA-L Rail – Tin Roof**
Address: **within Australia**
Wind Terrain Category: **Terrain Category 1, 2 & 3**

Australian/New Zealand Standards

NCC 2022	Section B of Vol1
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: **Aug-24**

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Gamcorp Pty Ltd
A.C.N 665 643 658 A.B.N 86 665 643 658
www.gamcorp.com.au solar@gamcorp.com.au
37 Butler St, Richmond VIC 3121
Tel: +61 3 9543 2211

ISO 9001:2015 REGISTERED COMPANY

CLEAN ENERGY COUNCIL MEMBER

Proud Member of CONSULT AUSTRALIA

Client: **XIAMEN GRACE SOLAR TECHNOLOGY CO. LTD.**
Project: **Flush Array Frame System Spacing Table with GS-XR-VA-L Rail – Tin Roof within Australia**
Address:

Job: **15178**
Date: **Aug-24**
Designed: **BL**
Checked: **AA**

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

Type of Rail	GS-XR-VA-L
Type of Interface	Tin Roof L Feet
Solar Panel Dimension	1.7mx1m
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	1200	1400	1570	1860	1200	1400	1570	1860	1090	1325	1485	1760	975	1270	1420	1680
B1	945	1395	1565	1855	945	1395	1565	1855	815	1250	1480	1760	730	1115	1420	1680
B2	765	1175	1445	1710	765	1175	1445	1710	660	1010	1370	1615	590	900	1225	1540
C	440	670	905	1405	440	670	905	1405	--	580	780	1210	--	515	695	1075
D	--	475	640	985	--	475	640	985	--	410	550	845	--	--	495	755

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	860	1215	1355	1595	860	1215	1355	1595	740	1135	1285	1505	665	1015	1235	1440
B1	640	980	1335	1590	640	980	1335	1590	555	845	1145	1505	--	755	1025	1440
B2	525	795	1080	1470	525	795	1080	1470	--	685	930	1390	--	615	830	1275
C	--	455	615	945	--	455	615	945	--	--	530	815	--	--	475	725
D	--	--	435	665	--	--	435	665	--	--	--	575	--	--	--	510

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

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Gamcorp Pty Ltd
A.C.N 665 643 658 A.B.N 86 665 643 658
www.gamcorp.com.au solar@gamcorp.com.au
37 Butler St, Richmond VIC 3121
Tel: +61 3 9543 2211

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Project: **Flush Array Frame System Spacing Table with GS-XR-VA-L Rail – Tin Roof**
Address: **within Australia**

Job: **15178**
Date: **Aug-24**
Designed: **BL**
Checked: **AA**

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

Type of Rail	GS-XR-VA-L
Type of Interface	Tin Roof L Feet
Solar Panel Dimension	1.7mx1m
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	1045	1300	1455	1725	855	1215	1355	1590	770	1170	1300	1530	730	1115	1275	1495
B1	775	1190	1455	1725	640	975	1325	1590	575	880	1195	1530	545	830	1125	1495
B2	630	965	1310	1580	520	790	1070	1465	--	715	970	1410	--	675	910	1380
C	--	550	745	1150	--	455	610	940	--	410	550	845	--	--	520	795
D	--	--	525	805	--	--	435	660	--	--	--	595	--	--	--	565

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	710	1085	1265	1480	580	890	1180	1375	525	800	1085	1320	--	755	1025	1295
B1	530	810	1095	1480	--	665	900	1370	--	600	810	1245	--	565	765	1170
B2	--	655	885	1365	--	540	730	1115	--	--	660	1005	--	--	620	945
C	--	--	510	775	--	--	415	635	--	--	--	575	--	--	--	540
D	--	--	--	550	--	--	--	450	--	--	--	405	--	--	--	--

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

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Gamcorp Pty Ltd
A.C.N 665 643 658 A.B.N 86 665 643 658
www.gamcorp.com.au solar@gamcorp.com.au
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Address:

Job: **15178**
Date: **Aug-24**
Designed: **BL**
Checked: **AA**

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

Type of Rail	GS-XR-VA-L
Type of Interface	Tin Roof L Feet
Solar Panel Dimension	1.7mx1m
Terrain category	**1**

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	835	1205	1340	1580	730	1115	1275	1495	675	1030	1245	1450	650	995	1225	1430
B1	625	955	1300	1580	545	830	1125	1495	505	770	1045	1450	--	745	1005	1430
B2	510	775	1050	1450	--	675	910	1380	--	625	845	1295	--	605	815	1250
C	--	445	600	920	--	--	520	795	--	--	485	740	--	--	465	710
D	--	--	425	645	--	--	--	565	--	--	--	520	--	--	--	505

--
--

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	570	870	1170	1360	--	755	1025	1295	--	700	945	1260	--	675	915	1240
B1	--	650	880	1355	--	565	765	1170	--	525	710	1085	--	505	685	1045
B2	--	530	715	1095	--	--	620	945	--	--	575	875	--	--	555	845
C	--	--	410	625	--	--	--	540	--	--	--	505	--	--	--	485
D	--	--	--	440	--	--	--	--	--	--	--	--	--	--	--	--

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Gamcorp Pty Ltd
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www.gamcorp.com.au solar@gamcorp.com.au
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Address:

Job: **15178**
Date: **Aug-24**
Designed: **BL**
Checked: **AA**

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

Type of Rail	GS-XR-VA-L
Type of Interface	Tin Roof L Feet
Solar Panel Dimension	2.3mx1.2m
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	785	1265	1420	1700	785	1265	1420	1700	690	1200	1340	1595	630	1085	1285	1515
B1	615	1070	1415	1695	615	1070	1415	1695	535	775	1260	1590	485	700	1125	1515
B2	510	730	1185	1550	510	730	1185	1550	440	645	870	1460	395	595	760	1395
C	--	495	670	1035	--	495	670	1035	--	425	580	890	--	--	515	795
D	--	--	475	725	--	--	475	725	--	--	410	625	--	--	--	555

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	570	820	1225	1445	570	820	1225	1445	490	710	1110	1365	440	645	870	1305
B1	430	630	835	1440	430	630	835	1440	375	560	715	1315	--	500	655	1170
B2	--	530	680	1230	--	530	680	1230	--	460	605	930	--	415	545	790
C	--	--	455	695	--	--	455	695	--	--	390	600	--	--	--	535
D	--	--	--	490	--	--	--	490	--	--	--	425	--	--	--	--

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Address:

Job: **15178**
Date: **Aug-24**
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Flush Array Frame System Spacing Table for Tin Roof (mm)

Type of Rail	GS-XR-VA-L
Type of Interface	Tin Roof L Feet
Solar Panel Dimension	2.3mx1.2m
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	660	1150	1315	1560	560	820	1225	1440	510	735	1155	1380	485	700	1095	1350
B1	510	740	1200	1560	425	630	825	1435	390	580	740	1370	365	545	705	1285
B2	425	620	810	1430	--	525	675	1225	--	475	630	1105	--	450	595	885
C	--	405	550	850	--	--	450	690	--	--	410	625	--	--	--	590
D	--	--	340	595	--	--	--	490	--	--	--	440	--	--	--	415

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	475	680	1075	1335	390	585	750	1240	--	535	680	1195	--	500	655	1125
B1	350	535	690	1250	--	440	595	880	--	400	535	770	--	380	510	730
B2	--	440	585	855	--	365	485	700	--	--	440	645	--	--	415	615
C	--	--	--	575	--	--	--	470	--	--	--	425	--	--	--	400
D	--	--	--	405	--	--	--	--	--	--	--	--	--	--	--	--

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

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Address:

Job: **15178**
Date: **Aug-24**
Designed: **BL**
Checked: **AA**

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

Type of Rail	GS-XR-VA-L
Type of Interface	Tin Roof L Feet
Solar Panel Dimension	2.3mx1.2m
Terrain category	**1**

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	550	790	1215	1425	485	695	1095	1350	445	650	880	1315	430	635	835	1295
B1	415	615	800	1425	365	545	700	1285	--	510	655	1190	--	490	640	1145
B2	--	510	660	1200	--	450	595	880	--	415	550	800	--	400	535	765
C	--	--	445	680	--	--	--	590	--	--	--	545	--	--	--	525
D	--	--	--	480	--	--	--	415	--	--	--	--	--	--	--	--

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	380	570	730	1230	--	500	650	1125	--	460	610	970	--	450	595	885
B1	--	435	570	835	--	380	500	725	--	--	470	680	--	--	450	655
B2	--	355	475	680	--	--	415	610	--	--	380	570	--	--	370	555
C	--	--	--	460	--	--	--	400	--	--	--	--	--	--	--	--
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 GS-XR-VA-L Rail – Tin Roof**
Address: **within Australia**

Job: **15178**
Date: **Aug-24**
Designed: **BL**
Checked: **AA**

General Notes

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

Components	Part Number	Description
GS Rail	GS-XR-VA-L	As per drawing or test report provided by client
Tin Interface Kit 5#	GS-IK-LD05	
Universal Panel Clamp Kit	GS-AC	
Inter Clamp Kit	GS-IC-F40; GS-IC-F32.5; GS-IC-F37.5; GS-IC-F30	
End Clamp Kit	GS-EC-F35/40/46; GS-EC-A02; GS-EC-F30; GS-EC-F32;	

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 installed parallel to roof surface.

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.

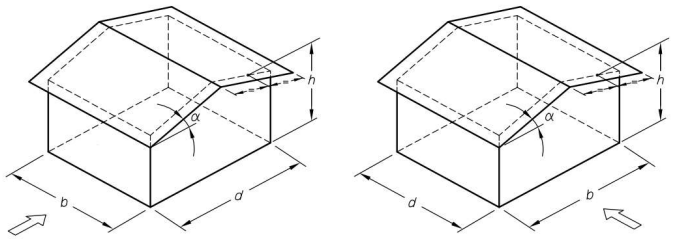
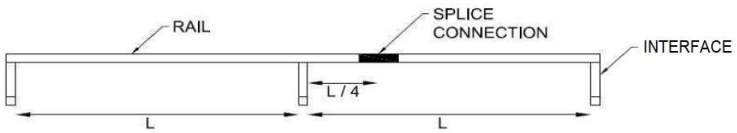


Figure 1 – h, d and b definition

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.



Gamcorp Pty Ltd
A.C.N 665 643 658 A.B.N 86 665 643 658
www.gamcorp.com.au solar@gamcorp.com.au
37 Butler St, Richmond VIC 3121
Tel: +61 3 9543 2211

Client: **XIAMEN GRACE SOLAR TECHNOLOGY CO. LTD.** Job: **15178**
Project: **Flush Array Frame System Spacing Table with GS-XR-VA-L Rail – Tin Roof** Date: **Aug-24**
Designed: **BL**
Address: **within Australia** Checked: **AA**

Note 11 Refer Figure 2 for definition of roof zones.

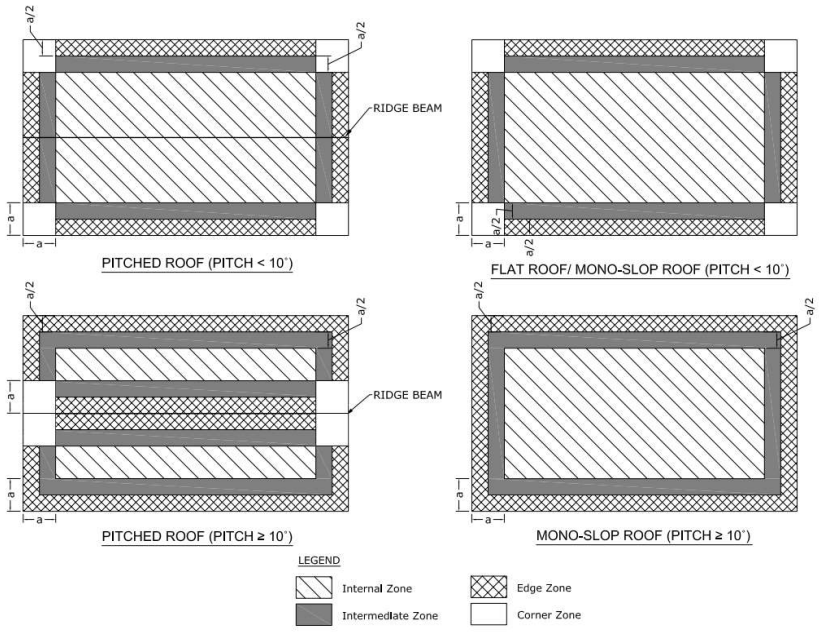


Figure2- Roof Zones Definition

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)

Note 12 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.

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www.gamcorp.com.au solar@gamcorp.com.au
37 Butler St, Richmond VIC 3121
Tel: +61 3 9543 2211

Structural Design Documentation

Flush Array Frame System Spacing Table

According to AS/NZS 1170.2-2021
with GS-XR-VA-L Rail – Tile Roof
PV Panel Sizes - 1.7mx1m, 2.3mx1.2m
within Australia
Terrain Category 1, 2 & 3

For: XIAMEN GRACE SOLAR TECHNOLOGY CO. LTD.
(BYMEA Group) Building C/D, Vanke Yunxi
Huli Dist, Xiamen, Fujian Province
China

Job Number: 15178
Date: 14 August 2024

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Gamcorp Pty Ltd
A.C.N 665 643 658 A.B.N 86 665 643 658
www.gamcorp.com.au solar@gamcorp.com.au
37 Butler St, Richmond VIC 3121
Tel: +61 3 9543 2211

Job No: **15178**
Client: **XIAMEN GRACE SOLAR TECHNOLOGY CO. LTD.**
Project: **Flush Array Frame System Spacing Table with GS-XR-VA-L Rail – Tile Roof**
Address: **within Australia**
Wind Terrain Category: **Terrain Category 1, 2 & 3**

Australian/New Zealand Standards

NCC 2022	Section B of Vol1
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: **Aug-24**

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A.C.N 665 643 658 A.B.N 86 665 643 658
www.gamcorp.com.au solar@gamcorp.com.au
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Address: **within Australia**

Job: **15178**
Date: **Aug-24**
Designed: **BL**
Checked: **AA**

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

Type of Rail	GS-XR-VA-L
Type of Interface	Tile Roof Tile Hook
Solar Panel Dimension	1.7mx1m
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	625	995	1410	1860	625	995	1410	1860	540	850	1190	1760	475	745	1040	1680
B1	625	990	1400	1855	625	990	1400	1855	535	840	1180	1760	475	745	1040	1680
B2	500	785	1100	1710	500	785	1100	1710	430	675	935	1530	385	595	825	1330
C	335	520	715	1140	335	520	715	1140	--	445	610	970	--	395	540	855
D	--	400	545	860	--	400	545	860	--	345	470	735	--	--	415	650

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	420	655	905	1480	420	655	905	1480	360	560	775	1245	--	495	680	1085
B1	415	650	900	1465	415	650	900	1465	360	555	770	1240	--	495	680	1085
B2	335	520	720	1150	335	520	720	1150	--	450	615	980	--	400	545	860
C	--	350	475	745	--	350	475	745	--	--	410	640	--	--	365	565
D	--	--	365	570	--	--	365	570	--	--	--	490	--	--	--	435

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

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A.C.N 665 643 658 A.B.N 86 665 643 658
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Address: **within Australia**

Job: **15178**
Date: **Aug-24**
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Checked: **AA**

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

Type of Rail	GS-XR-VA-L
Type of Interface	Tile Roof Tile Hook
Solar Panel Dimension	1.7mx1m
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	510	805	1120	1725	415	650	900	1470	375	580	805	1295	355	545	755	1210
B1	510	805	1120	1725	415	645	895	1460	375	580	805	1295	355	545	755	1210
B2	410	640	885	1440	335	520	715	1140	--	465	640	1020	--	440	605	955
C	--	425	580	920	--	345	470	740	--	--	425	665	--	--	400	625
D	--	--	450	700	--	--	365	565	--	--	--	510	--	--	--	480

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	345	530	735	1175	--	435	595	940	--	390	535	840	--	365	500	785
B1	345	530	735	1175	--	430	590	935	--	390	535	840	--	365	500	785
B2	--	425	585	925	--	350	475	745	--	--	430	670	--	--	405	630
C	--	--	390	605	--	--	--	490	--	--	--	445	--	--	--	415
D	--	--	--	465	--	--	--	380	--	--	--	345	--	--	--	--

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

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Address: **within Australia**

Job: **15178**
Date: **Aug-24**
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Checked: **AA**

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

Type of Rail	GS-XR-VA-L
Type of Interface	Tile Roof Tile Hook
Solar Panel Dimension	1.7mx1m
Terrain category	**1**

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	405	635	880	1430	355	545	755	1210	325	505	700	1115	--	485	670	1065
B1	405	635	880	1430	355	545	755	1210	325	505	695	1110	--	485	670	1065
B2	325	505	700	1115	--	440	605	955	--	405	555	875	--	390	535	840
C	--	340	465	725	--	--	400	625	--	--	370	575	--	--	355	550
D	--	--	360	555	--	--	--	480	--	--	--	445	--	--	--	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	--	425	580	920	--	365	500	785	--	340	465	730	--	325	445	695
B1	--	425	580	920	--	365	500	785	--	340	465	725	--	325	445	695
B2	--	340	465	730	--	--	405	630	--	--	370	580	--	--	360	555
C	--	--	--	485	--	--	--	415	--	--	--	385	--	--	--	370
D	--	--	--	370	--	--	--	--	--	--	--	--	--	--	--	--

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

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

Type of Rail	GS-XR-VA-L
Type of Interface	Tile Roof Tile Hook
Solar Panel Dimension	2.3mx1.2m
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	465	735	1040	1700	465	735	1040	1700	395	625	880	1470	--	550	770	1270
B1	460	730	1035	1695	460	730	1035	1695	390	620	875	1460	--	550	770	1270
B2	--	580	815	1350	--	580	815	1350	--	500	690	1130	--	440	605	980
C	--	--	525	840	--	--	525	840	--	--	450	715	--	--	400	630
D	--	--	405	635	--	--	405	635	--	--	--	545	--	--	--	480

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	--	485	670	1090	--	485	670	1090	--	415	570	920	--	--	505	805
B1	--	480	665	1080	--	480	665	1080	--	410	570	915	--	--	505	805
B2	--	--	530	850	--	--	530	850	--	--	455	725	--	--	400	635
C	--	--	--	550	--	--	--	550	--	--	--	470	--	--	--	415
D	--	--	--	420	--	--	--	420	--	--	--	--	--	--	--	--

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

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Gamcorp Pty Ltd
A.C.N 665 643 658 A.B.N 86 665 643 658
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Address: **within Australia**

Job: **15178**
Date: **Aug-24**
Designed: **BL**
Checked: **AA**

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

Type of Rail	GS-XR-VA-L
Type of Interface	Tile Roof Tile Hook
Solar Panel Dimension	2.3mx1.2m
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	--	590	830	1380	--	480	665	1085	--	430	595	960	--	405	555	895
B1	--	590	830	1380	--	475	660	1080	--	430	595	960	--	405	555	895
B2	--	470	655	1065	--	--	525	840	--	--	475	755	--	--	445	705
C	--	--	430	680	--	--	--	545	--	--	--	490	--	--	--	460
D	--	--	--	515	--	--	--	420	--	--	--	--	--	--	--	--

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	540	870	--	--	440	695	--	--	390	620	--	--	--	580
B1	--	390	540	870	--	--	435	690	--	--	390	620	--	--	--	580
B2	--	--	430	685	--	--	--	550	--	--	--	495	--	--	--	465
C	--	--	--	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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Address: **within Australia**

Job: **15178**
Date: **Aug-24**
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Checked: **AA**

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

Type of Rail	GS-XR-VA-L
Type of Interface	Tile Roof Tile Hook
Solar Panel Dimension	2.3mx1.2m
Terrain category	**1**

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	--	470	650	1055	--	405	555	895	--	--	515	825	--	--	495	785
B1	--	470	650	1055	--	405	555	895	--	--	510	820	--	--	495	785
B2	--	--	515	825	--	--	445	705	--	--	410	645	--	--	390	620
C	--	--	--	535	--	--	--	460	--	--	--	425	--	--	--	410
D	--	--	--	410	--	--	--	--	--	--	--	--	--	--	--	--

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	--	--	430	680	--	--	--	580	--	--	--	535	--	--	--	515
B1	--	--	--	535	--	--	--	465	--	--	--	425	--	--	--	410
B2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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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Address: **within Australia**

Job: **15178**
Date: **Aug-24**
Designed: **BL**
Checked: **AA**

General Notes

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

Components	Part Number	Description
GS Rail	GS-XR-VA-L	As per drawing or test report provided by client
Stainless Steel Hook 1#	GS-IK-01	
Universal Panel Clamp Kit	GS-AC	
Inter Clamp Kit	GS-IC-F40; GS-IC-F32.5; GS-IC-F37.5; GS-IC-F30	
End Clamp Kit	GS-EC-F35/40/46; GS-EC-A02; GS-EC-F30; GS-EC-F32;	

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 installed parallel to roof surface.

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.

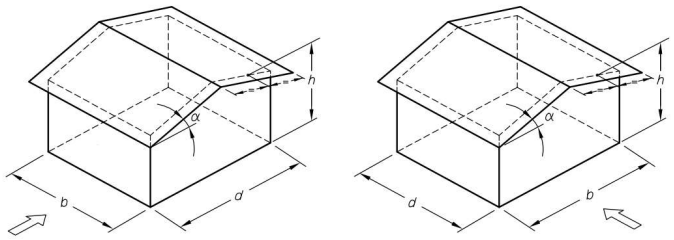
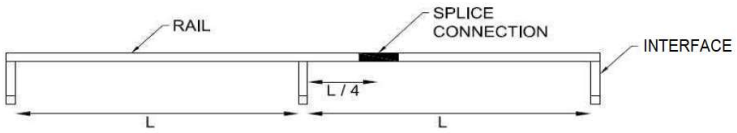


Figure 1 – h, d and b definition

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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Address: **within Australia** Designed: **BL**
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Note 11 Refer Figure 2 for definition of roof zones.

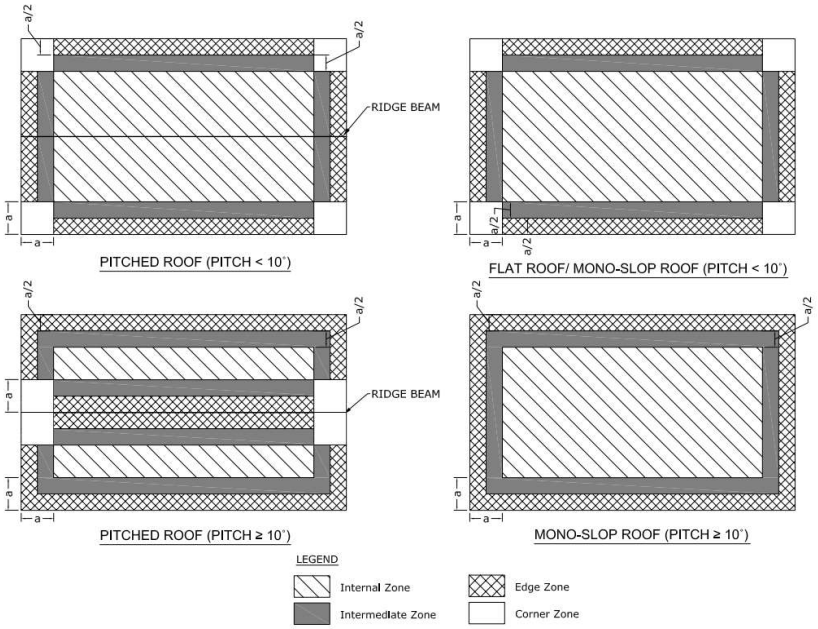

Figure2- Roof Zones Definition

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)

Note 12 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.