

Our Ref: 20935

December 2018

Mortec Industries  
2/43 Lara Way  
Campbellfield, VIC, 3061

### **Mortec Roof Mounting System for use within Australia**

Dome Consulting (Aust) Pty Ltd have carried out a structural design check of the Mortec Industries PV Mounting System for use in Australia. The design check has been based on the information provided by Mortec Industries

#### **Australian Standards**

AS 1170. 2011 – Structural Design Actions

Part 0 – General Principles

Part 1 – Permanent imposed and other actions

Part 2 – Wind Actions

Part 3 – Snow and Ice Actions

AS 1664.1 – Aluminium structures - Limit state design

#### **Following design criteria has been used for the structural verification**

Wind Region A, B, C, D

Wind Terrain Category 2 & 3

Wind average recurrence interval of 100 years

Maximum Building height 20 m

Max. Solar Panel Dimensions 2040×1000

The design and documentation has determined that all supporting componentry in the above mentioned documentation was found to be acceptable.

#### **Refer to attached summary table for interface spacing.**

Construction is to be carried out strictly in accordance with the manufacturers instructions. This work was designed in accordance with the provisions of Australian Building Regulations and in accordance with sound, widely accepted engineering principles

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## Structural Design Summary Table

### Roof Mounting System

For

Mortec Industries  
in accordance to AS1170.2 2011 Amdt 5 - June 2017

### Terrain Category 3

**Tile Roof**

**5° < a < 10°**

**TG.3**

**Roof Mounting System**

For Up To 2040m Long Panels (2 Rails)									
Max. Support Spacing (mm)									
Installation Height (m)	Region A		Region B			Region C		Region D	
	Center	Edge	Center	Edge		Center	Edge	Center	Edge
10 m	1854	1671	1657	1339		1197	835	729	516
15 m	1770	1602	1586	1138		1020	714	628	446
20 m	1710	1461	1452	1004		903	635	556	397

**Tile Roof**

**10° < a < 20°**

**TG.3**

**Roof Mounting System**

For Up To 2040m Long Panels (2 Rails)									
Max. Support Spacing (mm)									
Installation Height (m)	Region A		Region B			Region C		Region D	
	Center	Edge	Center	Edge		Center	Edge	Center	Edge
10 m	1722	1476	1497	1013		929	641	573	400
15 m	1650	1251	1271	867		794	550	492	346
20 m	1596	1104	1120	769		706	491	438	308

**Tile Roof**

**20° < a < 30°**

**TG.3**

**Roof Mounting System**

For Up To 2040m Long Panels (2 Rails)									
Max. Support Spacing (mm)									
Installation Height (m)	Region A		Region B			Region C		Region D	
	Center	Edge	Center	Edge		Center	Edge	Center	Edge
10 m	1671	1587	1339	1102		835	694	516	432
15 m	1602	1365	1138	941		714	597	446	374
20 m	1461	1203	1004	835		635	532	397	334

**Tile Roof**

**30° < a < 60°**

**TG.3**

**Roof Mounting System**

For Up To 2040m Long Panels (2 Rails)									
Max. Support Spacing (mm)									
Installation Height (m)	Region A		Region B			Region C		Region D	
	Center	Edge	Center	Edge		Center	Edge	Center	Edge
10 m	1683	1536	1580	1191		1179	844	815	527
15 m	1644	1383	1464	1066		1053	729	703	455
20 m	1614	1269	1348	974		961	647	625	403

**Tin Roof**

**$5^\circ < a < 10^\circ$**

**TG.3**

**Roof Mounting System**

For Up To 2040m Long Panels (2 Rails)									
Max. Support Spacing (mm)									
Installation Height (m)	Region A		Region B			Region C		Region D	
	Center	Edge	Center	Edge		Center	Edge	Center	Edge
10 m	1845	1663	1662	1510		1464	1337	1291	1182
15 m	1761	1594	1591	1451		1408	1286	1241	1141
20 m	1701	1543	1540	1406		1363	1251	1205	1108

**Tin Roof**

**$10^\circ < a < 20^\circ$**

**TG.3**

**Roof Mounting System**

For Up To 2040m Long Panels (2 Rails)									
Max. Support Spacing (mm)									
Installation Height (m)	Region A		Region B			Region C		Region D	
	Center	Edge	Center	Edge		Center	Edge	Center	Edge
10 m	1713	1546	1552	1409		1375	1254	1214	1111
15 m	1642	1484	1490	1355		1322	1206	1170	1070
20 m	1588	1439	1445	1314		1283	1171	1135	1041

**Tin Roof**

**$20^\circ < a < 30^\circ$**

**TG.3**

**Roof Mounting System**

For Up To 2040m Long Panels (2 Rails)									
Max. Support Spacing (mm)									
Installation Height (m)	Region A		Region B			Region C		Region D	
	Center	Edge	Center	Edge		Center	Edge	Center	Edge
10 m	1663	1579	1510	1439		1337	1277	1182	1132
15 m	1594	1516	1451	1382		1286	1230	1141	1091
20 m	1543	1469	1406	1341		1251	1194	1108	1061

**Tin Roof**

**$30^\circ < a < 60^\circ$**

**TG.3**

**Roof Mounting System**

For Up To 2040m Long Panels (2 Rails)									
Max. Support Spacing (mm)									
Installation Height (m)	Region A		Region B			Region C		Region D	
	Center	Edge	Center	Edge		Center	Edge	Center	Edge
10 m	1675	1561	1585	1466		1458	1343	1329	1188
15 m	1612	1519	1543	1424		1417	1295	1279	1147
20 m	1606	1490	1513	1394		1387	1257	1241	1114

## Notes

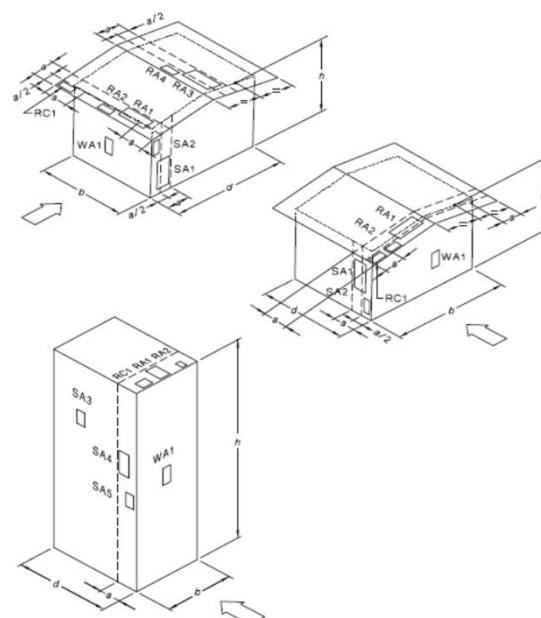
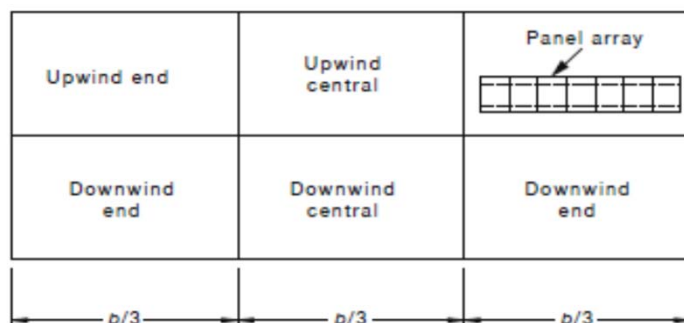
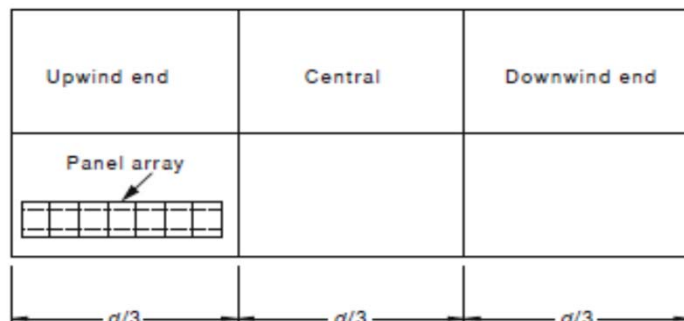
- \* Minimum 35mm embedment length into timber
- \* Please note that the screws provided with our products are designed for mounting in to wooden and metal structures. Mortec industries recommend using 13-11x50 RoofStars - Self Drilling Screws from ICONS® to fix to steel purlins.
- \* Above spacing based on 1.9mm steel purlin or F17 Hardwood - Following reductions shall be applied

Material	Wind region C			Wind region C	
	Centre	Edge		Centre	Edge
0.55mm steel batten	22%	25%		30%	42%
0.75mm steel batten	n/a	n/a		10%	5%

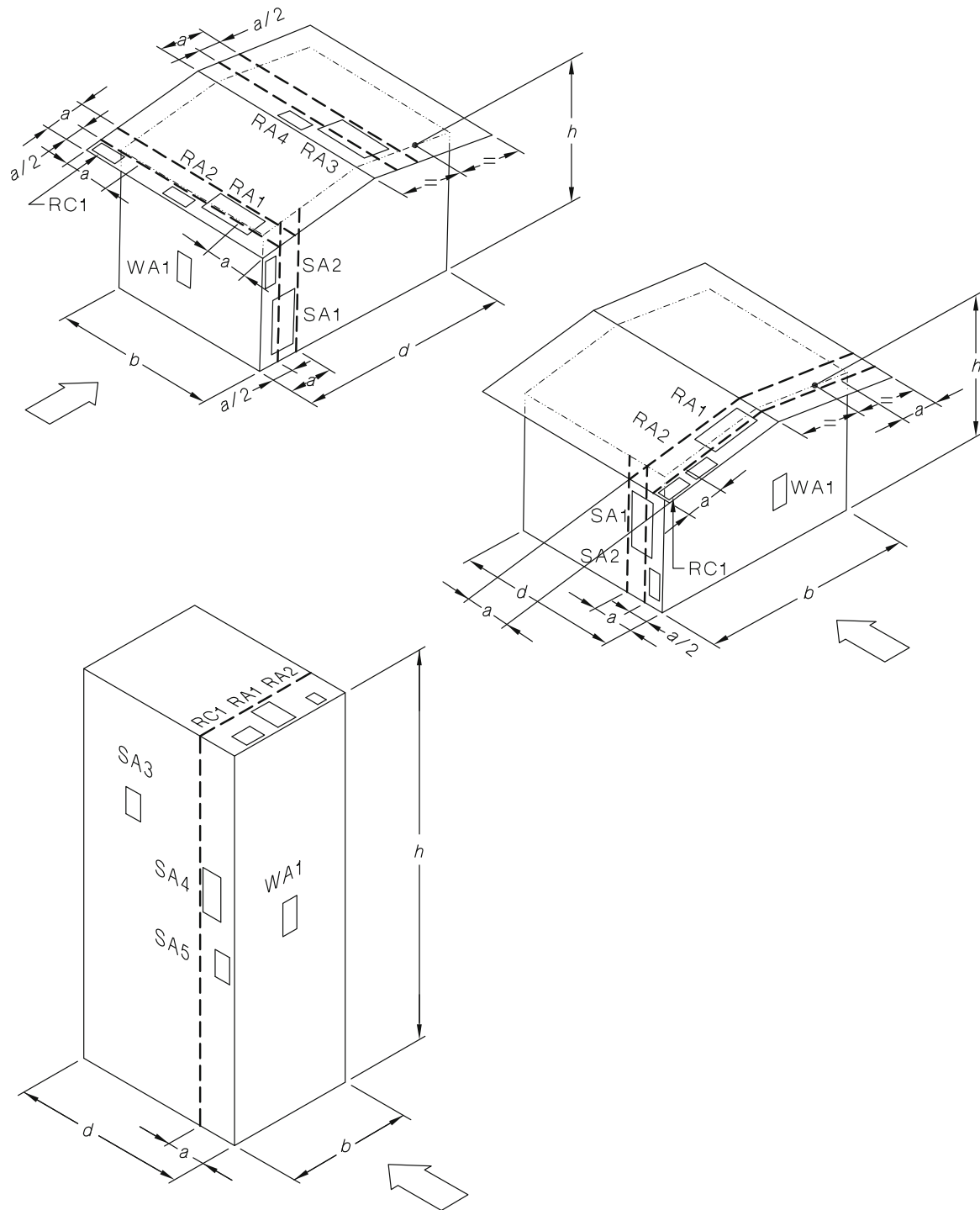
- \* Please consult Mortec industries for installing PV modules with a greater length than 2040mm.
- \* For PV panels with length of 1700mm, increase the spacing by 15%.

**Terrain Category 2 (TC2)** 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)** 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.



- NOTES:
- 1 The value of dimension  $a$  is the minimum of  $0.2b$ ,  $0.3d$  and  $h$ .
  - 2 The side ratio of any local pressure factor area on the roof shall not exceed 4.



## NOTES:

- 1 The value of dimension  $a$  is the minimum of  $0.2b$ ,  $0.2d$  and  $h$ .
- 2 The side ratio of any local pressure factor area on the roof shall not exceed 4.

FIGURE 5.3 LOCAL PRESSURE FACTORS ( $K_f$ )**5.4.5 Permeable cladding reduction factor ( $K_p$ ) for roofs and side walls**

The permeable cladding reduction factor ( $K_p$ ) shall be taken as 1.0 except that where an external surface consists of permeable cladding and the open area ratio is greater than 0.1% and less than 1%, the values given in Table 5.8 may be used for negative pressure. The open-area ratio is the ratio of the open area of the surface to the total area of the surface. Figure 5.4 shows dimension  $d_a$ .

## SECTION 4 SITE EXPOSURE MULTIPLIERS

### 4.1 GENERAL

This Section shall be used to calculate the exposure multipliers for site conditions related to terrain/height ( $M_{z,cat}$ ), shielding ( $M_s$ ) and topography ( $M_t$ ).

The design shall take account of known future changes to terrain roughness when assessing terrain category and to buildings providing shielding when assessing shielding.

### 4.2 TERRAIN/HEIGHT MULTIPLIER ( $M_{z,cat}$ )

#### 4.2.1 Terrain category definitions

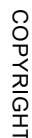
Terrain, over which the approach wind flows towards a structure, shall be assessed on the basis of the following category descriptions:

- (a) *Terrain Category 1 (TC1)* Very exposed open terrain with few or no obstructions and enclosed, limited-sized water surfaces at serviceability and ultimate wind speeds in all wind regions, e.g. flat, treeless, poorly grassed plains; rivers, canals and lakes; and enclosed bays extending less than 10 km in the wind direction.
- (b) *Terrain Category 1.5 (TC1.5)* Open water surfaces subjected to shoaling waves at serviceability and ultimate wind speeds in all wind regions, e.g. near-shore ocean water; large unenclosed bays on seas and oceans; lakes; and enclosed bays extending greater than 10 km in the wind direction. The terrain-height multipliers for this terrain category shall be obtained by linear interpolation between the values for TC1 and TC2 in Table 4.1.
- (c) *Terrain Category 2 (TC2)* 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.
- (d) *Terrain Category 2.5 (TC2.5)* Terrain with a few trees or isolated obstructions. This category is intermediate between TC2 and TC3 and represents the terrain in developing outer urban areas with scattered houses, or large acreage developments with fewer than ten buildings per hectare. The terrain-height multipliers for this terrain category shall be obtained by linear interpolation between the values for TC2 and TC3 in Table 4.1.
- (e) *Terrain Category 3 (TC3)* 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.
- (f) *Terrain Category 4 (TC4)* Terrain with numerous large, high (10 m to 30 m tall) and closely-spaced constructions, such as large city centres and well-developed industrial complexes.

Selection of the terrain category shall be made with due regard to the permanence of the obstructions that constitute the surface roughness.

NOTE: The aerodynamic roughness length,  $z_0$ , in metres, is related to the terrain category number by the following relation:

$$z_0 = 2 \times 10^{(TC \text{ number} - 4)}.$$



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