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General Certification

Flush Mount Solar System on Concealed Fix
Roof_Lysaght Klip-Lok 406
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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Report Title		PV Array Frame Engineering Certification - Flush Mount on Kliplok 406				
Document ID		13697-02-CER/JD		**Job No.**	13697	
File Path		G:\Shared drives\13000\13600-13699\13697\03 CERTIFICATION				
Client		Antai Technology Co., Ltd		**Client Contact**	Jerry Jiang	
Rev	**Date**	**Revision Details**	**Prepared By**	**Author**	**Verifier**	**Approver**
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: 13697-02/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 Concealed Fix Roof -Lysaght Klip-Lok 406

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 Concealed Fix Roof - Lysaght Klip-Lok 406 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
Roof Clamp	TYN-500/465/467
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 **Concealed Fix Roof - Lysaght Klip-Lok 406** itself. The roof structure or the building structure and PV panels shall be assessed separately and accordingly.

The certificate is only valid when roof clamp fixing to the **full ribs** **of Lysaght Klip-Lok 406 on top of purlins**. 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 Lysaght Klip-Lok 406 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/m²**
- 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 capacity of the roof clamp on Lysaght Klip-Lok 406 was obtained from test report no. 23-0026-B, dated 20/04/2023 and provided by Melbourne Testing Services Pty Ltd.**
- **The array frame component of the flush mounted system on the concealed fix 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:

- 13697-02-DWG-Flush Mount system with roof clamp

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

Structural Design Documentation

Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-Lok 406
According to AS/NZS 1170.2-2021

with roof clamp 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: 13697-02 - Flush (Lysaght Klip-Lok 406)
Date: 8 February 2024

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

Job No: 13697-02

Client: Antai Technology Co., Ltd

Project: Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-Lok 406 with roof clamp 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:	**13697-02**
Project:	**Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-Lok 406**	Date:	**Feb-24**
	with roof clamp 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 Concealed Fix Roof - Lysaght Klip-Lok 406

Type of Rail	Antai Rail (Part No:TYN-509)
Type of Interface	Antai roof clamp (Part No:TYN-500/465/467)
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	835	1290	1770	2000	680	1050	1435	1925	615	945	1285	1865	580	890	1215	1835
B1	620	950	1300	2000	510	780	1060	1650	460	705	955	1480	435	665	900	1390
B2	505	770	1045	1630	415	630	855	1325	--	570	775	1195	--	540	725	1120
C	--	550	745	1150	--	455	610	935	--	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	565	870	1180	1820	465	710	965	1495	420	640	865	1340	--	605	820	1265
B1	425	645	875	1355	--	530	720	1105	--	480	645	995	--	450	610	935
B2	--	525	710	1090	--	430	580	890	--	--	525	805	--	--	495	755
C	--	--	505	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:	**13697-02**
Project:	**Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-Lok 406 with roof clamp and Antai Rail – PV panel dimension 1.7mx1.1m & 2.2mx1.1m**	Date:	**Feb-24**
Address:	**within Australia**	Designed:	**JD**
		Checked:	**JG**

Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-Lok 406

Type of Rail	Antai Rail (Part No:TYN-509)
Type of Interface	Antai roof clamp (Part No:TYN-500/465/467)
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	1010	1575	1905	2000	1010	1575	1905	2000	870	1350	1830	2000	780	1200	1645	2000
B1	755	1165	1595	2000	755	1165	1595	2000	650	1000	1365	2000	580	890	1215	1900
B2	610	940	1280	2000	610	940	1280	2000	530	810	1100	1715	470	720	980	1520
C	440	670	905	1405	440	670	905	1405	--	580	780	1205	--	515	695	1070
D	--	475	640	980	--	475	640	980	--	410	550	845	--	--	490	750

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	685	1055	1440	1930	685	1055	1440	1930	590	905	1235	1850	530	810	1100	1720
B1	515	785	1065	1660	515	785	1065	1660	445	675	915	1420	--	605	820	1265
B2	415	635	860	1335	415	635	860	1335	--	550	745	1145	--	490	665	1020
C	--	455	615	940	--	455	615	940	--	--	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:	**13697-02**
Project:	**Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-Lok 406 with roof clamp 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 Concealed Fix Roof - Lysaght Klip-Lok 406

Type of Rail	Antai Rail (Part No:TYN-509)
Type of Interface	Antai roof clamp (Part No:TYN-500/465/467)
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	645	995	1370	1920	525	810	1110	1750	475	730	995	1560	450	690	940	1470
B1	480	735	1005	1575	395	605	820	1275	--	545	735	1145	--	510	695	1075
B2	390	595	810	1260	--	490	660	1025	--	440	595	920	--	415	560	865
C	--	425	575	890	--	--	470	725	--	--	425	650	--	--	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	435	670	915	1430	355	550	745	1155	--	495	670	1035	--	465	630	980
B1	--	500	675	1045	--	410	555	855	--	370	500	765	--	--	470	720
B2	--	405	545	840	--	--	450	690	--	--	405	620	--	--	380	585
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:	**13697-02**
Project:	**Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-Lok 406 with roof clamp 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 Concealed Fix Roof - Lysaght Klip-Lok 406

Type of Rail	Antai Rail (Part No:TYN-509)
Type of Interface	Antai roof clamp (Part No:TYN-500/465/467)
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	**780**	**1215**	**1685**	**2000**	**780**	**1215**	**1685**	**2000**	**675**	**1040**	**1435**	**1950**	**600**	**925**	**1270**	**1880**
B1	**580**	**900**	**1230**	**1955**	**580**	**900**	**1230**	**1955**	**500**	**770**	**1055**	**1660**	**450**	**690**	**940**	**1470**
B2	**470**	**725**	**990**	**1555**	**470**	**725**	**990**	**1555**	**410**	**625**	**850**	**1325**	**360**	**555**	**755**	**1175**
C	**--**	**515**	**700**	**1085**	**--**	**515**	**700**	**1085**	**--**	**445**	**605**	**930**	**--**	**400**	**540**	**830**
D	**--**	**365**	**495**	**760**	**--**	**365**	**495**	**760**	**--**	**--**	**425**	**650**	**--**	**--**	**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	**530**	**815**	**1115**	**1760**	**530**	**815**	**1115**	**1760**	**455**	**700**	**955**	**1495**	**410**	**625**	**850**	**1325**
B1	**395**	**605**	**825**	**1285**	**395**	**605**	**825**	**1285**	**--**	**520**	**710**	**1100**	**--**	**465**	**630**	**980**
B2	**--**	**490**	**665**	**1030**	**--**	**490**	**665**	**1030**	**--**	**425**	**575**	**885**	**--**	**380**	**510**	**785**
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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Tel: +61 3 9543 2211

Client:	**Antai Technology Co., Ltd**	Job:	**13697-02**
Project:	**Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-Lok 406 with roof clamp 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 based on the capacity of array frame and fixing of array frames to the roof not roof structure and PV panels.

Note 3 Recommended fixings of array frames to Lysaght Klip Lok 406 – Antai's roof clamp (Part Number:TYN-500/465/467)

Roof clamp shall be fixed to the full ribs of roof sheeting on top of purlins

The installation is ONLY valid on Lysaght Klip-Lok 406 ® roof sheeting

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.

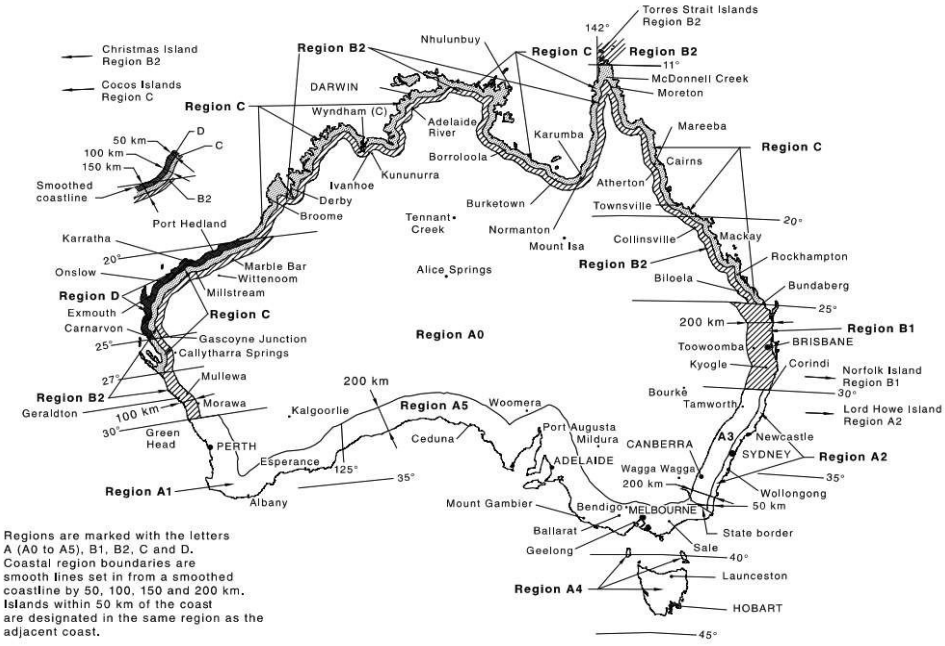
Note 6 Panels to be installed parallel to roof surface.

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

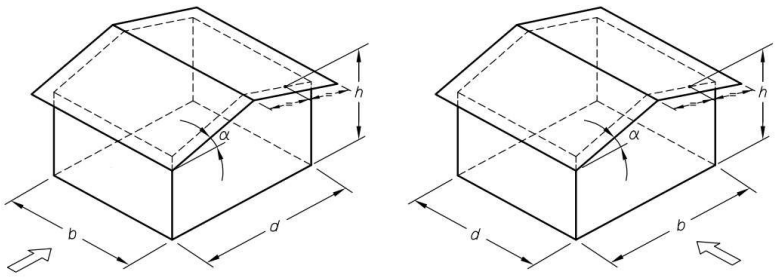
Terrain Category 2 - Open terrain, including grassland, with well-scattered obstructions having heights generally from 1.5 m to 5 m, with no more than two obstructions per hectare (e.g. farmland and cleared subdivisions with isolated trees and uncut grass).

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.

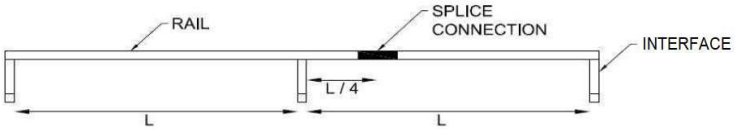


Note: use the minimum value of d from the two figures above for h/d definition

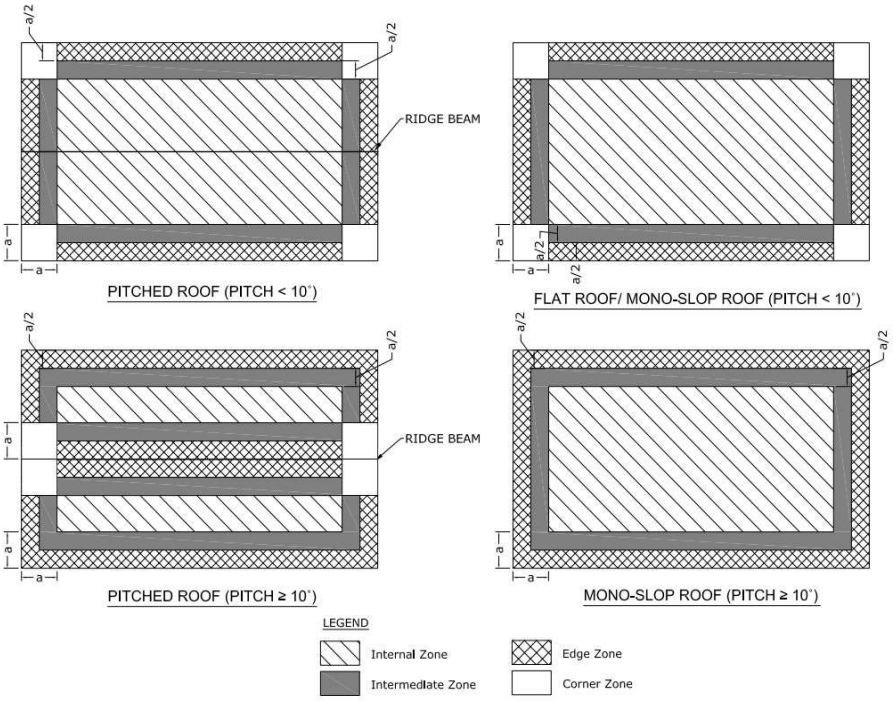
Figure 1 – h, d and b definition

Client: **Antai Technology Co., Ltd** Job: **13697-02**
Project: **Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-Lok 406 with roof clamp 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