



Gamcorp (Melbourne) Pty Ltd A.C.N 141 076 904 A.B.N 73 015 060 240 www.gamcorp.com.au Email: melbourne@gamcorp.com.au Suite 4, 346 Ferntree Gully Rd, Notting Hill VIC 3149. Tel: 03 9543 2211 Fax: 03 9543 4046

Our Ref: 5172/JZ

5 June 2018

Xiamen Mibet New Energy Co. LTD No.69 Xintian Road, Jimei, Xiamen, Fujian, China

### **PV** Array Frame Engineering Certification

### Installation of MRac Roof Mount Solar System on Tin and Tile Roof with MC Rails

Gamcorp (Melbourne) Pty Ltd, being Structural Engineers within the meaning of Australian Building Regulations, have carried out a structural design check of MRac Roof Mount Solar System installation on tin and tile roof within Australia. The design check is based on the information and test reports provided by Xiamen Mibet New Energy Co. LTD.

This certificate is **only valid** for the Mrac Roof Mount Solar System itself. The roof structure or the building structure and PV panels shall be assessed separately and accordingly.

This certificate is **only valid** when fixing into minimum 1.9BMT steel or minimum JD4 seasoned timber. If the fixing condition is different from those conditions, interface spacing shall be reviewed and validated.

This certificate is **only valid** when the roof zone definition falls into D6 of AS1170.2-2011(R2016).

This certificate is **only valid** as a whole. Any information extracted from this certificate is not valid if standing alone.

We find the Installation of MRac Roof Mount Solar System on tin and tile roof for Australian use to be structurally sufficient based on the following conditions:

- Wind loads to AS/NZ1170.2:2011(R2016) Wind actions
- Wind region A, B, C, D
- Wind terrain category 2 & 3
- Wind average recurrence interval of 200 years
- Maximum building height 20m
- The maximum assessed PV panel dimensions are **1670mm x 1000mm**
- Weight of the PV panel and array frame to be 15 kg/m<sup>2</sup>
- Rails to be **MC Rails**
- Refer to Note 1 for the assessed components and test reports provided

ISO 9001:2008 Registered Firm Certificate No: AU1222





**Relationships built on trust** 

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- The spacings are determined based on fixings into minimum 1.9BMT steel or JD4 seasoned timber
- Each PV panel to be installed using 2 rails minimum in all circumstances
- No PV panel to be installed within 2xs from edges and ridge. "s" is the maximum gap between the underside of the panel and the roof surface when installed on the roof (50mm≤s≤300mm)
- Installation of PV array to be done in accordance with the PV installation manual
- The certification **excludes** assessment of roof structure and PV panels

### Refer to attached summary table for interface spacing

### NOTES:

- The recommended spacing nominated in this certification is based on the capacity of the array frame, not the roof structure and PV panel. It is the responsibility of the installer to adopt the most critical spacing.
- If any of the above conditions cannot be met, the structural engineer must be notified immediately.
- Standard Tile Interface is considered reaching its serviceability limit when 3° rotation of the middle plate is observed.
- The spacing shown in the interface tables shall be adjusted based on the assessment and requirement of the roof structures

Construction is to be carried out strictly in accordance with the manufacturers instructions. This work was designed by **John Zhang** in accordance with the provisions of Australian Building Regulations and in accordance with sound, widely accepted engineering principles. This certificate is only valid till 30/06/2020. Gamcorp should be contacted for future validation.

Yours faithfully, Gamcorp (Melbourne) Pty Ltd

<u>Jianzeng Geng</u> Principal Engineer MIEAust CPEng NER 3108316

NT Registration: 239858ES QLD Registration: 18455 VIC Registration: EC 39483 TAS Registration: CC7263

> ISO 9001:2008 Registered Firm Certificate No: AU1222



Gamcorp (Melbourne) Pty Ltd Consulting Structural & Civil Engineers A.C.N 141 076 904 A.B.N 73 015 060 240

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# Structural Design Documentation

# MRac L Feet System on Tin Roof Interface Spacing Table According to AS/NZS 1170.2-2011(R2016) with MC Rail within Australia Terrain Category 2 & 3

# For: XIAMEN MIBET NEW ENERGY CO.LTD



 Job Number:
 5172

 Date:
 22 May 2018

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ISO 9001:2008 Registered Firm Certificate No: AU1222

Job No: 5172

Client: XIAMEN MIBET NEW ENERGY CO.LTD

Project: MRac L Feet System on Tin Roof

Address: within Australia

## Australian Standards

AS/NZS 1170 – Structural Design Actions Part 0 -2002 – General Principles Part 1 -2002 – Permanent imposed and other actions Part 2 -2011(R2016) – Wind Actions AS 4055 -2012 – Wind Loads for Housing AS/NZS 1664 -1997 – Aluminium Structures AS 4100 -1998(R2016) – Steel Structures AS/NZS 4600 -2005 – Cold-Formed Steel Structures

Wind Terrain Category: WTC

WTC 2 & 3

Designed: JZ

Date: May-18



Client: Project: Relationships built on trust XIAMEN MIBET NEW ENERGY CO.LTD MRac L Feet System on Tin Roof

Address: within Australia Designed: JZ

Job: 5172 Date: May-18

Checked: JG

#### MRac L Feet System on Tin Roof

1.0m
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	Roof Angle (Φ) –		$0^{\circ} \leqslant \Phi < 5^{\circ}$					
Wind	Building Height – H (m)							
Region		H≤	10	10 <h< td=""><td>≤15</td><td>15<h< td=""><td>≤20</td></h<></td></h<>	≤15	15 <h< td=""><td>≤20</td></h<>	≤20	
		D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central	
А		1677	1811	1590	1713	1526	1642	
В		1412	1687	1216	1498	1083	1331	
С		544	668	470	576	420	514	
	]							
D		350	428	303	370	271	331	

	Roof Angle (Φ) –		$5^{\circ} \leqslant \Phi \leqslant 30^{\circ}$					
Wind	Building Height – H (m)							
Region		H≤	10	10 <h< th=""><th>l≤15</th><th>15&lt;</th><th>H≤20</th></h<>	l≤15	15<	H≤20	
		D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central	
А		1677	1929	1590	1821	1526	1744	
В		1412	1817	1216	1747	1083	1572	
С	1	544	787	470	678	420	604	
	1							
D		350	502	303	434	271	388	

Client: XIAMEN MIBET I Project: MRac L Feet Syst Address: within Australia Designed: JZ

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Relationships built on trust XIAMEN MIBET NEW ENERGY CO.LTD MRac L Feet System on Tin Roof

Job: **5172** Date: **May-18** 

Checked: JG

### MRac L Feet System on Tin Roof

Solar Panel Dimension	1.67m x 1.0m
Terrain category	2

	Roof Angle (Φ) –		$0^{\circ} \leq \Phi < 5^{\circ}$				
Wind			Buildi	ng Height – H (m)			
Region		H≤	10	10 <h≤15< th=""><th colspan="2">15<h≤20< th=""></h≤20<></th></h≤15<>		15 <h≤20< th=""></h≤20<>	
		D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central
Α	_	1423	1567	1282	1510	1207	1479
	-						
В	-	950	1167	858	1052	809	991
С		369	452	334	408	315	385
D	_	239	291	216	264	204	249

Wind		Building Height – H (m)								
Region		H≤	10	10<	1≤15	15<	H≤20			
		D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central			
A		1423	1662	1282	1601	1207	1567			
В	-	950	1376	858	1239	809	1167			
С		369	531	334	479	315	452			
D		239	341	216	309	204	291			

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Client: Project: Address: Designed:	Relationsh XIAMEN MIBET NEW EN MRac L Feet System on within Australia JZ	ips built on trust IERGY CO.LTD Tin Roof				Job: Date: Checked:	5172 May-18 JG
	<u>General Notes</u>						
Note 1	Following components are <b>Components</b> MC Rail Splice for MC Rail Inter Clamp Kit (MC) End Clamp Kit(MC) Standard Tile Interface L Feet Set	e satisfied to use accord <b>Part Number</b> MC Rail Splice for MC Rail Inter Clamp Kit (MC) End Clamp Kit(MC) Standard Tile Interfa L Feet Set	ding to AS/N2	2S 1170.2-2011(R201 Description as per drawing provid as per drawing provid	6) ded by XIAMEN MIBET NEW ded by XIAMEN MIBET NEW	ENERGY CO. ENERGY CO. ENERGY CO. ENERGY CO. ENERGY CO. ENERGY CO.	LTD LTD LTD LTD LTD LTD
Note 2	Terrain category 2 (TC2) m, with no more than two	refers to open terrain, obstruction per obstru	including gra uctions per he	ssland, with well-scatt ectare.	tered obstructions having he	ights genera	Illy from 1.5 m to 5
	Terrain category 3(TC3) r housing or light industrial	efers to numerous clos estates. Refer clause	ely spaced ol 4.2.1 of AS/N	ostructions having hei ZS 1170.2-2011(R20)	ghts generally from 3 m to 1 16) for definition of Terrain (	0 m. For exa ategory 3.	ample suburban
Note 3	For the definition of Down	wind, Upwind end and	l central, refe	r figure D9 from AS/N	ZS 1170.2-2011(R2016).		
	RIDGE BEA	M a Len	a gth of Buil	ding	LEGEND		
Note 4	Screw embedment is mini	mum 35 mm into timt	oer.				
Note 5	Recommended Screws Metal Purlin/Batten Non-cyclonic Region Cyclonic Region Timber Rafter & Purlin/ Softwood and Hardwood ( embedment depth or mor Note: The spacing tables	/ <b>Batten</b> 35mm e) are only applicable to a	Fastener Buildex 1 Buildex M Fastener Buildex 1 minimum 1.9	r <b>s to Use</b> 4g-10 TPI Teks screw: 16 RoofZips screws r <b>s to Use</b> 4g-10 TPI (T17s) scre mm BMT steel purlin a	s ws and JD4 seasoned timber.		
Note 6	The optimised location of should be placed at the ce	rail splice connection i entre of spacing or ove	s at quarter l r the interfac CE	ength of the spacing c e.	of the interface. No Splice co	nnection	
	RAIL	CON		L FEET			
Note 7	Number of Inter Clamp Ki Wind Region	t (MC) required per pa TC1.5	nel TC2	TC2.5	TC3		
	A B	4 4	4 4	4 4	4		
	C	6	6	6	4		
	U	δ	δ	8	6		



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# Structural Design Documentation

# MRac Tile Roof System on Tile Roof Interface Spacing Table According to AS/NZS 1170.2-2011(R2016) with MC Rail within Australia Terrain Category 2 & 3

# For: XIAMEN MIBET NEW ENERGY CO.LTD



 Job Number:
 5172

 Date:
 22 May 2018

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ISO 9001:2008 Registered Firm Certificate No: AU1222

Job No: 5172

Client: XIAMEN MIBET NEW ENERGY CO.LTD

Project: MRac Tile Roof System on Tile Roof

Address: within Australia

## Australian Standards

AS/NZS 1170 – Structural Design Actions Part 0 -2002 – General Principles Part 1 -2002 – Permanent imposed and other actions Part 2 -2011(R2016) – Wind Actions AS 4055 -2012 – Wind Loads for Housing AS/NZS 1664 -1997 – Aluminium Structures AS 4100 -1998(R2016) – Steel Structures AS/NZS 4600 -2005 – Cold-Formed Steel Structures

Wind Terrain Category: WTC 2 & 3

Designed: JZ

Date: May-18



Client: Project: Address: within Australia Designed: JZ

Relationships built on trust XIAMEN MIBET NEW ENERGY CO.LTD MRac Tile Roof System on Tile Roof

Job: 5172 Date: May-18

Checked: JG

#### MRac Tile Roof System on Tile Roof

Type of Rail	MC Rail
Type of Interface	Standard Tile Interface
Solar Panel Dimension	1.67m x 1.0m
<b>Terrain category</b>	<b>3</b>
Roof Angle (Φ) –	$0^{o}{\leqslant}\Phi<5^{o}$

Wind		Buildi	ing Height – H (m)			
Region	H≤	10	10<	1≤15	15<	H≤20
	D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central
А	987	1242	841	1052	743	927
В	874	1096	746	931	661	822
С	586	727	503	622	448	552
D	443	546	381	469	340	417

	Roof Angle (Φ) –		$5^{\circ} \leqslant \Phi \leqslant 30^{\circ}$					
Wind	Building Height – H (m)							
Region		H≤	10	10<	l≤15	15<	H≤20	
		D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central	
А		987	1501	841	1264	743	1110	
В		874	1318	746	1115	661	981	
С		586	865	503	739	448	654	
	7							
D		443	647	381	555	340	493	

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Client: Project: Address:

Relationships built on trust XIAMEN MIBET NEW ENERGY CO.LTD MRac Tile Roof System on Tile Roof

Address: within Australia Designed: JZ Job: **5172** Date: **May-18** 

Checked: JG

### MRac Tile Roof System on Tile Roof

Terrain category	2
Solar Panel Dimension	1.67m x 1.0m
Type of Interface	Standard Tile Interface
Type of Rail	MC Rail
Type of Pail	MC Pail

	Roof Angle (Φ) –		$0^{\circ} \leqslant \Phi < 5^{\circ}$					
Wind	ind Building Height – H (m)							
Region		H≤10		10 <h≤15< th=""><th colspan="2">15<h≤20< th=""></h≤20<></th></h≤15<>		15 <h≤20< th=""></h≤20<>		
		D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central	
А		647	805	581	721	547	677	
В		576	715	518	641	488	603	
С		392	483	353	435	333	409	
D		298	366	269	330	254	311	

Wind	Building Height – H (m)							
Region		H≤10		10 <h≤15< th=""><th colspan="2">15<h≤20< th=""></h≤20<></th></h≤15<>		15 <h≤20< th=""></h≤20<>		
	1	D.W & U.W	Central	D.W & U.W	Central	D.W & U.W	Central	
А	-	647	960	581	858	547	805	
В	-	576	850	518	761	488	715	
С	-	392	571	353	513	333	483	
D	-	298	431	269	389	254	366	

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Client: Project: Address: Designed:	Relations XIAMEN MIBET NEW E MRac Tile Roof System within Australia JZ	hips built on trus NERGY CO.LTD I on Tile Roof	st			Job: Date: Checked:	5172 May-18 JG		
	<u>General Notes</u>								
Note 1	Following components an Components MC Rail Splice for MC Rail Inter Clamp Kit (MC) End Clamp Kit(MC) Standard Tile Interface L Feet Set	e satisfied to use acc <b>Part Number</b> MC Rail Splice for MC Rail Inter Clamp Kit (MC End Clamp Kit(MC Standard Tile Inte L Feet Set	cording to AS/NZ IC) ) rface	S 1170.2-2011(R201 Description as per drawing provi- as per drawing provi-	6) ded by XIAMEN MIBET NEW ded by XIAMEN MIBET NEW	ENERGY CO. ENERGY CO. ENERGY CO. ENERGY CO. ENERGY CO. ENERGY CO.	LTD LTD LTD LTD LTD LTD		
Note 2	Terrain category 2 (TC2) m, with no more than tw	refers to open terrai o obstruction per obs	n, including gras structions per he	ssland, with well-scat ectare.	tered obstructions having he	ights genera	ally from 1.5 m to 5		
	Terrain category 3(TC3) housing or light industria	refers to numerous c Il estates. Refer claus	losely spaced ob se 4.2.1 of AS/N	ostructions having hei ZS 1170.2-2011(R20	ghts generally from 3 m to 1 16) for definition of Terrain o	0 m. For exacted ategory 3.	ample suburban		
Note 3	For the definition of Dow	nwind, Upwind end a	nd central, refe	r figure D9 from AS/N	ZS 1170.2-2011(R2016).				
	RIDGE BEA		a ength of Build	ding -	LEGEND				
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Note 6	The optimised location of rail splice connection is at quarter length of the spacing of the interface. No Splice connection should be placed at the centre of spacing or over the interface. $\sim$ SPLICE								
		C		L FEET					
Note 7	Number of Inter Clamp k Wind Region	(it (MC) required per TC1.5	panel TC2	TC2.5	TC3				
	A B	4 4	4 4	4 4	4 4				
	C	6	6	6	4				
	U	ō	Ø	8	σ				