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General Certification

Flush Mount Solar System on Pierced Fix Roof
Within Australia

For: Antai Technology Co., Ltd

No. 5-5, Wuxing Road,
Guanshan Village, Wuan Town, Changtai District,
Zhangzhou City, Fujian Province, China

Job No.: 13697

Date: 09/02/2024

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Client		Antai Technology Co., Ltd		**Client Contact**	Jerry Jiang	
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0	09/02/2024	First Issue	JD	JD	JG	LvS
Current Revision		0				

Approval			
Author Signature		Approver Signature	
Name	Jiewen Deng	Name	L. Van Spaandonk
Title	Structural Engineer	Title	Principal Engineer

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Our Ref:13697-01/JD
09/02/2024

Antai Technology Co., Ltd
No. 5-5, Wuxing Road,
Guanshan Village, Wuan Town, Changtai District,
Zhangzhou City, Fujian Province, China

General Certification

RE: General Certificate - Flush Mount Solar System on Tin (Penetrative) Roof

Gamcorp Pty Ltd, being Structural Engineers within the meaning of Australian Building Regulations, have carried out a structural design check of Flush Mounted System on Tin Roof (Pierced Fix Roof) within Australia. The design check is based on the array frame information provided by Xiamen Antai Technology Co., Ltd.

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

Component	**Part No**
Rail	TYN-509
Rail Splice	TYN-510
L Feet	TYN-507/508
Inner Clamp Kit	Mid Clamp - Type A(TYN-513/511) Mid Clamp - Type B(TYN-513/512)
End Clamp Kit	End Clamp - Type A(TYN-505/506/511) End Clamp - Type B(TYN-505/506/512)
Grounding Lug	TYN-514

This certificate is **only valid** for Flush Mounted System on the Tin (Penetrative) Roof with Antai's Rail. The roof structure or the building structure and PV panels shall be assessed separately and accordingly.

The interface spacings for Tin (Penetrative) roof are determined based on fixings into minimum **JD4 seasoned** timber with screw embedment of **35mm** and steel purlin thickness of **1.9mm (1 screw per each interface)**. 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.

We find the Installation of Flush Mounted System on Tin (Penetrative) Roof for Australian use to be structurally sufficient based on the following conditions:

- Wind loads to **AS/NZS 1170.2:2021 Wind actions**
- Wind region **A (0-5), 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 **1700mm x 1100mm and 2200mm x 1100mm**
- PV panel to be parallel to the roof surface
- Maximum wind pressure is limited to **5kPa**
- Weight of the PV panel and array frame to be **15 kg/m^2**

- Material of Rails to be **AL 6005-T6** UNO
- 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 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.**
- **The capacity of Rail Splice was obtained from test report no. XMML23110584_EN, dated 27/12/2023 and provided by BM Shenghe Testing Technology (Xiamen) Co., Ltd.**
- **The connection capacity of rail, clamp type B and L feet was obtained from test report no. AT-TR-24011201, dated 12/01/2023 and provided by Antai Technology Co., Ltd.**
- **The connection capacity of rail, clamp type A and L feet was obtained from test report no. AT-TR-23122201, dated 09/11/2023 and provided by Antai Technology Co., Ltd.**
- **The array frame component of the flush mounted system on the tin (penetrative) roof in the attached array frame drawing forms an integrated part of the whole certificate.**
- **The spacing shown in the interface tables shall be adjusted based on the assessment and requirement of the roof structures.**
- **If any of the above conditions cannot be met, the structural engineer must be notified immediately.**

Construction is to be carried out strictly in accordance with the manufacturer's instructions. This work was designed by **Jiewen Deng** in accordance with the provisions of Australian Building Regulations and in accordance with sound, widely accepted engineering principles. This certificate is only valid till **09/02/2026**. Gamcorp should be contacted for future validation. Contact Gamcorp for a customized 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:

- 13697-01-DWG-Flush Mount system with L Feet

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37 Butler St, Richmond VIC 3121
Tel: 03 9543 2211

Structural Design Documentation

Flush Array Frame System Spacing Table on Pierced Fix Roof

According to AS/NZS 1170.2-2021

with L feet (screw) and Antai Rail – PV panel dimension 1.7mx1.1m & 2.2mx1.1m

within Australia

Terrain Category 2 & 3

For: Antai Technology Co., Ltd
No. 5-5, Wuxing Road,
Guanshan Village, Wuan Town, Changtai District,
Zhangzhou City, Fujian Province, China

Job Number: 13697-01 - Flush with L feet (screw)
Date: 2 February 2024

Gamcorp Pty Ltd A.C.N 665 643 658 A.B.N 86 665 643 658
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37 Butler St, Richmond VIC 3121
Tel: 03 9543 2211

Job No: 13697-01
Client: Antai Technology Co., Ltd
Project: Flush Array Frame System Spacing Table on Pierced Fix Roof with L feet (screw) and Antai Rail – PV panel dimension 1.7mx1.1m & 2.2mx1.1m
Address: within Australia
Wind 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	Aluminium structures Part 1: Limit state design
AS/NZS 4600:2018	Cold-formed steel structures

Designed: JD
Checked: JG
Date: Feb-24

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Client:	**Antai Technology Co., Ltd**	Job:	**13697-01**
Project:	**Flush Array Frame System Spacing Table on Pierced Fix Roof**	Date:	**Feb-24**
	with L feet (screw) and Antai Rail – PV panel dimension 1.7mx1.1m & 2.2mx1.1m	Designed:	**JD**
Address:	**within Australia**	Checked:	**JG**

Flush Array Frame System Spacing Table on Pierced Fix Roof

Type of Rail	Antai Rail (Part No:TYN-509)
Type of Interface	Antai L feet (Part No:TYN-507/508)
Solar Panel Dimension	1.7mx1.1m
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	1610	1800	2000	855	1315	1675	1925	770	1180	1610	1865	730	1115	1520	1835
B1	775	1190	1625	2000	640	975	1325	1925	575	880	1195	1855	545	830	1125	1740
B2	630	965	1310	1915	520	790	1070	1655	--	715	970	1495	--	675	910	1400
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	1480	1820	580	890	1205	1700	525	800	1085	1635	--	755	1025	1585
B1	530	810	1095	1695	--	665	900	1385	--	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 to Note 9 for definition h and d.**

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Client:	**Antai Technology Co., Ltd**	Job:	**13697-01**
Project:	**Flush Array Frame System Spacing Table on Pierced Fix Roof**	Date:	**Feb-24**
	with L feet (screw) and Antai Rail – PV panel dimension 1.7mx1.1m & 2.2mx1.1m	Designed:	**JD**
Address:	**within Australia**	Checked:	**JG**

Flush Array Frame System Spacing Table on Pierced Fix Roof

Type of Rail	Antai Rail (Part No:TYN-509)
Type of Interface	Antai L feet (Part No:TYN-507/508)
Solar Panel Dimension	1.7mx1.1m
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	1265	1730	1905	2000	1265	1730	1905	2000	1090	1640	1830	2000	975	1500	1760	2000
B1	945	1455	1905	2000	945	1455	1905	2000	815	1250	1705	2000	730	1115	1520	2000
B2	765	1175	1600	2000	765	1175	1600	2000	660	1010	1375	1945	590	900	1225	1880
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	1320	1680	1930	860	1320	1680	1930	740	1135	1545	1850	665	1015	1375	1785
B1	640	980	1335	1925	640	980	1335	1925	555	845	1145	1780	--	755	1025	1585
B2	525	795	1080	1670	525	795	1080	1670	--	685	930	1430	--	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 to Note 9 for definition h and d.**

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Client:	**Antai Technology Co., Ltd**	Job:	**13697-01**
Project:	**Flush Array Frame System Spacing Table on Pierced Fix Roof with L feet (screw) and Antai Rail – PV panel dimension 1.7mx1.1m & 2.2mx1.1m**	Date:	**Feb-24**
		Designed:	**JD**
Address:	**within Australia**	Checked:	**JG**

Flush Array Frame System Spacing Table on Pierced Fix Roof

Type of Rail	Antai Rail (Part No:TYN-509)
Type of Interface	Antai L feet (Part No:TYN-507/508)
Solar Panel Dimension	2.2mx1.1m
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	805	1245	1655	1920	660	1015	1385	1805	595	910	1245	1735	560	860	1175	1695
B1	600	920	1255	1920	495	755	1025	1595	445	680	920	1430	420	640	870	1345
B2	485	745	1010	1575	400	610	830	1280	--	555	750	1155	--	520	700	1080
C	--	425	575	890	--	--	470	725	--	--	425	655	--	--	400	615
D	--	--	405	625	--	--	--	510	--	--	--	460	--	--	--	435

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	550	840	1140	1680	450	685	930	1445	405	620	835	1295	--	585	790	1225
B1	410	625	845	1305	--	515	695	1070	--	465	625	960	--	435	590	905
B2	--	505	685	1055	--	415	560	860	--	--	510	780	--	--	480	730
C	--	--	390	600	--	--	--	490	--	--	--	445	--	--	--	420
D	--	--	--	425	--	--	--	--	--	--	--	--	--	--	--	--

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

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Client:	**Antai Technology Co., Ltd**	Job:	**13697-01**
Project:	**Flush Array Frame System Spacing Table on Pierced Fix Roof with L feet (screw) and Antai Rail – PV panel dimension 1.7mx1.1m & 2.2mx1.1m**	Date:	**Feb-24**
		Designed:	**JD**
Address:	**within Australia**	Checked:	**JG**

Flush Array Frame System Spacing Table on Pierced Fix Roof

Type of Rail	Antai Rail (Part No:TYN-509)
Type of Interface	Antai L feet (Part No:TYN-507/508)
Solar Panel Dimension	2.2mx1.1m
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	**980**	**1520**	**1785**	**2000**	**980**	**1520**	**1785**	**2000**	**840**	**1305**	**1685**	**1950**	**750**	**1160**	**1590**	**1880**
B1	**730**	**1125**	**1540**	**2000**	**730**	**1125**	**1540**	**2000**	**630**	**965**	**1320**	**1945**	**560**	**860**	**1175**	**1840**
B2	**590**	**905**	**1235**	**1905**	**590**	**905**	**1235**	**1905**	**510**	**780**	**1060**	**1655**	**455**	**695**	**945**	**1470**
C	**--**	**515**	**700**	**1085**	**--**	**515**	**700**	**1085**	**--**	**445**	**605**	**935**	**--**	**400**	**540**	**830**
D	**--**	**365**	**495**	**760**	**--**	**365**	**495**	**760**	**--**	**--**	**425**	**655**	**--**	**--**	**380**	**580**

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	**660**	**1020**	**1395**	**1810**	**660**	**1020**	**1395**	**1810**	**570**	**875**	**1195**	**1715**	**510**	**785**	**1065**	**1635**
B1	**495**	**760**	**1030**	**1605**	**495**	**760**	**1030**	**1605**	**430**	**655**	**885**	**1375**	**--**	**585**	**790**	**1225**
B2	**405**	**615**	**835**	**1290**	**405**	**615**	**835**	**1290**	**--**	**530**	**720**	**1105**	**--**	**475**	**640**	**985**
C	**--**	**--**	**475**	**730**	**--**	**--**	**475**	**730**	**--**	**--**	**410**	**630**	**--**	**--**	**365**	**560**
D	**--**	**--**	**--**	**515**	**--**	**--**	**--**	**515**	**--**	**--**	**--**	**445**	**--**	**--**	**--**	**395**

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

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Client:	**Antai Technology Co., Ltd**	Job:	**13697-01**
Project:	**Flush Array Frame System Spacing Table on Pierced Fix Roof with L feet (screw) and Antai Rail – PV panel dimension 1.7mx1.1m & 2.2mx1.1m**	Date:	**Feb-24**
		Designed:	**JD**
Address:	**within Australia**	Checked:	**JG**

General Notes

Note 1 Array frame components specified in the certificate are certified according to AS/NZS 1170.2-2021.

Note 2 Interface spacing is calculated based on 1.9mm steel purlins (G450) or 35mm screw embedment length into timber battens (JD4 seasoned timber). (1 screws per each interface)

Note 3 Recommended screws:

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

Note 4 Maximum uplift wind pressure is limited to 5kPa, -- states NOT SUITABLE FOR INSTALLATION.

Note 5 Deflection is limited to Minimum of L/120 and 15mm.

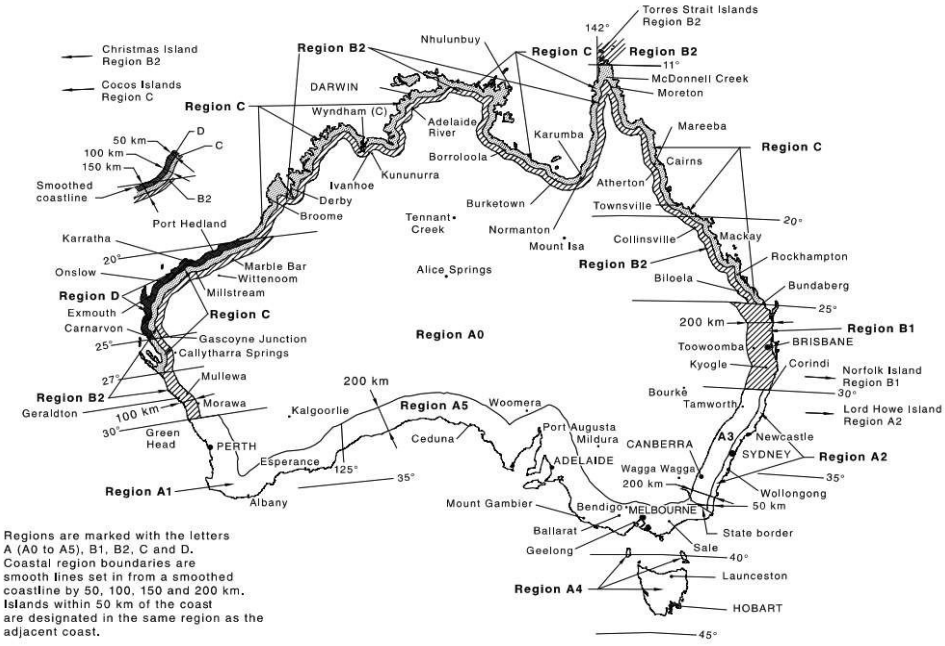
Note 6 Panels to be installed parallel to roof surface.

Note 7 Terrain category has been defined according to section 4.2.1 of AS/NZS 1170.2:2021:

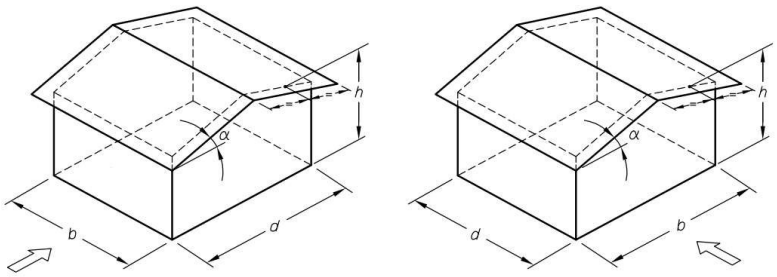
Terrain Category 2 - Open terrain, including grassland, with well-scattered obstructions having heights generally from 1.5 m to 5 m, with no more than two obstructions per hectare (e.g. farmland and cleared subdivisions with isolated trees and uncut grass).

Terrain Category 3 - 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 definition of wind regions is shown as below (refer to Figure 3.1A – AS/NZS 1170.2:2021)



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

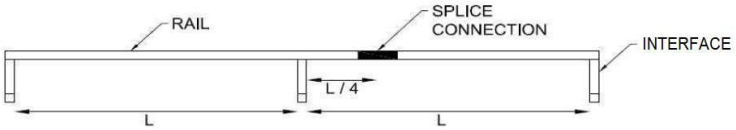


Note: use the minimum value of d from the two figures above for h/d definition

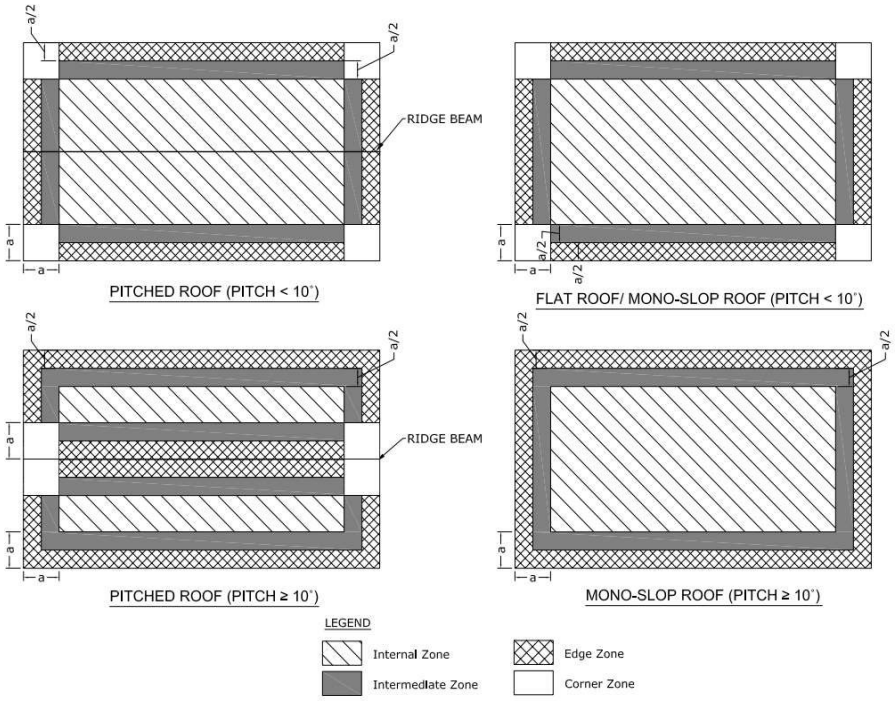
Figure 1 – h, d and b definition

Client: **Antai Technology Co., Ltd** Job: **13697-01**
Project: **Flush Array Frame System Spacing Table on Pierced Fix Roof with L feet (screw) and Antai Rail – PV panel dimension 1.7mx1.1m & 2.2mx1.1m** Date: **Feb-24**
Address: **within Australia** Designed: **JD**
Checked: **JG**

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



Note 11 Refer to Figure 2 for definition of roof zones.



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)

Figure 2 – Roof Zones Definition