EBULEN CONSULT

SOLAR PV ROOF-MOUNT RACKING FRAME ENGINEERING CERTIFICATE

GOOMAX TILT LEG SYSTEM WITH NON-PENETRATIVE CLAMP

Prepared for:

Xiamen Goomax Energy Technology Co., Ltd.

Suite 905, Jordan Building A, High-tech Park, Huli District

Xiamen, China

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Ref: E22020448-Rev.5

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OVERVIEW

This structural engineering certificate is issued for Goomax Tilt Leg racking system, which is assessed against relevant Australian Standards and regulations. The assessment is carried out based on sound engineering methodologies. Assessment specifications and findings are given in the following sections.

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 1170.2:2021 – Structural design actions, Part 2: Wind actions
- AS/NZS 1664:1997 – Aluminum Structures
- AS/NZS 4600:2018 – Cold-Formed Steel Structures

ASSESSED PV RACKING FRAME COMPONENTS

The following products by Xiamen Goomax Energy Technology Co., Ltd. are assessed against relevant Australian Standards and building regulations based on the specified conditions.

Assessed Components	Component Number	Material
Goomax Rail 1	GM-R56	AL 6005-T5
Goomax Rail 2	GM-R69 (GM-R69-B)	AL 6005-T5
Goomax Rail 3	GM-R01-Light	AL 6005-T5
Rail Splice 1	GM-RS-51-AZ	AL 6005-T5
Rail Splice 2	GM-RS-51-AZ-1	AL 6005-T5
Rail Splice 3	GM-RS-56-AZ （GM-RS-56-AZ-B）	AL 6005-T5
Goomax Non-penetrative Clamp and Bracket	GM-MRH-07-AZ, GM-MRH-07L-AZ	AL 6005-T5
	GM-MRH-18-AZ	AL 6005-T5
	GM-MRH-19-AZ	AL 6005-T5
	GM-MRH-20-AZ	AL 6005-T5
Tilt Leg Kits – Front	GM-AS-200/400/600-AZ; GM-AS-400-AZ-02	AL 6005-T5
Tilt Leg Kits – Rear	GM-AS-B01-AZ; GM-AS-B01-AZ-02	AL 6005-T5
Goomax Adjustable Middle Panel Clamp	GM-MC-30(35)-AZ GM-MC-30(40)-AZ GM-MC-35(40)-AZ GM-MC-35(40)-AZ-1 GM-MC-35(40)-AZ-2	AL 6005-T5

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	GM-MC-30(35)-AZ-1 GM-MC-30(35)-AZ-2 (GM-MC-30(35)-AZ-B) GM-MC-35(50)-AZ GM-MC-200-TF2-AZ GM-MC-X(30-50)-AZ	
Goomax Adjustable End Panel Clamp	GM-EC-30/35/40/45/50-AZ GM-EC-35(40)-AZ GM-EC-30(35)-AZ (GM-EC-30(35)-AZ-B) GM-EC-200-TF2-AZ	AL 6005-T5
Goomax Thin Film Panel Middle Clamp	GM-MC-60-TF2-AZ	AL 6005-T5
Goomax Thin Film Panel End Clamp	GM-EC-60-TF2-AZ	AL 6005-T5
Bolt and Nut	GM-BN-25-AZ	AL 6005-T5, SUS304
Other Required but Non-structural Components	GM-CT-AZ, GM-E-EL-AZ, GM-EK-AZ, GM-SL-XJ-AZ, GM-XJ-AZ, GM-E-EL-12	SUS 304, Plastic

Note: the materials listed in the table refer to the main components and members of the racking frame, other accessories such as nuts, bolts, washers, and sockets are made of SUS 304.

ASSESSMENT CONDITIONS

- Solar PV system design life of 25 years
- Wind region A, B, C, D
- Terrain category 2 & 3
- Ultimate wind recurrence interval of 200 years
- Maximum average roof height of 30m
- Maximum panel tilt angle to roof surface is 30º
- Solar PV panel assessed: 2274mm x 1200mm, 2000mm x 1200mm and 1670mm x 1000mm
- Self-weight of solar PV panel and racking frame is 0.15kPa-0.19kPa
- Solar PV panel is supported by minimum 2 rails
- The clamps capacities are taken from below testing reports:
  - No.20-0948 by Melbourne Testing Services (MTS) Pty Ltd, dated 15/10/2020
  - No.22-0561 by Melbourne Testing Services (MTS) Pty Ltd, dated 22/06/2020
- The clamps have been assessed with the following roof sheeting types:
  - Lysaght KlipLok 700 Classic/Hi-strength
  - Lysaght KlipLok 406
  - Lysaght KlipLok 305
  - Fielders Kingklip 700
- Product details are taken from the drawing set provided by Xiamen Goomax Energy Technology Co., Ltd. as listed in the above component table
- Installation to be carried out strictly in accordance with the manufacturer's installation guidelines

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IMPORTANT NOTES

- ***This certification is issued based on assessments of solar PV racking frame system and its fixing connection to building roof. It has not considered the structural capacity of building structure and solar PV panel due to uncertainty of generic application. The installer must use the data tables as references only.***
- ***The attached spacing tables must be read in conjunction with foot notes and general notes.***
- ***The non-structural components are only certified structurally using the deem-to-comply method as they do not contribute to the system's structural capacity.***
- ***This certification shall be reviewed and revalidated by the structural engineer after two years from the date of issue or if any applicable standard is updated.***

CONCLUSION

The above-mentioned solar PV roof-mount racking frame system by Xiamen Goomax Energy Technology Co., Ltd. is found structurally sound against relevant Australian Standards following the engineering recommendations in this certification. Installation shall be conducted following the manufacturer's guidelines.

Certified by:

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APPENDIX A – INSTALLATION GUIDELINE FOR 2M X 1.2M PV PANEL

Interface Spacing Table for Roof Height H ≤5m, Terrain Category 3 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°< Φ ≤ 15°	15°< Φ ≤ 25°	25°< Φ ≤ 30°
A	Internal Zone	1406	801	709
	Intermediate Zone	897	521	462
	Edge Zone	659	385	343
	Corner Zone	430	254*	226*
B	Internal Zone	923	535	475
	Intermediate Zone	597	350	312
	Edge Zone	442	260*	232*
	Corner Zone	290	172*	153*
C	Internal Zone	590	346	308
	Intermediate Zone	386	228*	203*
	Edge Zone	287	170*	152*
	Corner Zone	189*	113*	100*
D	Internal Zone	379	224*	199*
	Intermediate Zone	249*	148*	132*
	Edge Zone	186*	110*	98*
	Corner Zone	123*	73*	65*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 5m <H ≤10m, Terrain Category 3 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°< Φ ≤ 15°	15°< Φ ≤ 25°	25°< Φ ≤ 30°
A	Internal Zone	1406	801	709
	Intermediate Zone	897	521	462
	Edge Zone	659	385	343
	Corner Zone	430	254*	226*
B	Internal Zone	923	535	475
	Intermediate Zone	597	350	312
	Edge Zone	442	260*	232*
	Corner Zone	290	172*	153*
C	Internal Zone	590	346	308
	Intermediate Zone	386	228*	203*
	Edge Zone	287	170*	152*
	Corner Zone	189*	113*	100*
D	Internal Zone	379	224*	199*
	Intermediate Zone	249*	148*	132*
	Edge Zone	186*	110*	98*
	Corner Zone	123*	73*	65*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 10m ＜H ≤15m, Terrain Category 3 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°＜ Φ ≤ 15°	15°＜ Φ ≤ 25°	25°＜ Φ ≤ 30°
A	Internal Zone	1202	690	611
	Intermediate Zone	772	450	400
	Edge Zone	568	334	297
	Corner Zone	372	220*	196*
B	Internal Zone	793	462	410
	Intermediate Zone	516	303	270*
	Edge Zone	382	226*	201*
	Corner Zone	251*	149*	133*
C	Internal Zone	510	300	267*
	Intermediate Zone	334	198*	176*
	Edge Zone	249*	148*	131*
	Corner Zone	164*	98*	87*
D	Internal Zone	328	194*	173*
	Intermediate Zone	216*	128*	114*
	Edge Zone	161*	96*	85*
	Corner Zone	107*	64*	57*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 15m ＜H ≤20m, Terrain Category 3 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°＜ Φ ≤ 15°	15°＜ Φ ≤ 25°	25°＜ Φ ≤ 30°
A	Internal Zone	1065	614	545
	Intermediate Zone	687	401	357
	Edge Zone	507	298	265*
	Corner Zone	332	197*	175*
B	Internal Zone	706	412	366
	Intermediate Zone	460	271*	241*
	Edge Zone	341	202*	180*
	Corner Zone	225*	134*	119*
C	Internal Zone	454	268*	238*
	Intermediate Zone	299	177*	158*
	Edge Zone	222*	132*	118*
	Corner Zone	147*	87*	78*
D	Internal Zone	293	173*	155*
	Intermediate Zone	193*	115*	102*
	Edge Zone	144*	86*	76*
	Corner Zone	95*	57*	51*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 20m≤H≤30m, Terrain Category 3 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°< Φ ⩽ 15°	15°< Φ ⩽ 25°	25°< Φ ⩽ 30°
A	Internal Zone	930	539	478
	Intermediate Zone	602	353	314
	Edge Zone	445	262*	234*
	Corner Zone	292	173*	154*
B	Internal Zone	619	362	322
	Intermediate Zone	404	239*	213*
	Edge Zone	300	178*	158*
	Corner Zone	198*	118*	105*
C	Internal Zone	400	236*	210*
	Intermediate Zone	263*	156*	139*
	Edge Zone	196*	116*	104*
	Corner Zone	130*	77*	69*
D	Internal Zone	258*	153*	136*
	Intermediate Zone	170*	101*	90*
	Edge Zone	127*	76*	67*
	Corner Zone	84*	50*	45*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height H ≤5m, Terrain Category 2 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°< Φ ≤ 15°	15°< Φ ≤ 25°	25°< Φ ≤ 30°
A	Internal Zone	1144	658	583
	Intermediate Zone	736	429	382
	Edge Zone	542	319	284*
	Corner Zone	355	210*	187*
B	Internal Zone	756	441	392
	Intermediate Zone	492	290	258*
	Edge Zone	365	216*	192*
	Corner Zone	240*	143*	127*
C	Internal Zone	486	286	255*
	Intermediate Zone	319	189*	168*
	Edge Zone	237*	141*	126*
	Corner Zone	157*	93*	83*
D	Internal Zone	313	185*	165*
	Intermediate Zone	206*	123*	109*
	Edge Zone	154*	92*	82*
	Corner Zone	102*	61*	54*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 5m <H ≤10m, Terrain Category 2 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°< Φ ≤ 15°	15°< Φ ≤ 25°	25°< Φ ≤ 30°
A	Internal Zone	930	539	478
	Intermediate Zone	602	353	314
	Edge Zone	445	262*	234*
	Corner Zone	292	173*	154*
B	Internal Zone	619	362	322
	Intermediate Zone	404	239*	213*
	Edge Zone	300	178*	158*
	Corner Zone	198*	118*	105*
C	Internal Zone	400	236*	210*
	Intermediate Zone	263*	156*	139*
	Edge Zone	196*	116*	104*
	Corner Zone	130*	77*	69*
D	Internal Zone	258*	153*	136*
	Intermediate Zone	170*	101*	90*
	Edge Zone	127*	76*	67*
	Corner Zone	84*	50*	45*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 10m ＜H ≤15m, Terrain Category 2 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°＜ Φ ≤ 15°	15°＜ Φ ≤ 25°	25°＜ Φ ≤ 30°
A	Internal Zone	837	486	432
	Intermediate Zone	543	319	284*
	Edge Zone	402	237*	211*
	Corner Zone	265*	157*	140*
B	Internal Zone	558	328	291
	Intermediate Zone	365	216*	192*
	Edge Zone	272*	161*	143*
	Corner Zone	179*	107*	95*
C	Internal Zone	361	213*	190*
	Intermediate Zone	238*	141*	126*
	Edge Zone	177*	105*	94*
	Corner Zone	117*	70*	62*
D	Internal Zone	233*	138*	123*
	Intermediate Zone	154*	92*	82*
	Edge Zone	115*	69*	61*
	Corner Zone	76*	45*	40*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 15m ＜H ≤20m, Terrain Category 2 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°＜ Φ ≤ 15°	15°＜ Φ ≤ 25°	25°＜ Φ ≤ 30°
A	Internal Zone	787	458	407
	Intermediate Zone	512	301	268*
	Edge Zone	379	224*	200*
	Corner Zone	250*	148*	132*
B	Internal Zone	526	309	275*
	Intermediate Zone	345	204*	182*
	Edge Zone	256*	152*	136*
	Corner Zone	169*	101*	90*
C	Internal Zone	341	202*	180*
	Intermediate Zone	224*	133*	119*
	Edge Zone	167*	100*	89*
	Corner Zone	111*	66*	59*
D	Internal Zone	220*	131*	117*
	Intermediate Zone	146*	87*	77*
	Edge Zone	109*	65*	58*
	Corner Zone	72*	43*	38*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 20m≤H≤30m, Terrain Category 2 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°< Φ ⩽ 15°	15°< Φ ⩽ 25°	25°< Φ ⩽ 30°
A	Internal Zone	728	425	378
	Intermediate Zone	474	279*	249*
	Edge Zone	352	208*	185*
	Corner Zone	232*	138*	123*
B	Internal Zone	487	287	255*
	Intermediate Zone	320	189*	169*
	Edge Zone	238*	141*	126*
	Corner Zone	157*	94*	83*
C	Internal Zone	316	187*	167*
	Intermediate Zone	208*	124*	110*
	Edge Zone	155*	92*	82*
	Corner Zone	67*	61*	55*
D	Internal Zone	204*	121*	108*
	Intermediate Zone	135*	80*	72*
	Edge Zone	101*	60*	54*
	Corner Zone	67*	40*	36*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

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APPENDIX B – INSTALLATION GUIDELINE FOR 2.274M X 1.2M PV PANEL

Interface Spacing Table for Roof Height H ≤5m, Terrain Category 3 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°< Φ ≤ 15°	15°< Φ ≤ 25°	25°< Φ ≤ 30°
A	Internal Zone	1237	704	624
	Intermediate Zone	789	458	406
	Edge Zone	579	339	301
	Corner Zone	378	223*	199*
B	Internal Zone	811	470	417
	Intermediate Zone	525	308	274
	Edge Zone	388	229*	204*
	Corner Zone	255	151*	135*
C	Internal Zone	519	304	271
	Intermediate Zone	340	201*	179*
	Edge Zone	252	149*	133*
	Corner Zone	166*	99*	88*
D	Internal Zone	333	197*	175*
	Intermediate Zone	219*	130*	116*
	Edge Zone	163*	97*	86*
	Corner Zone	108*	64*	57*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 5m <H ≤10m, Terrain Category 3 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°< Φ ≤ 15°	15°< Φ ≤ 25°	25°< Φ ≤ 30°
A	Internal Zone	1237	704	624
	Intermediate Zone	789	458	406
	Edge Zone	579	339	301
	Corner Zone	378	223*	199*
B	Internal Zone	811	470	417
	Intermediate Zone	525	308	274
	Edge Zone	388	229*	204*
	Corner Zone	255	151*	135*
C	Internal Zone	519	304	271
	Intermediate Zone	340	201*	179*
	Edge Zone	252	149*	133*
	Corner Zone	166*	99*	88*
D	Internal Zone	333	197*	175*
	Intermediate Zone	219*	130*	116*
	Edge Zone	163*	97*	86*
	Corner Zone	108*	64*	57*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 10m ＜H ≤15m, Terrain Category 3 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°＜ Φ ≤ 15°	15°＜ Φ ≤ 25°	25°＜ Φ ≤ 30°
A	Internal Zone	1057	606	538
	Intermediate Zone	679	395	351
	Edge Zone	500	293	261
	Corner Zone	327	193*	172*
B	Internal Zone	698	406	361
	Intermediate Zone	453	267	237*
	Edge Zone	336	198*	177*
	Corner Zone	221*	131*	117*
C	Internal Zone	448	264	235*
	Intermediate Zone	294	174*	155*
	Edge Zone	219*	130*	116*
	Corner Zone	144*	86*	77*
D	Internal Zone	288	171*	152*
	Intermediate Zone	190*	113*	101*
	Edge Zone	142*	84*	75*
	Corner Zone	94*	56*	50*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 15m ＜H ≤20m, Terrain Category 3 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°＜ Φ ≤ 15°	15°＜ Φ ≤ 25°	25°＜ Φ ≤ 30°
A	Internal Zone	937	540	479
	Intermediate Zone	604	353	314
	Edge Zone	446	262	233*
	Corner Zone	292	173*	154*
B	Internal Zone	620	362	322
	Intermediate Zone	404	238*	212*
	Edge Zone	300	177*	158*
	Corner Zone	198*	117*	105*
C	Internal Zone	400	236*	210*
	Intermediate Zone	262	156*	139*
	Edge Zone	195*	116*	103*
	Corner Zone	129*	77*	69*
D	Internal Zone	257	153*	136*
	Intermediate Zone	170*	101*	90*
	Edge Zone	127*	75*	67*
	Corner Zone	84*	50*	45*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 20m≤H≤30m, Terrain Category 3 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°< Φ ⩽ 15°	15°< Φ ⩽ 25°	25°< Φ ⩽ 30°
A	Internal Zone	818	474	421
	Intermediate Zone	530	310	276
	Edge Zone	391	231*	205*
	Corner Zone	257	152*	136*
B	Internal Zone	544	319	283
	Intermediate Zone	355	210*	187*
	Edge Zone	264	156*	139*
	Corner Zone	174*	103*	92*
C	Internal Zone	351	207*	185*
	Intermediate Zone	231*	137*	122*
	Edge Zone	172*	102*	91*
	Corner Zone	114*	68*	60*
D	Internal Zone	227*	134*	120*
	Intermediate Zone	150*	89*	79*
	Edge Zone	112*	66*	59*
	Corner Zone	74*	44*	39*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height H ≤5m, Terrain Category 2 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°< Φ ≤ 15°	15°< Φ ≤ 25°	25°< Φ ≤ 30°
A	Internal Zone	1006	578	513
	Intermediate Zone	647	378	336
	Edge Zone	477	280	249*
	Corner Zone	312	185*	165*
B	Internal Zone	665	388	345
	Intermediate Zone	433	255	227*
	Edge Zone	321	190*	169*
	Corner Zone	211*	125*	112*
C	Internal Zone	428	252	224*
	Intermediate Zone	281	166*	148*
	Edge Zone	209*	124*	110*
	Corner Zone	138*	82*	73*
D	Internal Zone	275	163*	145*
	Intermediate Zone	181*	108*	96*
	Edge Zone	135*	81*	72*
	Corner Zone	90*	53*	48*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 5m ＜H ≤10m, Terrain Category 2 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°< Φ ≤ 15°	15°< Φ ≤ 25°	25°< Φ ≤ 30°
A	Internal Zone	818	474	421
	Intermediate Zone	530	310	276
	Edge Zone	391	231*	205*
	Corner Zone	257	152*	136*
B	Internal Zone	544	319	283
	Intermediate Zone	355	210*	187*
	Edge Zone	264	156*	139*
	Corner Zone	174*	103*	92*
C	Internal Zone	351	207*	185*
	Intermediate Zone	231*	137*	122*
	Edge Zone	172*	102*	91*
	Corner Zone	114*	68*	60*
D	Internal Zone	227*	134*	120*
	Intermediate Zone	150*	89*	79*
	Edge Zone	112*	66*	59*
	Corner Zone	74*	44*	39*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 10m ＜H ≤15m, Terrain Category 2 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°＜ Φ ≤ 15°	15°＜ Φ ≤ 25°	25°＜ Φ ≤ 30°
A	Internal Zone	736	428	380
	Intermediate Zone	478	281	250*
	Edge Zone	354	209*	186*
	Corner Zone	233*	138*	123*
B	Internal Zone	491	288	256
	Intermediate Zone	321	190*	169*
	Edge Zone	239*	142*	126*
	Corner Zone	158*	94*	84*
C	Internal Zone	317	188*	167*
	Intermediate Zone	209*	124*	111*
	Edge Zone	156*	93*	83*
	Corner Zone	103*	61*	55*
D	Internal Zone	205*	122*	108*
	Intermediate Zone	136*	81*	72*
	Edge Zone	101*	60*	54*
	Corner Zone	67*	40*	36*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 15m ＜H ≤20m, Terrain Category 2 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°＜ Φ ≤ 15°	15°＜ Φ ≤ 25°	25°＜ Φ ≤ 30°
A	Internal Zone	692	403	358
	Intermediate Zone	450	265	236*
	Edge Zone	333	197*	175*
	Corner Zone	220*	130*	116*
B	Internal Zone	462	272	242*
	Intermediate Zone	303	179*	160*
	Edge Zone	225*	134*	119*
	Corner Zone	149*	89*	79*
C	Internal Zone	299	177*	158*
	Intermediate Zone	197*	117*	104*
	Edge Zone	147*	88*	78*
	Corner Zone	97*	58*	52*
D	Internal Zone	194*	115*	102*
	Intermediate Zone	128*	76*	68*
	Edge Zone	96*	57*	51*
	Corner Zone	63*	38*	34*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

Interface Spacing Table for Roof Height 20m≤H≤30m, Terrain Category 2 (Unit: mm)				
Wind Region	Panel Tilt Angle / Roof Zone	0°< Φ ⩽ 15°	15°< Φ ⩽ 25°	25°< Φ ⩽ 30°
A	Internal Zone	640	374	332
	Intermediate Zone	417	246*	219*
	Edge Zone	309	183*	163*
	Corner Zone	204*	121*	108*
B	Internal Zone	428	252	224*
	Intermediate Zone	281	166*	148*
	Edge Zone	209*	124*	111*
	Corner Zone	138*	82*	73*
C	Internal Zone	278	165*	147*
	Intermediate Zone	183*	109*	97*
	Edge Zone	137*	81*	72*
	Corner Zone	59*	54*	48*
D	Internal Zone	180*	107*	95*
	Intermediate Zone	119*	71*	63*
	Edge Zone	89*	53*	47*
	Corner Zone	59*	35*	31*

NOTES:
1. * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
2. Definition of Terrain Category is given in General Note 1.
3. Notion of Roof Zone is given in General Note 2.
4. Panel tilt angle is given in reference to roof surface
5. The spacing table is based on the fixing condition specified in General Note 6.

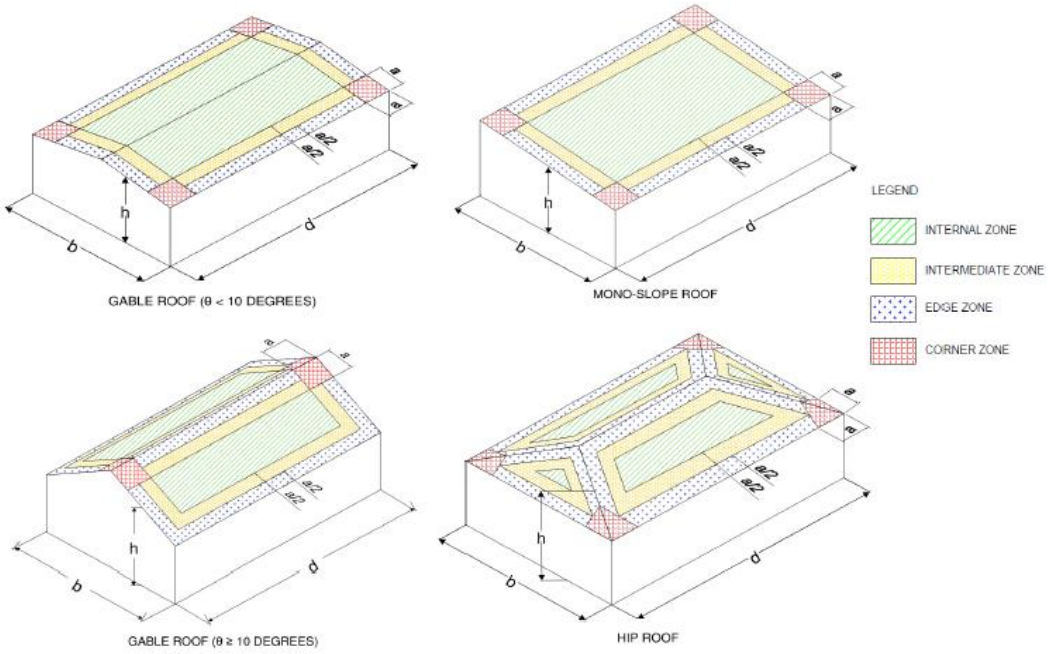
Appendix C – General notes

Note 1 Terrain Category 3 (TC 3) denotes terrain with numerous closely spaced obstructions having heights generally from 3m to 10m. The minimum density of obstructions shall be at least the equivalent of 10 house-size obstructions per hectare.

Terrain Category 2 (TC 2) denotes open terrain, including grassland, with well-scattered obstructions having heights generally from 1.5m to 5m, with no more than two obstructions per hectare.

Refer to AS/NZS 1170.2:2021 - 4.2.1 for Terrain Category definitions.

Note 2 Notion of Roof Zone is as shown in the following figure. "a" is the smaller number between roof height and 1/5 of roof width.

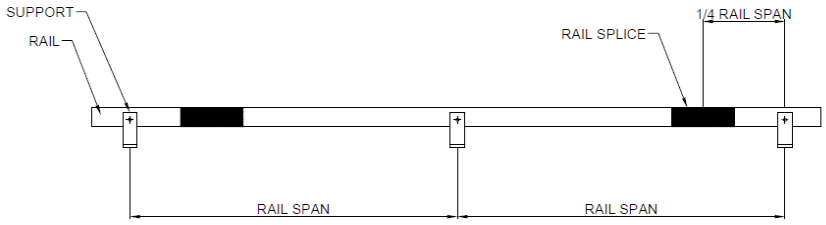


Refer to AS/NZS 1170.2:2021 – Chapter 5.4.4 for more accurate Roof Zone notion and cases.

To determine the zone dimension "a", follow the steps:

1) Determine building height (h), building length (b) and building width (d).
2) Determine (h/d) and (h/b)
3) If (h/b) or (h/d) ≥ 0.2, a is the minimum of 0.2b or 0.2d
4) If (h/b) and (h/d) < 0.2, a is equal to 2h

Note 3 To ensure the fixing spacing in above tables are valid, rail splice connectors must not be installed at the support point or at the middle span point between two adjacent supports. It is recommended to install the connector at 1/4 span points from the supports.



Note 4 Number of panel clamps required per panel for installation on **maximum 15m** high building:

Tilt Angle	Terrain	Roof Zone	Region A	Region B	Region C	Region D
15°	TC3	Internal	4	4	4	6
		Intermediate	4	4	6	NA
		Edge	4	6	8	NA
		Corner	6	8	NA	NA
	TC2	Internal	4	4	6	NA
		Intermediate	4	6	NA	NA
		Edge	6	8	NA	NA
		Corner	8	NA	NA	NA
30°	TC3	Internal	4	6	8	NA
		Intermediate	6	8	NA	NA
		Edge	6	NA	NA	NA
		Corner	NA	NA	NA	NA
	TC2	Internal	4	6	NA	NA
		Intermediate	8	NA	NA	NA
		Edge	NA	NA	NA	NA
		Corner	NA	NA	NA	NA

NOTES:
1. NA denotes the situations where an excessive amount of panel clamps are required and the installation is no longer practical.
2. A site-specific engineering assessment must be carried out to determine the number of panel clamps required for situations not covered in this table.

Number of panel clamps required per panel for installation on **maximum 30m** high building:

Tilt Angle	Terrain	Roof Zone	Region A	Region B	Region C	Region D
15°	TC3	Internal	4	4	6	8
		Intermediate	4	6	8	NA
		Edge	6	8	NA	NA
		Corner	8	NA	NA	NA
	TC2	Internal	4	4	8	NA
		Intermediate	6	6	NA	NA
		Edge	6	8	NA	NA
		Corner	NA	NA	NA	NA
30°	TC3	Internal	4	6	NA	NA
		Intermediate	6	NA	NA	NA
		Edge	8	NA	NA	NA
		Corner	NA	NA	NA	NA
	TC2	Internal	6	8	NA	NA
		Intermediate	8	NA	NA	NA
		Edge	NA	NA	NA	NA
		Corner	NA	NA	NA	NA

NOTES:
1. NA denotes the situations where an excessive amount of panel clamps are required and the installation is no longer practical.
2. A site-specific engineering assessment must be carried out to determine the number of panel clamps required for situations not covered in this table.

Note 5 The provided installation spacing tables are based on maximum PV panel size of 2274mm x 1200mm with 2 rails per panel array. For other panel sizes and more rails, refer the below table for adjustment factors based on the given spacing tables.

Maximum Panel Size	Number of Rails	Spacing Adjustment Factor
1670x1000	2 rails	136%
1670x1000	3 rails	203%
2000x1200	3 rails	170%
2274x1200	3 rails	150%

The maximum allowable fixing spacing shall not exceed 1800mm after applying the adjustment factors.

Note 6 The provided installation spacing tables are applicable to Goomax non-penetrative roof clamps as per below combinations. The clamps must be mounted over roof purlins. Their pull-out capacities have been taken from Testing Report No.20-0948, dated 15/10/2020 and No.22-0561, dated 22/06/2022 by Melbourne Testing Services (MTS).

1)	GM-MRH-07-AZ/GM-MRH-07L-AZ	Lysaght KlipLok 700/Fielders KingKlip 700 Small/Large Clamp
2)	GM-MRH-19-AZ	Lysaght KlipLok 406 and 700 Small Clamp
3)	GM-MRH-06-AZ	Lysaght KlipLok 406 Small Clamp
4)	GM-MRH-20-AZ	Lysaght KlipLok 406 and 700 Large Clamp

Note 7 According to the above-mentioned Testing Report No.20-0948, the GM-MRH-18-AZ clamp has been tested to a failure of slipping off from Lysaght Longline 305 sheeting. When installig on Lyasght Longline 305 sheeting, apply a 65% reduction factor to the existing Spacing Tables to get final fixing spacing

Note 8 All above-mentioned adjustment factors from different notes shall not be applied together to determine the final installation spacing. Factors from each note shall be applied independently.

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APPENDIX D – ASSESSED PV RACKING FRAME PART DRAWINGS

Note:
This certification is a public access version, it does not include part drawings because of Goomax's intellectual properties. Refer to the full version of the certification for part drawings.