

Structural Design Documentation

**Tilt Array Frame System Spacing Table For Tin Roof
(Pierced Fix Roof)
According to AS/NZS 1170.2-2011 (R2016)
with GM-R01-light, GM-R56 and GM-R69
within Australia
Terrain Category 2 & 3**

For: Xiamen Goomax Energy Technology Co., Ltd
Suit 905, Jordan Building A, High-tech Park
Huli District, Xiamen, 361000
China

Job Number: 9123 – 02
Date: 19 November 2020



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Job No: 9123 - 02
Client: Xiamen Goomax Energy Technology Co., Ltd
Project: Tilt Array Frame System Spacing Table For Tin Roof
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with GM-R01-light, GM-R56 and GM-R69
Address: within Australia

Australian 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 1170.2:2011 (R2016) – Structural design actions, Part 2: Wind actions
AS/NZS 1664.1:1997 – Aluminium structures - Limit state design
AS 4100:2020 – Steel Structures
AS/NZS 4600:2018 – Cold-formed Steel Structures

Wind Terrain Category: WTC 2 & 3

Designed: JD
Checked: AA

Date: Nov-20

Project: **Solar Array Interface Spacing Table**
 Address: **within Australia**
 Designed: **JD**

Job: **9123 - 02**
 Date: **Nov-20**
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**Tilt Array Frame System Spacing Table For Tin Roof
 (Pierced Fix Roof) - mm**

Type of Rail GM-R01-Light, GM-R56 and GM-R69
 Type of Interface Tilt Roof Set
 Solar Panel Dimension 1.67mx1m
 Terrain category **2**

Tilt angle to roof surface (α) - $\alpha \leq 15^\circ$

Wind Region	Building Height - H (m)															
	H \leq 5				5<H \leq 10				10<H \leq 15				15<H \leq 20			
	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal
A	475	725	990	1545	390	595	805	1250	345	535	725	1120	240	510	685	1060
B	--	490	660	1015	--	400	540	830	--	365	490	745	--	340	460	705
C	--	--	425	655	--	--	350	535	--	--	--	485	--	--	--	455
D	--	--	--	420	--	--	--	345	--	--	--	--	--	--	--	--

Tilt angle to roof surface (α) - $15^\circ < \alpha \leq 30^\circ$

Wind Region	Building Height - H (m)															
	H \leq 5				5<H \leq 10				10<H \leq 15				15<H \leq 20			
	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal
A	--	445	605	930	--	365	495	760	--	230	445	685	--	--	425	645
B	--	--	405	620	--	--	335	510	--	--	--	460	--	--	--	435
C	--	--	--	405	--	--	--	330	--	--	--	--	--	--	--	--
D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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Tilt angle to roof surface (α) - $\alpha \leq 15^\circ$

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	575	885	1205	1755	575	885	1205	1755	495	760	1035	1620	445	680	925	1435
B	385	590	800	1240	385	590	800	1240	335	510	690	1065	--	455	615	945
C	--	385	515	795	--	385	515	795	--	330	445	685	--	--	400	610
D	--	--	335	510	--	--	335	510	--	--	--	440	--	--	--	395

Tilt angle to roof surface (α) - $15^\circ < \alpha \leq 30^\circ$

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	355	540	730	1130	355	540	730	1130	--	465	630	970	--	420	565	865
B	--	365	490	750	--	365	490	750	--	--	425	650	--	--	380	580
C	--	--	--	485	--	--	--	485	--	--	--	420	--	--	--	375
D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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**Tilt Array Frame System Spacing Table For Tin Roof
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Type of Rail GM-R01-Light, GM-R56 and GM-R69
 Type of Interface Tilt Roof Set
 Solar Panel Dimension 2m x 1m
 Terrain category **2**

Tilt angle to roof surface (α) - $\alpha \leq 15^\circ$

Wind Region	Building Height - H (m)															
	H≤5				5<H≤10				10<H≤15				15<H≤20			
	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal
A	395	605	825	1290	230	495	675	1045	--	445	605	935	--	425	575	885
B	--	405	550	850	--	335	450	690	--	--	405	625	--	--	385	585
C	--	--	355	545	--	--	--	445	--	--	--	405	--	--	--	380
D	--	--	--	350	--	--	--	--	--	--	--	--	--	--	--	--

Tilt angle to roof surface (α) - $15^\circ < \alpha \leq 30^\circ$

Wind Region	Building Height - H (m)															
	H≤5				5<H≤10				10<H≤15				15<H≤20			
	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal
A	--	375	505	775	--	--	415	635	--	--	375	570	--	--	355	540
B	--	--	340	515	--	--	--	425	--	--	--	385	--	--	--	360
C	--	--	--	335	--	--	--	--	--	--	--	--	--	--	--	--
D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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Wind Region	Building Height - H (m)															
	H \leq 5				5<H \leq 10				10<H \leq 15				15<H \leq 20			
	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal
A	480	735	1005	1585	480	735	1005	1585	415	635	865	1350	370	565	770	1200
B	230	490	665	1035	230	490	665	1035	--	425	575	890	--	380	515	790
C	--	220	430	660	--	220	430	660	--	--	375	570	--	--	335	505
D	--	--	--	425	--	--	--	425	--	--	--	365	--	--	--	325

Tilt angle to roof surface (α) - $15^\circ < \alpha \leq 30^\circ$

Wind Region	Building Height - H (m)															
	H \leq 5				5<H \leq 10				10<H \leq 15				15<H \leq 20			
	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal
A	--	450	610	945	--	450	610	945	--	390	525	810	--	345	470	725
B	--	--	410	625	--	--	410	625	--	--	355	540	--	--	--	485
C	--	--	--	405	--	--	--	405	--	--	--	350	--	--	--	--
D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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Type of Rail GM-R01-Light, GM-R56 and GM-R69
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 Solar Panel Dimension 2.25m x 1.2m
 Terrain category **2**

Tilt angle to roof surface (α) - $\alpha \leq 15^\circ$

Wind Region	Building Height - H (m)															
	H≤5				5<H≤10				10<H≤15				15<H≤20			
	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal
A	--	340	690	1145	--	--	590	930	--	--	340	820	--	--	--	740
B	--	--	490	755	--	--	270	615	--	--	--	555	--	--	--	520
C	--	--	--	485	--	--	--	275	--	--	--	--	--	--	--	--
D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Tilt angle to roof surface (α) - $15^\circ < \alpha \leq 30^\circ$

Wind Region	Building Height - H (m)															
	H≤5				5<H≤10				10<H≤15				15<H≤20			
	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal
A	--	--	--	645	--	--	--	440	--	--	--	--	--	--	--	--
B	--	--	--	460	--	--	--	--	--	--	--	--	--	--	--	--
C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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	H≤5				5<H≤10				10<H≤15				15<H≤20			
	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal
A	--	630	895	1410	--	630	895	1410	--	440	725	1200	--	--	645	1065
B	--	350	595	920	--	350	595	920	--	--	510	790	--	--	455	700
C	--	--	260	590	--	--	260	590	--	--	--	505	--	--	--	450
D	--	--	--	235	--	--	--	235	--	--	--	--	--	--	--	--

Tilt angle to roof surface (α) - $15^\circ < \alpha \leq 30^\circ$

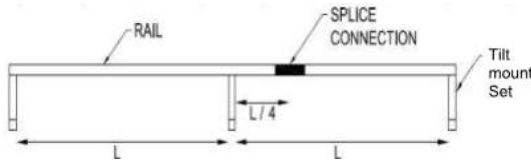
Wind Region	Building Height - H (m)															
	H≤5				5<H≤10				10<H≤15				15<H≤20			
	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal	Corner	Edge	Interme diate	Internal
A	--	--	355	820	--	--	355	820	--	--	--	680	--	--	--	615
B	--	--	--	555	--	--	--	555	--	--	--	480	--	--	--	315
C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

General Notes

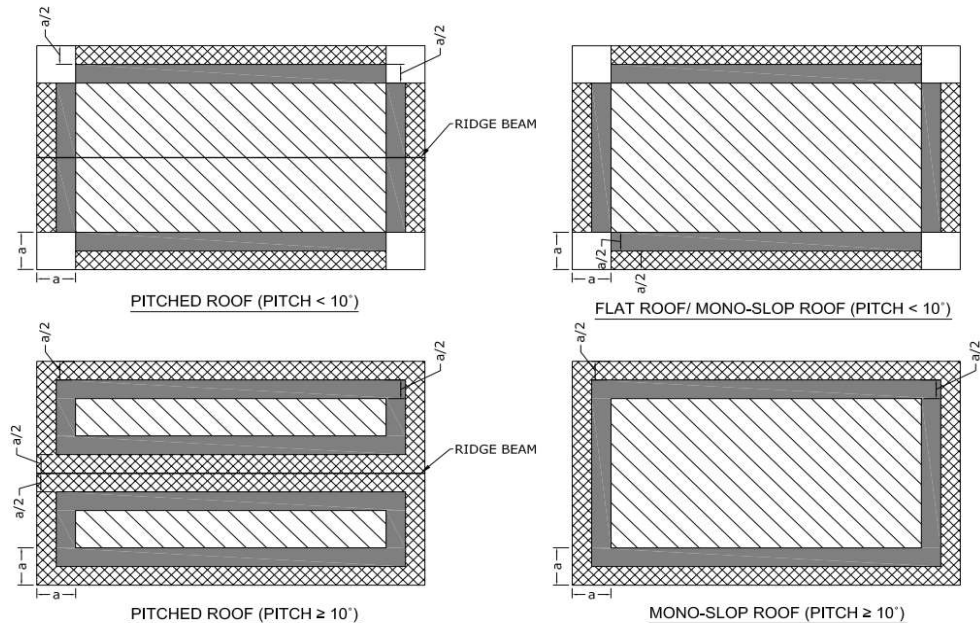
- Note 1 Array frame components specified in the certificate are satisfied to use according to AS/NZS 1170.2-2011(R2016)
- Note 2 Spacing calculated based on 1.9mm steel purlin or 35mm screw embedment length into timber (JD4 seasoned timber).
- Note 3 Recommended screws

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

- Note 4 Maximum uplift wind pressure is limited to 3.85 kPa for panel dimension of 2.25m x 1.2m
 Maximum uplift wind pressure is limited to 5 kPa for panel dimension of 1.67m x 1m & 2m x 1m
 -- states more uplift pressure
- Note 5 Tilt angle is measured from roof surface.
- Note 6 Deflection is limited to Minimum of L/120 and 15mm
- Note 7 Terrain Category 2 (TC2) refers to 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 (TC3) refers to 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 optimised location of rail splice connection is at quarter length of the spacing of the interface. No Splice connection should be placed at the centre of spacing or over the interface.



- Note 9 Refer Figure 1 for definition of roof zones.



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Figure 1 - Roof Zones Definition

In Figure 1, the value of dimension "a" is the minimum of 0.2b, 0.2d and h. (b & d are building dimensions and h is its height)