



EBULEN CONSULT

SOLAR PV ROOF-MOUNT RACKING FRAME ENGINEERING CERTIFICATE

ANTAI FLUSH-MOUNT SYSTEM WITH 499 RAIL, L-FOOT & LL305 CLAMPS

Prepared for:

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OVERVIEW

This structural engineering certificate is issued for Antai Solar Roof Flush-mount racking system with 499 rail, L-foot bracket and non-penetrative roof clamp fixing, which have been 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 4312-2019 - Atmospheric corrosivity zones in Australia and detailed calculation referred to:
 - (1) ISO9224:2012 - Corrosion of metals and alloys Corrosivity of atmospheres - Guiding values for the corrosivity categories
 - (2) ISO9223:2012 - Corrosion of metals and alloys - Corrosivity of atmospheres - Classification, determination and estimation

ASSESSED PV RACKING FRAME PARTS

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

Part Category	Included Parts	Part Material
Rail	ATL-TYN-499	AL 6005-T6
Rail Splice	ATL-TYN-304/54	AL 6005-T6
Tin Interface Bracket	ATL-FWNY-05	AL 6005-T6
Inter/End Panel Clamp Kit	ATL-FWNY-09	AL 6005-T6
	ATL-GN-003	AL 6005-T6
	ATL-CG-018	AL 6005-T6
Longline 305 Roof Clamp	ATL-TYN-307/308	AL 6005-T5

Note: The rail splice can only be the two separated components with the code name ATL-TYN-304/54, which are fixed both inside and outside of the rail at the connection point. Other types of rail splices are not covered by this certification.

ASSESSMENT CONDITIONS

- Solar PV system design life of 25 years
- Wind region A, B, C, D
- Terrain category 2.0, 2.5, 3.0
- Ultimate wind recurrence interval of 200 years
- Maximum average roof height of 20m
- Solar PV panel assessed: 2300mm x 1200mm, 2100mm x 1100mm, 2000mm x 1100mm, 1800mm x 1200mm, 1700mm x 1100mm
- Self-weight of the solar PV panel and racking frame is 0.15kPa-0.18kPa
- Solar PV panel is supported by minimum 2 rails
- The spacing table values given in the Installation Guideline are based on the Corrosivity Category C3
- The clamps capacities are taken from below testing reports: No. 20-0250 by Melbourne Testing Services (MTS) Pty Ltd, dated 22/06/2020
- The racking rail capacity is taken as per the test report: No.XMML23090468_EN by BM Shenghe Testing Technology (Xiamen) Co., Ltd, dated 19/09/2023.
- The clamps have been assessed with the Lysaght Longline 305 roof sheeting
- Product details are taken from the drawing set provided by Antai Technology Co., Ltd. as listed in the above component table
- Installation to be carried out strictly in accordance with the manufacturer's installation guidelines

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 certificate shall be read as a whole. Any section, text, image, table extracted from this certification is not valid stand-alone.***
- ***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 Antai 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

Maximum Panel Size: 1800mm x 1200mm									
Interface Spacing Table for Terrain Category 3, h/d <= 0.5 (Unit: mm)									
Wind Region	Height & Roof Pitch Roof Zone	H<5m		5m<H<10m		10m<H≤15m		15m<H≤20m	
		Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°
A	Internal Zone	1600	1600	1600	1600	1600	1600	1600	1600
	Intermediate Zone	1473	1554	1473	1554	1369	1434	1305	1360
	Edge Zone	1278	1337	1278	1337	1096	1214	973	1076
	Corner Zone	822	908	822	908	708	782	631	696
B1	Internal Zone	1494	1578	1494	1578	1385	1455	1320	1375
	Intermediate Zone	1154	1279	1154	1279	991	1096	880	973
	Edge Zone	844	933	844	933	728	803	648	715
	Corner Zone	550	606	550	606	475	524	424	467
B2	Internal Zone	1413	1491	1413	1491	1327	1382	1231	1317
	Intermediate Zone	1037	1148	1037	1148	892	986	793	876
	Edge Zone	761	840	761	840	656	724	585	645
	Corner Zone	496	547	496	547	429	473	383	422
C	Internal Zone	1024	1134	1024	1134	881	974	783	866
	Intermediate Zone	663	732	663	732	573	632	511	563
	Edge Zone	490	541	490	541	424	467	379	417
	Corner Zone	322	355	322	355	279*	307*	250*	275*
D	Internal Zone	650	717	650	717	561	619	501	552
	Intermediate Zone	425	469	425	469	368	405	329	362
	Edge Zone	316*	348	316*	348	274*	301*	245*	269*
	Corner Zone	209*	229*	209*	229*	181*	199*	162*	178*

NOTES:

- * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
- Definition of Terrain Category is given in General Note 1.
- Notion of Roof Zone is given in General Note 2.
- The Roof pitch angle is given in reference to horizontal. The value of Φ shall be determined and measured by following the figure in Note 3
- The spacing table is based on the fixing condition specified in General Note 7.
- For 0.5 < h/d < 1.0 cases, the spacing value can be obtained by linear interpolation between h/d ≤ 0.5 and h/d ≥ 1 data with the same TC

Maximum Panel Size: 1800mm x 1200mm									
Interface Spacing Table for Terrain Category 3, h/d >= 1 (Unit: mm)									
Wind Region	Height & Roof Pitch Roof Zone	H<5m		5m<H<10m		10m<H≤15m		15m<H≤20m	
		Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°
A	Internal Zone	1505	1593	1505	1593	1392	1469	1327	1385
	Intermediate Zone	1170	1292	1170	1292	1004	1116	892	991
	Edge Zone	856	950	856	950	737	817	657	727
	Corner Zone	557	616	557	616	481	532	430	475
B1	Internal Zone	1203	1307	1203	1307	1032	1147	917	1018
	Intermediate Zone	775	860	775	860	668	741	596	660
	Edge Zone	572	633	572	633	494	547	441	488
	Corner Zone	375	414	375	414	325	359	290*	321
B2	Internal Zone	1081	1202	1081	1202	929	1031	826	916
	Intermediate Zone	699	775	699	775	603	668	538	595
	Edge Zone	516	571	516	571	446	494	399	441
	Corner Zone	339	375	339	375	294*	324	263*	290*
C	Internal Zone	690	765	690	765	596	660	531	588
	Intermediate Zone	451	499	451	499	390	432	349	385
	Edge Zone	335	370	335	370	290*	321	260*	287*
	Corner Zone	221*	244*	221*	244*	192*	212*	172*	189*
D	Internal Zone	442	489	442	489	383	423	342	378
	Intermediate Zone	291*	322	291*	322	252*	279*	226*	249*
	Edge Zone	217*	239*	217*	239*	188*	208*	168*	186*
	Corner Zone	143*	158*	143*	158*	125*	137*	111*	123*

NOTES:

- * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
- Definition of Terrain Category is given in General Note 1.
- Notion of Roof Zone is given in General Note 2.
- The Roof pitch angle is given in reference to horizontal. The value of Φ shall be determined and measured by following the figure in Note 3
- The spacing table is based on the fixing condition specified in General Note 7.
- For 0.5 < h/d < 1.0 cases, the spacing value can be obtained by linear interpolation between h/d ≤ 0.5 and h/d ≥ 1 data with the same TC

Maximum Panel Size: 1800mm x 1200mm									
Interface Spacing Table for Terrain Category 2.5, h/d ≤ 0.5 (Unit: mm)									
Wind Region	Height & Roof Pitch Roof Zone	H<5m		5m<H<10m		10m<H≤15m		15m<H≤20m	
		Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°
A	Internal Zone	1600	1600	1600	1600	1555	1600	1484	1566
	Intermediate Zone	1397	1472	1330	1385	1244	1323	1138	1261
	Edge Zone	1152	1276	1019	1128	909	1005	833	921
	Corner Zone	743	821	660	729	590	651	542	598
B1	Internal Zone	1416	1494	1345	1401	1280	1337	1170	1290
	Intermediate Zone	1041	1152	922	1020	823	910	755	834
	Edge Zone	764	844	678	749	606	669	557	614
	Corner Zone	498	549	443	488	397	438	365	402
B2	Internal Zone	1353	1412	1288	1342	1149	1273	1052	1165
	Intermediate Zone	936	1036	830	918	742	819	681	751
	Edge Zone	688	760	612	675	547	604	503	554
	Corner Zone	450	496	401	441	359	395	330	364
C	Internal Zone	925	1023	820	907	733	809	672	742
	Intermediate Zone	601	663	534	589	478	527	440	484
	Edge Zone	445	490	396	436	355	391	327	360
	Corner Zone	293*	322	261*	287*	234*	258*	216*	237*
D	Internal Zone	589	649	524	577	469	517	431	475
	Intermediate Zone	386	425	344	378	308*	339	284*	312*
	Edge Zone	287*	316*	256*	281*	230*	253*	211*	232*
	Corner Zone	190*	208*	169*	186*	152*	167*	140*	154*

NOTES:

- * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
- Definition of Terrain Category is given in General Note 1.
- Notion of Roof Zone is given in General Note 2.
- The Roof pitch angle is given in reference to horizontal. The value of Φ shall be determined and measured by following the figure in Note 3
- The spacing table is based on the fixing condition specified in General Note 7.
- For 0.5 < h/d < 1.0 cases, the spacing value can be obtained by linear interpolation between h/d ≤ 0.5 and h/d ≥ 1 data with the same TC

Maximum Panel Size: 1800mm x 1200mm									
Interface Spacing Table for Terrain Category 2.5, h/d ≥ 1 (Unit: mm)									
Wind Region	Height & Roof Pitch Roof Zone	H<5m		5m<H<10m		10m<H≤15m		15m<H≤20m	
		Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°
A	Internal Zone	1426	1508	1352	1414	1290	1347	1186	1300
	Intermediate Zone	1055	1173	935	1038	834	926	765	848
	Edge Zone	774	858	687	762	614	681	564	625
	Corner Zone	505	558	449	497	402	445	370	409
B1	Internal Zone	1085	1206	961	1067	857	951	786	872
	Intermediate Zone	701	777	623	690	558	617	512	567
	Edge Zone	518	573	461	510	413	457	380	420
	Corner Zone	340	376	303*	335	272*	300*	250*	277*
B2	Internal Zone	975	1084	865	960	772	856	708	785
	Intermediate Zone	633	701	562	623	503	557	463	512
	Edge Zone	468	518	417	461	373	413	344	380
	Corner Zone	308*	340	274*	303*	246*	272*	227*	250*
C	Internal Zone	625	692	556	615	498	551	457	506
	Intermediate Zone	409	453	365	403	327	361	301*	332
	Edge Zone	304*	336	271*	300*	243*	269*	224*	247*
	Corner Zone	201*	222*	179*	198*	161*	178*	148*	164*
D	Internal Zone	401	444	357	395	321	354	295*	326
	Intermediate Zone	264*	292*	236*	260*	212*	234*	195*	215*
	Edge Zone	197*	217*	176*	194*	158*	174*	145*	160*
	Corner Zone	130*	144*	116*	128*	105*	115*	96*	106*

NOTES:

- * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
- Definition of Terrain Category is given in General Note 1.
- Notion of Roof Zone is given in General Note 2.
- The Roof pitch angle is given in reference to horizontal. The value of Φ shall be determined and measured by following the figure in Note 3
- The spacing table is based on the fixing condition specified in General Note 7.
- For 0.5 < h/d < 1.0 cases, the spacing value can be obtained by linear interpolation between h/d ≤ 0.5 and h/d ≥ 1 data with the same TC

Maximum Panel Size: 1800mm x 1200mm									
Interface Spacing Table for Terrain Category 2, h/d ≤ 0.5 (Unit: mm)									
Wind Region	Height & Roof Pitch Roof Zone	H<5m		5m<H<10m		10m<H≤15m		15m<H≤20m	
		Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°
A	Internal Zone	1600	1600	1501	1585	1419	1497	1380	1449
	Intermediate Zone	1343	1399	1163	1287	1045	1158	983	1088
	Edge Zone	1044	1156	851	941	767	847	722	798
	Corner Zone	676	746	554	611	500	551	472	520
B1	Internal Zone	1358	1418	1196	1302	1075	1190	1011	1119
	Intermediate Zone	944	1045	771	852	695	767	655	723
	Edge Zone	694	766	569	627	514	566	484	534
	Corner Zone	454	500	373	411	337	371	318	350
B2	Internal Zone	1301	1355	1075	1190	967	1070	910	1006
	Intermediate Zone	850	940	695	767	627	692	591	652
	Edge Zone	626	691	514	566	464	511	438	482
	Corner Zone	410	451	337	371	305*	336	288*	317
C	Internal Zone	840	928	687	758	620	684	584	644
	Intermediate Zone	547	603	449	495	406	447	383	421
	Edge Zone	405	446	333	367	302*	332	285*	313*
	Corner Zone	267*	294*	220*	242*	199*	219*	188*	207*
D	Internal Zone	536	591	440	485	398	438	375	413
	Intermediate Zone	352	387	290*	319	262*	288*	247*	272*
	Edge Zone	262*	288*	216*	237*	195*	215*	184*	203*
	Corner Zone	173*	190*	143*	157*	129*	142*	122*	134*

NOTES:

- * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
- Definition of Terrain Category is given in General Note 1.
- Notion of Roof Zone is given in General Note 2.
- The Roof pitch angle is given in reference to horizontal. The value of Φ shall be determined and measured by following the figure in Note 3
- The spacing table is based on the fixing condition specified in General Note 7.
- For 0.5 < h/d < 1.0 cases, the spacing value can be obtained by linear interpolation between h/d ≤ 0.5 and h/d ≥ 1 data with the same TC

Maximum Panel Size: 1800mm x 1200mm									
Interface Spacing Table for Terrain Category 2, h/d ≥ 1 (Unit: mm)									
Wind Region	Height & Roof Pitch Roof Zone	H<5m		5m<H<10m		10m<H≤15m		15m<H≤20m	
		Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°
A	Internal Zone	1365	1432	1213	1311	1089	1212	1024	1139
	Intermediate Zone	957	1063	781	867	704	781	664	735
	Edge Zone	703	780	576	638	520	576	491	543
	Corner Zone	459	508	378	418	342	378	322	356
B1	Internal Zone	984	1093	803	891	724	802	682	755
	Intermediate Zone	638	707	523	579	472	523	446	493
	Edge Zone	472	522	388	429	351	388	331	366
	Corner Zone	310*	343	256*	282*	231*	255*	218*	241*
B2	Internal Zone	885	983	724	802	652	723	615	681
	Intermediate Zone	575	637	472	523	427	472	403	445
	Edge Zone	426	471	351	388	317	350	299*	331
	Corner Zone	281*	310*	231*	255*	209*	231*	198*	218*
C	Internal Zone	569	630	467	517	422	467	398	440
	Intermediate Zone	373	412	307*	339	278*	307*	262*	290*
	Edge Zone	277*	306*	229*	252*	207*	228*	195*	216*
	Corner Zone	183*	202*	151*	167*	137*	151*	129*	143*
D	Internal Zone	366	404	301*	333	272*	301*	257*	284*
	Intermediate Zone	241*	266*	199*	219*	180*	199*	170*	188*
	Edge Zone	180*	198*	148*	164*	134*	148*	127*	140*
	Corner Zone	119*	131*	98*	108*	89*	98*	84*	93*

NOTES:

- * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
- Definition of Terrain Category is given in General Note 1.
- Notion of Roof Zone is given in General Note 2.
- The Roof pitch angle is given in reference to horizontal. The value of Φ shall be determined and measured by following the figure in Note 3
- The spacing table is based on the fixing condition specified in General Note 7.
- For 0.5 < h/d < 1.0 cases, the spacing value can be obtained by linear interpolation between h/d ≤ 0.5 and h/d ≥ 1 data with the same TC

Maximum Panel Size: 2300mm x 1200mm									
Interface Spacing Table for Terrain Category 3, h/d <= 0.5 (Unit: mm)									
Wind Region	Height & Roof Pitch Roof Zone	H<5m		5m<H<10m		10m<H≤15m		15m<H≤20m	
		Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°
A	Internal Zone	1600	1600	1600	1600	1523	1600	1427	1509
	Intermediate Zone	1324	1381	1324	1381	1180	1296	1044	1159
	Edge Zone	1000	1109	1000	1109	857	950	761	842
	Corner Zone	643	711	643	711	554	612	494	545
B1	Internal Zone	1339	1397	1339	1397	1214	1311	1074	1192
	Intermediate Zone	903	1001	903	1001	775	858	689	762
	Edge Zone	661	730	661	730	569	629	507	560
	Corner Zone	430	474	430	474	372	410	332	365
B2	Internal Zone	1274	1337	1274	1337	1088	1208	964	1068
	Intermediate Zone	811	898	811	898	698	771	620	686
	Edge Zone	595	658	595	658	513	567	457	505
	Corner Zone	388	428	388	428	336	370	300	330
C	Internal Zone	801	887	801	887	689	762	613	677
	Intermediate Zone	519	573	519	573	448	494	400	440
	Edge Zone	384	423	384	423	332	366	296	326
	Corner Zone	252	278	252	278	218*	240*	195*	215*
D	Internal Zone	509	561	509	561	439	484	392	432
	Intermediate Zone	333	367	333	367	288	317	257	283
	Edge Zone	247*	272	247*	272	214*	236*	191*	211*
	Corner Zone	163*	179*	163*	179*	142*	156*	127*	139*

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. The Roof pitch angle is given in reference to horizontal. The value of Φ shall be determined and measured by following the figure in Note 3
5. The spacing table is based on the fixing condition specified in General Note 7.
6. For 0.5 < h/d < 1.0 cases, the spacing value can be obtained by linear interpolation between h/d ≤ 0.5 and h/d ≥ 1 data with the same TC

Maximum Panel Size: 2300mm x 1200mm									
Interface Spacing Table for Terrain Category 3, h/d >= 1 (Unit: mm)									
Wind Region	Height & Roof Pitch Roof Zone	H<5m		5m<H<10m		10m<H≤15m		15m<H≤20m	
		Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°
A	Internal Zone	1347	1409	1347	1409	1232	1321	1089	1214
	Intermediate Zone	915	1019	915	1019	786	873	698	775
	Edge Zone	670	743	670	743	577	640	514	569
	Corner Zone	436	482	436	482	376	417	336	372
B1	Internal Zone	941	1048	941	1048	808	898	717	797
	Intermediate Zone	607	673	607	673	523	580	466	516
	Edge Zone	447	495	447	495	387	428	345	382
	Corner Zone	293	324	293	324	254	281	227*	251
B2	Internal Zone	846	940	846	940	727	807	646	717
	Intermediate Zone	547	606	547	606	472	523	421	466
	Edge Zone	404	447	404	447	349	386	312	345
	Corner Zone	265	293	265	293	230*	254	205*	227*
C	Internal Zone	540	599	540	599	466	516	416	460
	Intermediate Zone	353	391	353	391	305	338	273	302
	Edge Zone	262	290	262	290	227*	251	203*	224*
	Corner Zone	173*	191*	173*	191*	150*	166*	134*	148*
D	Internal Zone	346	383	346	383	299	331	267	296
	Intermediate Zone	228*	252	228*	252	197*	218*	176*	195*
	Edge Zone	170*	187*	170*	187*	147*	162*	132*	145*
	Corner Zone	112*	124*	112*	124*	97*	107*	87*	96*

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. The Roof pitch angle is given in reference to horizontal. The value of Φ shall be determined and measured by following the figure in Note 3
5. The spacing table is based on the fixing condition specified in General Note 7.
6. For 0.5 < h/d < 1.0 cases, the spacing value can be obtained by linear interpolation between h/d ≤ 0.5 and h/d ≥ 1 data with the same TC

Maximum Panel Size: 2300mm x 1200mm									
Interface Spacing Table for Terrain Category 2.5, h/d ≤ 0.5 (Unit: mm)									
Wind Region	Height & Roof Pitch Roof Zone	H<5m		5m<H<10m		10m<H≤15m		15m<H≤20m	
		Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°
A	Internal Zone	1566	1600	1464	1548	1381	1453	1332	1389
	Intermediate Zone	1242	1323	1095	1216	974	1080	891	987
	Edge Zone	901	999	798	883	711	787	652	721
	Corner Zone	582	642	517	570	462	510	424	468
B1	Internal Zone	1279	1339	1127	1252	1001	1111	916	1015
	Intermediate Zone	815	902	722	798	644	712	591	652
	Edge Zone	598	660	531	586	475	524	436	481
	Corner Zone	390	430	347	382	311	342	286	315
B2	Internal Zone	1145	1272	1011	1121	899	996	823	911
	Intermediate Zone	733	811	650	718	580	641	533	588
	Edge Zone	539	595	479	528	428	472	394	434
	Corner Zone	352	388	313	345	281	309	259	285
C	Internal Zone	724	801	642	709	573	633	526	581
	Intermediate Zone	470	518	418	461	374	412	344	379
	Edge Zone	348	383	310	341	278	306	256	281
	Corner Zone	229*	252	204*	225*	183*	201*	169*	185*
D	Internal Zone	461	508	410	452	367	404	337	372
	Intermediate Zone	302	332	269	296	241*	265	222*	244*
	Edge Zone	224*	247*	200*	220*	180*	198*	165*	182*
	Corner Zone	148*	163*	132*	145*	119*	131*	109*	120*

NOTES:

- * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
- Definition of Terrain Category is given in General Note 1.
- Notion of Roof Zone is given in General Note 2.
- The Roof pitch angle is given in reference to horizontal. The value of Φ shall be determined and measured by following the figure in Note 3
- The spacing table is based on the fixing condition specified in General Note 7.
- For 0.5 < h/d < 1.0 cases, the spacing value can be obtained by linear interpolation between h/d ≤ 0.5 and h/d ≥ 1 data with the same TC

Maximum Panel Size: 2300mm x 1200mm									
Interface Spacing Table for Terrain Category 2.5, h/d ≥ 1 (Unit: mm)									
Wind Region	Height & Roof Pitch Roof Zone	H<5m		5m<H<10m		10m<H≤15m		15m<H≤20m	
		Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°
A	Internal Zone	1290	1348	1143	1275	1015	1131	928	1033
	Intermediate Zone	826	918	731	812	653	724	599	664
	Edge Zone	605	672	538	596	481	533	442	489
	Corner Zone	395	437	351	389	315	348	290	320
B1	Internal Zone	849	944	752	835	671	744	615	682
	Intermediate Zone	549	608	488	540	436	483	401	444
	Edge Zone	405	449	361	399	323	357	297	329
	Corner Zone	266	294	237*	262	213*	235*	196*	216*
B2	Internal Zone	763	848	677	751	604	670	554	614
	Intermediate Zone	495	548	440	487	394	436	362	401
	Edge Zone	366	405	326	361	292	323	269	297
	Corner Zone	241*	266	215*	237*	193*	213*	177*	196*
C	Internal Zone	489	542	435	481	389	431	358	396
	Intermediate Zone	320	354	285	315	256	283	235*	260
	Edge Zone	238*	263	212*	234*	190*	210*	175*	193*
	Corner Zone	157*	173*	140*	155*	126*	139*	116*	128*
D	Internal Zone	314	347	280	309	251	277	231*	255
	Intermediate Zone	207*	228*	184*	204*	165*	183*	152*	168*
	Edge Zone	154*	170*	137*	152*	123*	136*	114*	125*
	Corner Zone	102*	113*	91*	100*	82*	90*	75*	83*

NOTES:

- * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
- Definition of Terrain Category is given in General Note 1.
- Notion of Roof Zone is given in General Note 2.
- The Roof pitch angle is given in reference to horizontal. The value of Φ shall be determined and measured by following the figure in Note 3
- The spacing table is based on the fixing condition specified in General Note 7.
- For 0.5 < h/d < 1.0 cases, the spacing value can be obtained by linear interpolation between h/d ≤ 0.5 and h/d ≥ 1 data with the same TC

Maximum Panel Size: 2300mm x 1200mm									
Interface Spacing Table for Terrain Category 2, h/d ≤ 0.5 (Unit: mm)									
Wind Region	Height & Roof Pitch Roof Zone	H<5m		5m<H<10m		10m<H≤15m		15m<H≤20m	
		Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°
A	Internal Zone	1483	1569	1344	1402	1285	1341	1205	1307
	Intermediate Zone	1122	1247	910	1009	818	906	769	852
	Edge Zone	817	904	666	736	600	663	565	624
	Corner Zone	529	584	433	478	391	431	369	407
B1	Internal Zone	1155	1283	936	1038	841	931	791	876
	Intermediate Zone	739	817	603	667	544	600	512	566
	Edge Zone	543	600	445	491	402	443	379	418
	Corner Zone	355	391	292	321	264	290	249	274
B2	Internal Zone	1035	1149	841	931	756	837	712	787
	Intermediate Zone	665	735	544	600	491	541	462	510
	Edge Zone	490	540	402	443	363	400	342	377
	Corner Zone	321	353	264	290	239*	263	225*	248
C	Internal Zone	657	726	537	593	485	535	457	504
	Intermediate Zone	428	472	351	387	317	350	299	330
	Edge Zone	317	349	261	287	236*	260	223*	245*
	Corner Zone	209*	230*	172*	189*	156*	171*	147*	162*
D	Internal Zone	419	462	344	379	311	343	294	323
	Intermediate Zone	275	303	227*	249	205*	225*	193*	213*
	Edge Zone	205*	225*	169*	186*	153*	168*	144*	159*
	Corner Zone	135*	149*	112*	123*	101*	111*	95*	105*

NOTES:

- * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
- Definition of Terrain Category is given in General Note 1.
- Notion of Roof Zone is given in General Note 2.
- The Roof pitch angle is given in reference to horizontal. The value of Φ shall be determined and measured by following the figure in Note 3
- The spacing table is based on the fixing condition specified in General Note 7.
- For 0.5 < h/d < 1.0 cases, the spacing value can be obtained by linear interpolation between h/d ≤ 0.5 and h/d ≥ 1 data with the same TC

Maximum Panel Size: 2300mm x 1200mm									
Interface Spacing Table for Terrain Category 2, h/d ≥ 1 (Unit: mm)									
Wind Region	Height & Roof Pitch Roof Zone	H<5m		5m<H<10m		10m<H≤15m		15m<H≤20m	
		Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°	Φ < 10°	10° ≤ Φ ≤ 15°
A	Internal Zone	1171	1294	949	1057	852	948	802	891
	Intermediate Zone	749	832	611	678	551	611	519	575
	Edge Zone	550	610	451	499	407	451	384	425
	Corner Zone	359	398	296	327	267	295	252	279
B1	Internal Zone	770	855	628	697	566	628	533	591
	Intermediate Zone	499	553	409	453	370	409	349	386
	Edge Zone	369	408	303	335	274	303	259	286
	Corner Zone	243*	268	200*	221*	181*	200*	171*	189*
B2	Internal Zone	693	769	566	628	511	566	481	533
	Intermediate Zone	450	499	370	409	334	369	315	348
	Edge Zone	333	369	274	303	248	274	234*	259
	Corner Zone	219*	242*	181*	200*	164*	181*	155*	171*
C	Internal Zone	445	493	365	404	330	365	311	344
	Intermediate Zone	292	322	240*	265	217*	240*	205*	226*
	Edge Zone	217*	240*	179*	197*	162*	179*	153*	169*
	Corner Zone	143*	158*	118*	131*	107*	118*	101*	112*
D	Internal Zone	286	316	235*	260	213*	235*	201*	222*
	Intermediate Zone	189*	208*	155*	172*	141*	155*	133*	147*
	Edge Zone	141*	155*	116*	128*	105*	116*	99*	109*
	Corner Zone	93*	103*	77*	85*	70*	77*	66*	73*

NOTES:

- * denotes the situations where the wind load is more than 5KPa and the installation safety is compromised.
- Definition of Terrain Category is given in General Note 1.
- Notion of Roof Zone is given in General Note 2.
- The Roof pitch angle is given in reference to horizontal. The value of Φ shall be determined and measured by following the figure in Note 3
- The spacing table is based on the fixing condition specified in General Note 7.
- For 0.5 < h/d < 1.0 cases, the spacing value can be obtained by linear interpolation between h/d ≤ 0.5 and h/d ≥ 1 data with the same TC

General Notes

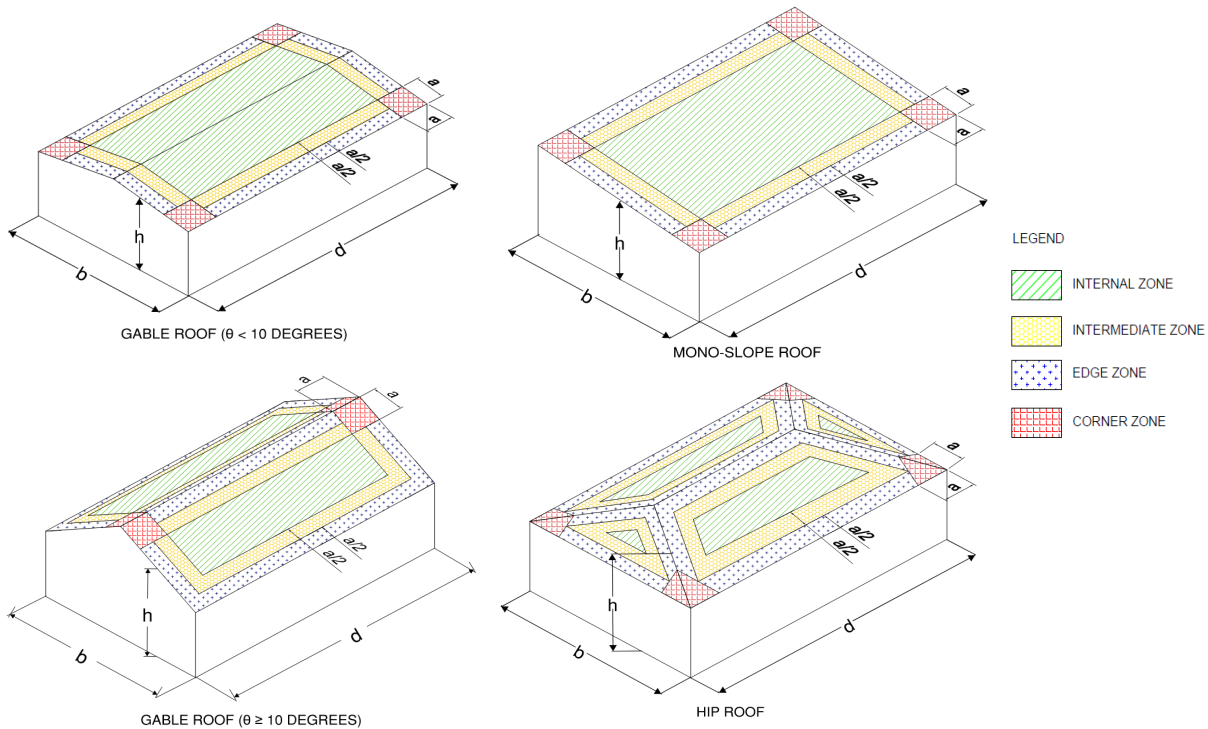
Note 1 Terrain Category 3 (TC 3) denotes terrain with numerous closely spaced obstructions having heights generally from 3m to 10m. The minimum density of obstructions shall be at least the equivalent of 10 house-size obstructions per hectare.

Terrain Category 2.5 (TC 2.5) denotes terrain with some trees or isolated obstructions, terrain in developing outer urban areas with scattered houses, or large acreage developments with more than two and less than 10 buildings 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 examples are shown in the following figures.
 (Note: As specified by Antai Technology Co., Ltd., this certificate is limited to 4-zone scenario only and it is not applicable for 2-zone scenarios.
 Refer to AS/NZS 1170.2:2021 section B6.1 for 2 zone scenario)



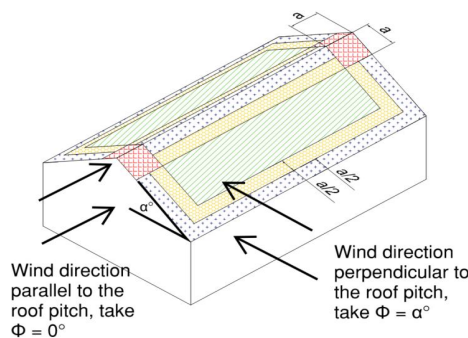
Refer to AS/NZS 1170.2:2021 – Chapter 5.4.4 for more accurate Roof Zone notion and cases.

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

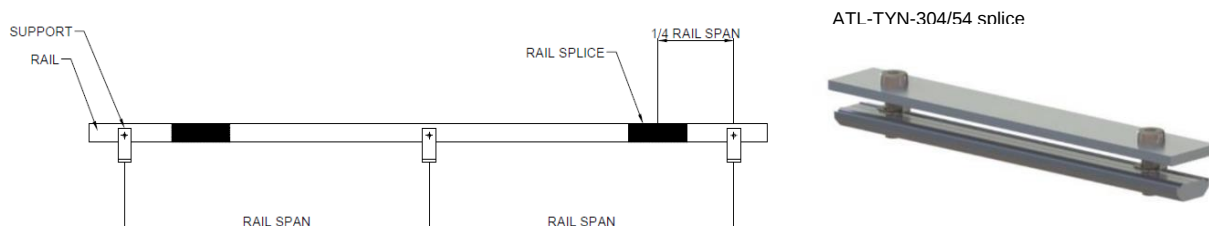
- 1) Determine building height (h), building length (b) and building width (d).
- 2) Determine (h/d) and (h/b)
- 3) If (h/b) or (h/d) ≥ 0.2 , a is the minimum of 0.2b or 0.2d
- 4) If (h/b) and (h/d) < 0.2 , a is equal to 2h

Note: "h" represents the average roof height. Average roof height = (pitch height - gutter height)/2

Note 3 The pitch angle Φ in the spacing table shall be determined based on the wind direction and the roof pitch angle by following the figure illustration below.



Note 4 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. The rail splice can only be the two separated components with the code name ATL-TYN-304/54, which are fixed both inside and outside of the rail at the connection point as shown below. Other types of rail splices are not covered by this certification.



Note 5 Number of panel clamps required per panel for installation:

		TC3			TC2.5			TC2		
		H≤10m	10m<H≤15m	15m<H≤20m	H≤10m	10m<H≤15m	15m<H≤20m	H≤10m	10m<H≤15m	15m<H≤20m
Region A	Internal	4	4	4	4	4	4	4	4	4
	Intermediate	4	4	4	4	4	4	4	4	4
	Edge	4	4	4	4	4	4	4	6	6
	Corner	4	6	6	6	6	6	6	8	8
Region B1&B2	Internal	4	4	4	4	4	4	4	4	4
	Intermediate	4	4	4	4	4	6	6	6	6
	Edge	6	6	6	6	6	8	8	8	8
	Corner	8	8	8	8	10	10	10	10	NA
Region C	Internal	4	4	4	4	4	6	6	6	6
	Intermediate	6	6	6	6	6	8	8	8	8
	Edge	6	8	8	8	8	10	10	10	10
	Corner	10	10	NA	NA	NA	NA	NA	NA	NA
Region D	Internal	6	6	6	6	6	8	8	8	8
	Intermediate	8	8	10	8	10	10	10	NA	NA
	Edge	10	10	NA	NA	NA	NA	NA	NA	NA
	Corner	NA	NA	NA	NA	NA	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 6 The provided installation spacing tables are based on maximum PV panel size of 2300mm 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 for 2300mmx1200mm.

Maximum Panel Size	Number of Rails	Spacing Adjustment Factor
2300x1200	3 rails	150%
2300x1200	4 rails	200%
2100x1100	2 rails	109%
2100x1100	3 rails	164%
2100x1100	4 rails	219%
2000x1100	2 rails	115%
2000x1100	3 rails	172%
2000x1100	4 rails	230%
1700x1100	2 rails	135%
1700x1100	3 rails	203%
1700x1100	4 rails	270%

Note: The maximum allowable fixing spacing shall not exceed 1600mm after applying the adjustment factors.

Note 7 The clamps capacities are taken from testing report No.20-0250 by Melbourne Testing Services Pty Ltd, dated 22/06/2020. This test was carried out using Lysaght Longline 305 Non-penetrative roof sheeting clamps. Other roof sheeting products are not covered in this assessment. **The clamps must be mounted over purlins and lapped roof sheeting ribs. No clamp is allowed to be installed on full roof sheeting ribs.**

Note 8 Linear interpolation can be used for determining the spacing values between $h/d > 0.5$ and $h/d < 1$:

Example for $h/d=0.75$:

1. Find fixing spacing **S1** from " $h/d \geq 1$ " table
2. Find fixing spacing **S2** from " $h/d \leq 0.5$ " table
3. **Final Fixing Spacing for $h/d=0.75$:**

$$= S1 + \frac{0.75-0.5}{1-0.5} \times (S2 - S1)$$

Note: Linear interpolation can only be used between tables with the same Terrain Category and Roof Zone.

Adjustment factor based on Corrosivity Category C3	
Corrosivity Category C4	95%
Corrosivity Category C5	80%

Note 10 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. For multiple installation conditions change, please seek for the engineer's advice.