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General Certification

Flush Mount Solar System on Concealed Fix Roof_Lysaght Klip-Lok 700 Hi-strength 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 Klip-Lok 700 Hi- Strength				
Document ID		13697-03-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: 13697-03/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 700 Hi-Strength

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 700 Hi-Strength 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 700 Hi-Strength** 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 700 Hi-Strength 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 700 Hi-Strength 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 capacity of the roof clamp on Lysaght Klip-Lok 700 Hi-Strength was obtained from test report no. 23-0026-A, dated 14/04/2023 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
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TAS Registration: CC7366

Attachments:

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

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Structural Design Documentation

Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-lok 700 Hi-strength 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: 13697-03 - Flush (Lysaght Klip-lok 700 Hi-strength)
Date: 5 February 2024

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Tel: 03 9543 2211

Job No: 13697-03

Client: Antai Technology Co., Ltd

Project: Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-lok 700 Hi-strength
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: **13697-03**

Project: **Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-lok 700 Hi-strength 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 700 Hi-strength

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	760	1175	1615	2000	625	955	1310	1925	560	860	1175	1845	530	815	1110	1735
B1	565	870	1185	1860	465	710	965	1505	420	640	870	1350	395	605	820	1270
B2	460	705	955	1490	380	575	780	1210	--	520	705	1090	--	490	665	1020
C	--	505	680	1050	--	415	555	855	--	375	505	770	--	--	475	725
D	--	--	480	735	--	--	395	605	--	--	--	545	--	--	--	515

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	515	790	1080	1690	425	650	880	1365	380	585	790	1220	--	550	745	1155
B1	385	590	795	1235	--	485	655	1010	--	435	590	905	--	410	555	855
B2	--	480	645	995	--	395	530	815	--	--	480	735	--	--	450	690
C	--	--	465	710	--	--	380	580	--	--	--	525	--	--	--	495
D	--	--	--	500	--	--	--	410	--	--	--	370	--	--	--	--

*** 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: **13697-03**

Project: **Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-lok 700 Hi-strength 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 700 Hi-strength

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	925	1435	1905	2000	925	1435	1905	2000	795	1230	1695	2000	710	1095	1505	2000
B1	690	1060	1455	2000	690	1060	1455	2000	595	910	1245	1960	530	815	1110	1735
B2	560	855	1170	1835	560	855	1170	1835	480	735	1005	1565	430	660	895	1385
C	400	610	825	1280	400	610	825	1280	--	525	715	1100	--	470	635	980
D	--	435	585	895	--	435	585	895	--	375	505	770	--	--	450	685

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	625	960	1315	1930	625	960	1315	1930	540	830	1130	1765	485	740	1005	1570
B1	470	715	975	1515	470	715	975	1515	405	615	835	1295	--	550	745	1155
B2	380	580	785	1215	380	580	785	1215	--	500	680	1045	--	450	605	930
C	--	415	560	860	--	415	560	860	--	--	485	745	--	--	435	660
D	--	--	400	605	--	--	400	605	--	--	--	525	--	--	--	465

*** 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:	**13697-03**
Project:	**Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-lok 700 Hi-strength 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 700 Hi-strength

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	585	910	1250	1920	480	740	1010	1600	435	665	905	1425	410	630	855	1340
B1	435	670	915	1435	355	550	745	1165	--	495	670	1045	--	465	630	980
B2	--	545	735	1150	--	445	605	935	--	405	545	840	--	380	510	790
C	--	390	525	810	--	--	430	660	--	--	390	595	--	--	365	560
D	--	--	370	570	--	--	--	465	--	--	--	420	--	--	--	395

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	400	610	835	1305	--	500	680	1055	--	450	610	945	--	425	575	890
B1	--	455	615	955	--	375	505	780	--	--	455	700	--	--	430	660
B2	--	370	500	770	--	--	410	630	--	--	370	565	--	--	--	535
C	--	--	310	545	--	--	--	450	--	--	--	405	--	--	--	380
D	--	--	--	385	--	--	--	--	--	--	--	--	--	--	--	--

*** 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:	**13697-03**
Project:	**Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-lok 700 Hi-strength 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 700 Hi-strength

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	715	1110	1535	2000	715	1110	1535	2000	615	950	1310	1950	550	845	1160	1845
B1	530	820	1125	1785	530	820	1125	1785	460	705	960	1515	410	630	855	1340
B2	430	660	900	1415	430	660	900	1415	370	570	775	1210	--	510	690	1070
C	--	470	640	990	--	470	640	990	--	405	550	850	--	360	490	755
D	--	--	450	690	--	--	450	690	--	--	390	595	--	--	--	530

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	745	1015	1605	485	745	1015	1605	415	640	870	1365	375	570	775	1210
B1	360	555	750	1170	360	555	750	1170	--	475	645	1000	--	425	575	890
B2	--	450	605	940	--	450	605	940	--	385	525	805	--	--	465	720
C	--	--	435	665	--	--	435	665	--	--	375	575	--	--	--	510
D	--	--	--	470	--	--	--	470	--	--	--	405	--	--	--	355

*** 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:	**13697-03**
Project:	**Flush Array Frame System Spacing Table on Concealed Fix Roof - Lysaght Klip-lok 700 Hi-strength 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 700 Hi-strength – 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 700 Hi-strength ® 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.

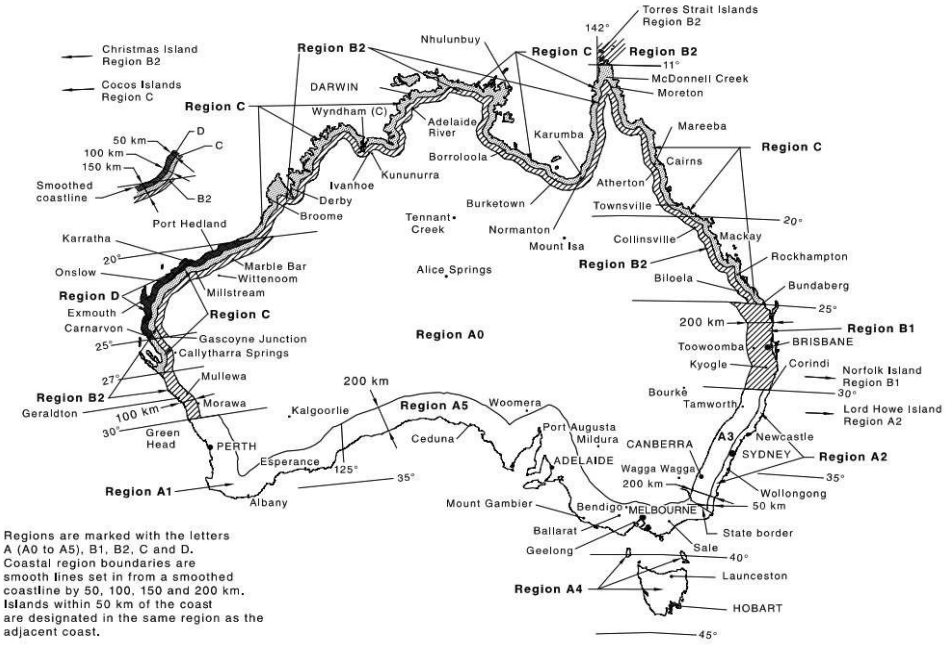
Note 6 Panels to be installed parallel to roof surface.

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

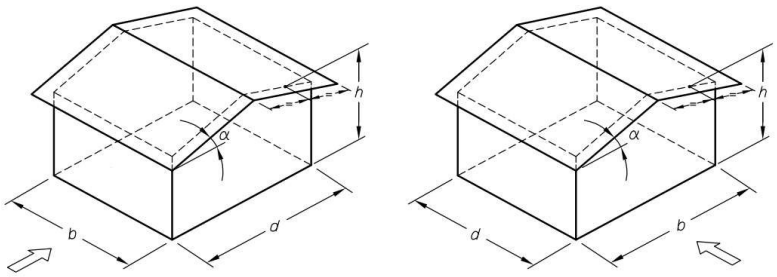
Terrain Category 2 - Open terrain, including grassland, with well-scattered obstructions having heights generally from 1.5 m to 5 m, with no more than two obstructions per hectare (e.g. farmland and cleared subdivisions with isolated trees and uncut grass).

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)



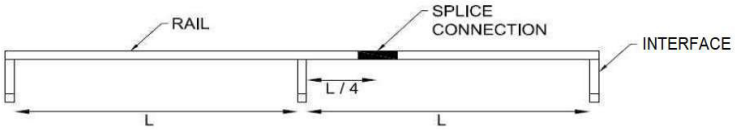
Note 9 Building height is average roof height of structure above ground. Refer to Figure 1 for definition of h, d and b.



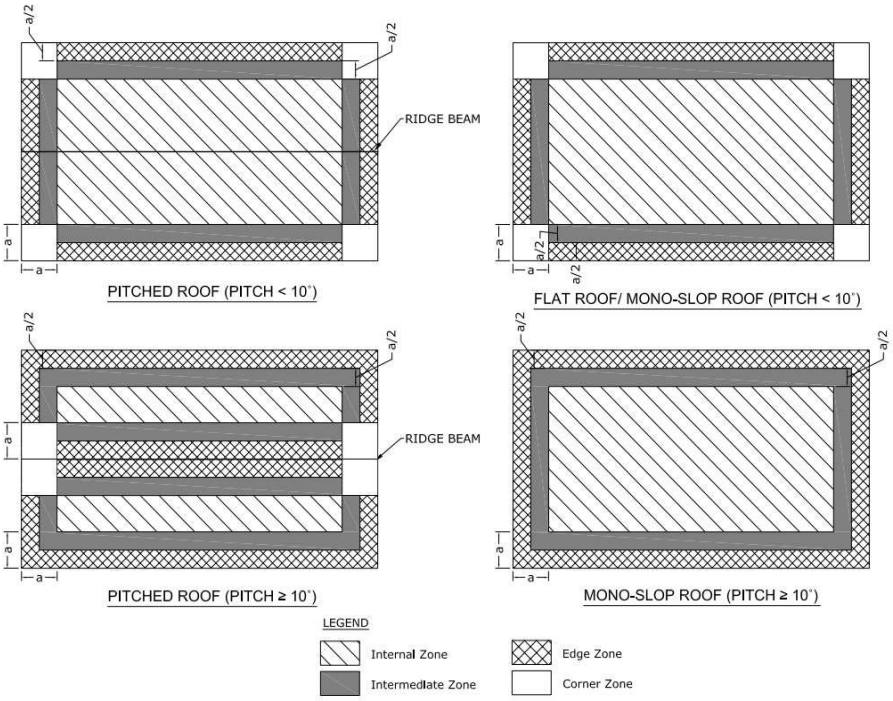
Note: use the minimum value of d from the two figures above for h/d definition

Figure 1 – h, d and b definition

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