# SOLAR PV ROOF-MOUNT RACKING FRAME ENGINEERING CERTIFICATE

## ANTAI FLUSH-MOUNT SYSTEM WITH 499 RAIL, L-FOOT & KL406 CLAMPS

Prepared for:

**Antai Technology Co., Ltd.**

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1801 Huandao East Rd,

Siming District

Xiamen, China

September 27, 2023

Ref: E22110958

## 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 has 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

## 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 |
| Clip Lock Roof Clamp | ATL-TYN-19/20 | AL 6005-T5 |

## 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, 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 clamps capacities are taken from below testing report: No.MT-15/317 by Melbourne Testing Services (MTS) Pty Ltd, dated 26/05/2015

- 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 Klip Lok 406 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:

Zhichao Zhang
B.Eng (Civil), M.Eng (Structural)
MIEAust, NER, CPEng, RPEV, RPEQ

**APPENDIX A – INSTALLATION GUIDELINE**

For Antai Technology Co., Ltd.
26/09/2023
Project Number: E22110958
Project Address: In Australia
Design Engineer: JC

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### 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 | 1429 | 1509 |
| | Intermediate Zone | 1322 | 1388 | 1322 | 1388 | 1127 | 1253 | 997 | 1107 |
| | Edge Zone | 955 | 1060 | 955 | 1060 | 819 | 907 | 727 | 805 |
| | Corner Zone | 614 | 679 | 614 | 679 | 529 | 585 | 472 | 520 |
| B1 | Internal Zone | 1346 | 1404 | 1346 | 1404 | 1160 | 1290 | 1026 | 1139 |
| | Intermediate Zone | 863 | 956 | 863 | 956 | 741 | 820 | 658 | 728 |
| | Edge Zone | 631 | 698 | 631 | 698 | 544 | 601 | 484 | 535 |
| | Corner Zone | 411 | 453 | 411 | 453 | 355 | 391 | 317 | 349 |
| B2 | Internal Zone | 1217 | 1343 | 1217 | 1343 | 1040 | 1154 | 921 | 1021 |
| | Intermediate Zone | 775 | 858 | 775 | 858 | 667 | 737 | 593 | 655 |
| | Edge Zone | 569 | 628 | 569 | 628 | 490 | 541 | 437 | 482 |
| | Corner Zone | 371 | 409 | 371 | 409 | 321 | 353 | 286 | 315 |
| C | Internal Zone | 766 | 848 | 766 | 848 | 658 | 728 | 586 | 647 |
| | Intermediate Zone | 496 | 547 | 496 | 547 | 428 | 472 | 382 | 421 |
| | Edge Zone | 367 | 404 | 367 | 404 | 317 | 349 | 283 | 312 |
| | Corner Zone | 241 | 265 | 241 | 265 | 209* | 230* | 187* | 205* |
| D | Internal Zone | 486 | 536 | 486 | 536 | 420 | 463 | 374 | 412 |
| | Intermediate Zone | 318 | 350 | 318 | 350 | 275 | 303 | 246 | 271 |
| | Edge Zone | 236* | 260 | 236* | 260 | 205* | 225* | 183* | 201* |
| | Corner Zone | 156* | 171* | 156* | 171* | 135* | 149* | 121* | 133* |

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

### 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 | 1353 | 1414 | 1353 | 1414 | 1177 | 1314 | 1040 | 1160 |
| | Intermediate Zone | 874 | 973 | 874 | 973 | 751 | 834 | 667 | 741 |
| | Edge Zone | 640 | 710 | 640 | 710 | 551 | 611 | 491 | 544 |
| | Corner Zone | 416 | 461 | 416 | 461 | 360 | 398 | 321 | 355 |
| B1 | Internal Zone | 899 | 1001 | 899 | 1001 | 772 | 858 | 685 | 761 |
| | Intermediate Zone | 579 | 643 | 579 | 643 | 500 | 554 | 445 | 493 |
| | Edge Zone | 427 | 473 | 427 | 473 | 369 | 409 | 330 | 365 |
| | Corner Zone | 280 | 310 | 280 | 310 | 243 | 268 | 217* | 240 |
| B2 | Internal Zone | 808 | 898 | 808 | 898 | 694 | 771 | 617 | 685 |
| | Intermediate Zone | 522 | 579 | 522 | 579 | 451 | 499 | 402 | 445 |
| | Edge Zone | 386 | 427 | 386 | 427 | 334 | 369 | 298 | 329 |
| | Corner Zone | 253 | 280 | 253 | 280 | 219* | 242 | 196* | 217* |
| C | Internal Zone | 516 | 572 | 516 | 572 | 445 | 493 | 397 | 440 |
| | Intermediate Zone | 337 | 373 | 337 | 373 | 292 | 323 | 261 | 288 |
| | Edge Zone | 250 | 277 | 250 | 277 | 217* | 240 | 194* | 214* |
| | Corner Zone | 165* | 182* | 165* | 182* | 143* | 158* | 128* | 141* |
| D | Internal Zone | 331 | 366 | 331 | 366 | 286 | 316 | 256 | 282 |
| | Intermediate Zone | 218* | 240 | 218* | 240 | 188* | 208* | 169* | 186* |
| | Edge Zone | 162* | 179* | 162* | 179* | 140* | 155* | 126* | 139* |
| | Corner Zone | 107* | 118* | 107* | 118* | 93* | 103* | 83* | 92* |

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

For Antai Technology Co., Ltd.
26/09/2023
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Design Engineer: JC

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| Interface Spacing Table for Terrain Category 2.5, h/d <= 0.5 (Unit: mm) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Wind Region | Height & Roof Pitch | H<5m | | 5m<H<10m | | 10m<H≤15m | | 15m<H≤20m | |
| | Roof Zone | 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 | 1388 | 1453 | 1338 | 1396 |
| | Intermediate Zone | 1187 | 1320 | 1046 | 1162 | 930 | 1032 | 851 | 943 |
| | Edge Zone | 861 | 954 | 762 | 843 | 679 | 751 | 623 | 689 |
| | Corner Zone | 556 | 614 | 494 | 545 | 441 | 487 | 406 | 447 |
| B1 | Internal Zone | 1222 | 1345 | 1077 | 1196 | 957 | 1061 | 875 | 970 |
| | Intermediate Zone | 778 | 862 | 689 | 763 | 615 | 680 | 564 | 623 |
| | Edge Zone | 571 | 631 | 507 | 560 | 453 | 500 | 416 | 459 |
| | Corner Zone | 372 | 410 | 331 | 365 | 297 | 327 | 273 | 301 |
| B2 | Internal Zone | 1094 | 1215 | 965 | 1071 | 859 | 952 | 786 | 871 |
| | Intermediate Zone | 700 | 774 | 621 | 686 | 554 | 612 | 509 | 562 |
| | Edge Zone | 515 | 568 | 457 | 505 | 409 | 451 | 376 | 414 |
| | Corner Zone | 336 | 371 | 299 | 330 | 268 | 296 | 247 | 272 |
| C | Internal Zone | 691 | 765 | 613 | 678 | 548 | 605 | 503 | 555 |
| | Intermediate Zone | 449 | 495 | 399 | 440 | 358 | 394 | 329 | 362 |
| | Edge Zone | 332 | 366 | 296 | 326 | 265 | 292 | 244 | 269 |
| | Corner Zone | 219* | 241 | 195* | 214* | 175* | 192* | 161* | 177* |
| D | Internal Zone | 440 | 485 | 391 | 431 | 350 | 386 | 322 | 355 |
| | Intermediate Zone | 288 | 318 | 257 | 283 | 230* | 254 | 212* | 233* |
| | Edge Zone | 214* | 236* | 191* | 210* | 172* | 189* | 158* | 174* |
| | Corner Zone | 142* | 156* | 126* | 139* | 113* | 125* | 104* | 115* |

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

| Interface Spacing Table for Terrain Category 2.5, h/d >= 1 (Unit: mm) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Wind Region | Height & Roof Pitch | H<5m | | 5m<H<10m | | 10m<H≤15m | | 15m<H≤20m | |
| | Roof Zone | Φ < 10° | 10° ≤ Φ ≤ 15° | Φ < 10° | 10° ≤ Φ ≤ 15° | Φ < 10° | 10° ≤ Φ ≤ 15° | Φ < 10° | 10° ≤ Φ ≤ 15° |
| A | Internal Zone | 1239 | 1355 | 1092 | 1218 | 970 | 1081 | 887 | 987 |
| | Intermediate Zone | 789 | 877 | 699 | 776 | 623 | 692 | 572 | 634 |
| | Edge Zone | 578 | 642 | 514 | 569 | 459 | 509 | 422 | 467 |
| | Corner Zone | 377 | 417 | 336 | 371 | 301 | 333 | 277 | 306 |
| B1 | Internal Zone | 811 | 902 | 718 | 798 | 641 | 711 | 588 | 652 |
| | Intermediate Zone | 524 | 581 | 466 | 516 | 417 | 461 | 383 | 424 |
| | Edge Zone | 387 | 429 | 345 | 381 | 309 | 341 | 284 | 314 |
| | Corner Zone | 254 | 281 | 227* | 250 | 203* | 225* | 187* | 207* |
| B2 | Internal Zone | 729 | 810 | 646 | 718 | 577 | 640 | 530 | 587 |
| | Intermediate Zone | 473 | 524 | 420 | 465 | 376 | 416 | 346 | 383 |
| | Edge Zone | 350 | 387 | 311 | 344 | 279 | 309 | 257 | 284 |
| | Corner Zone | 230* | 254 | 205* | 226* | 184* | 203* | 169* | 187* |
| C | Internal Zone | 467 | 518 | 415 | 460 | 372 | 412 | 342 | 378 |
| | Intermediate Zone | 306 | 338 | 272 | 301 | 244 | 270 | 225* | 248 |
| | Edge Zone | 227* | 251 | 203* | 224* | 182* | 201* | 167* | 185* |
| | Corner Zone | 150* | 166* | 134* | 148* | 120* | 133* | 111* | 122* |
| D | Internal Zone | 300 | 332 | 267 | 295 | 240 | 265 | 220* | 244 |
| | Intermediate Zone | 197* | 218* | 176* | 194* | 158* | 175* | 146* | 161* |
| | Edge Zone | 147* | 162* | 131* | 145* | 118* | 130* | 109* | 120* |
| | Corner Zone | 97* | 107* | 87* | 96* | 78* | 86* | 72* | 79* |

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

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### Interface Spacing Table for Terrain Category 2, h/d <= 0.5 (Unit: mm)

| Wind Region | 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 | 1350 | 1409 | 1227 | 1348 | 1151 | 1280 |
| | Intermediate Zone | 1072 | 1191 | 870 | 964 | 782 | 865 | 735 | 814 |
| | Edge Zone | 780 | 864 | 636 | 703 | 573 | 633 | 540 | 596 |
| | Corner Zone | 505 | 558 | 414 | 457 | 374 | 412 | 353 | 389 |
| B1 | Internal Zone | 1103 | 1226 | 894 | 991 | 804 | 890 | 756 | 836 |
| | Intermediate Zone | 706 | 781 | 576 | 637 | 520 | 574 | 490 | 540 |
| | Edge Zone | 519 | 573 | 425 | 469 | 384 | 423 | 362 | 399 |
| | Corner Zone | 339 | 374 | 279 | 307 | 252 | 278 | 238 | 262 |
| B2 | Internal Zone | 989 | 1098 | 804 | 890 | 723 | 800 | 680 | 752 |
| | Intermediate Zone | 635 | 702 | 520 | 574 | 469 | 517 | 442 | 487 |
| | Edge Zone | 468 | 516 | 384 | 423 | 347 | 382 | 327 | 360 |
| | Corner Zone | 306 | 337 | 252 | 278 | 228* | 251 | 215* | 237 |
| C | Internal Zone | 628 | 694 | 513 | 567 | 463 | 511 | 436 | 481 |
| | Intermediate Zone | 409 | 451 | 336 | 370 | 303 | 334 | 286 | 315 |
| | Edge Zone | 303 | 333 | 249 | 274 | 225* | 248 | 213* | 234* |
| | Corner Zone | 199* | 219* | 164* | 181* | 149* | 164* | 140* | 154* |
| D | Internal Zone | 400 | 442 | 329 | 362 | 297 | 327 | 280 | 309 |
| | Intermediate Zone | 263 | 289 | 216* | 238 | 196* | 215* | 185* | 203* |
| | Edge Zone | 195* | 215* | 161* | 177* | 146* | 160* | 138* | 151* |
| | Corner Zone | 129* | 142* | 107* | 117* | 97* | 106* | 91* | 100* |

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

### Interface Spacing Table for Terrain Category 2, h/d >= 1 (Unit: mm)

| Wind Region | 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 | 1119 | 1249 | 907 | 1009 | 814 | 906 | 766 | 851 |
| | Intermediate Zone | 715 | 795 | 584 | 648 | 526 | 584 | 496 | 550 |
| | Edge Zone | 526 | 583 | 431 | 477 | 389 | 430 | 367 | 406 |
| | Corner Zone | 343 | 380 | 282 | 312 | 255 | 282 | 241 | 266 |
| B1 | Internal Zone | 735 | 817 | 600 | 666 | 541 | 600 | 509 | 565 |
| | Intermediate Zone | 477 | 528 | 391 | 433 | 353 | 391 | 333 | 368 |
| | Edge Zone | 353 | 390 | 290 | 321 | 262 | 290 | 247 | 273 |
| | Corner Zone | 232* | 256 | 191* | 211* | 173* | 191* | 163* | 180* |
| B2 | Internal Zone | 662 | 735 | 541 | 600 | 488 | 540 | 460 | 509 |
| | Intermediate Zone | 430 | 476 | 353 | 391 | 319 | 353 | 301 | 333 |
| | Edge Zone | 319 | 352 | 262 | 290 | 237 | 262 | 224* | 247 |
| | Corner Zone | 210* | 232* | 173* | 191* | 156* | 173* | 148* | 163* |
| C | Internal Zone | 425 | 471 | 349 | 386 | 315 | 349 | 297 | 329 |
| | Intermediate Zone | 279 | 308 | 229* | 254 | 208* | 229* | 196* | 216* |
| | Edge Zone | 207* | 229* | 171* | 189* | 155* | 171* | 146* | 161* |
| | Corner Zone | 137* | 151* | 113* | 125* | 102* | 113* | 97* | 107* |
| D | Internal Zone | 273 | 302 | 225* | 249 | 204* | 225* | 192* | 212* |
| | Intermediate Zone | 180* | 199* | 149* | 164* | 134* | 148* | 127* | 140* |
| | Edge Zone | 134* | 148* | 111* | 122* | 100* | 111* | 95* | 105* |
| | Corner Zone | 89* | 98* | 73* | 81* | 66* | 73* | 63* | 69* |

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

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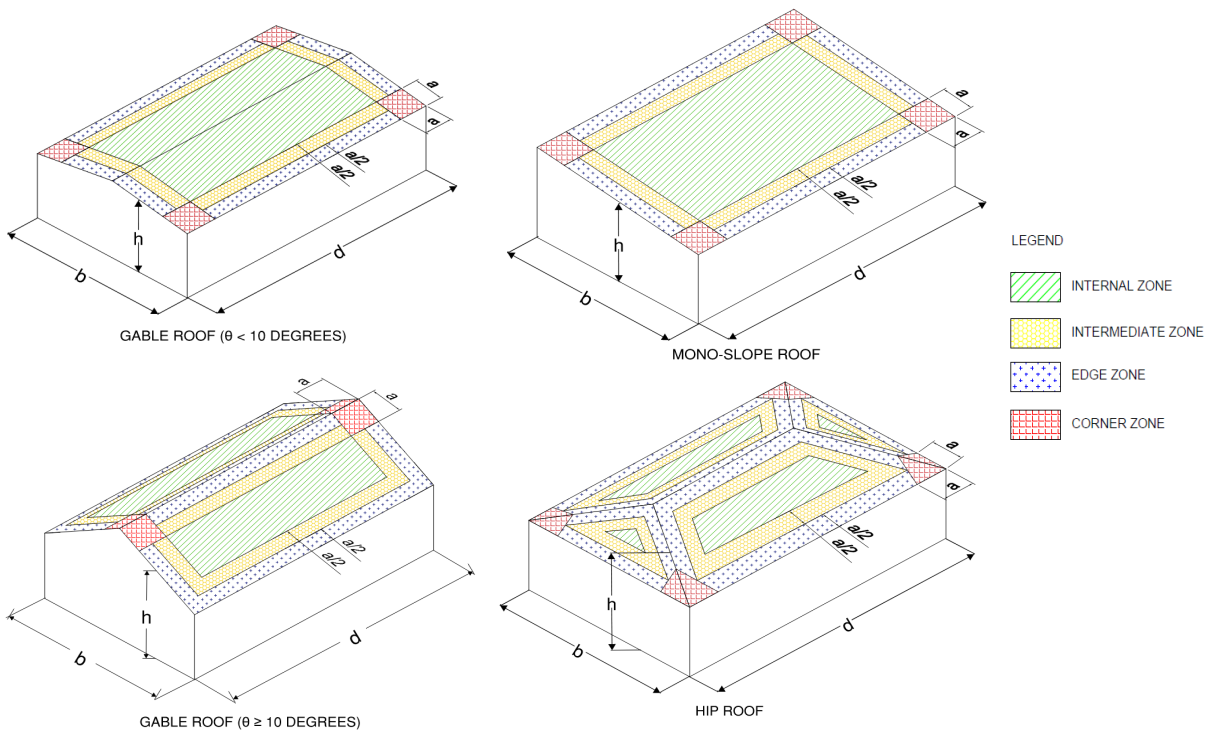EBULEN CONSULT

## 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)
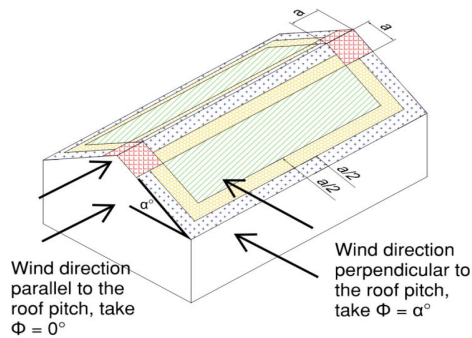


GABLE ROOF (θ < 10 DEGREES)

MONO-SLOPE ROOF

GABLE ROOF (θ ≥ 10 DEGREES)

HIP ROOF

LEGEND

- INTERNAL ZONE
- INTERMEDIATE ZONE
- EDGE ZONE
- CORNER ZONE

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.



Wind direction parallel to the roof pitch, take Φ = 0°

Wind direction perpendicular to the roof pitch, take Φ = α°

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***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.
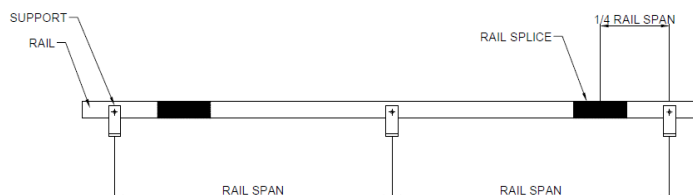


***Note 5*** Number of panel clamps required per panel for installation:

| | | 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.

| 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.MT-15/317 by Melbourne Testing Services Pty Ltd, dated 26/05/2015. This test was carried out using Lysaght KlipLok 406 Non-penetrative roof sheeting clamps. Other roof sheeting products are not covered in this assessment. **The clamps must be mounted over purlins and on full roof sheeting ribs. No clamp is allowed to be installed on lapped 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>=1" table
2. Find fixing spacing **S2** from "h/d<=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.

***Note 9*** 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.