

Our Ref: 1883  
3 September 2015

Xiamen Antai New Energy Tech. Co., Ltd.  
Room 402, No.21 Wanghai Road, Software Park II  
Siming District, Xiamen, China 361008

### Array Frame Engineering Certificate

#### **Installation of Tilt mounted solar array frame on tin roof with Kliplik 700 and Kliplik 406 Roof Clamps**

Gamcorp (Melbourne) Pty Ltd, being Structural Engineers within the meaning of Australian Building Regulations, have carried out a structural design check of the Xiamen Antai New Energy Tech. Co., Ltd. solar tilt frame for the use within Australia. The design check has been based on the information provided by Xiamen Antai New Energy Tech. Co., Ltd.

We find the Installation of tilt solar array frame on tin roof to be structurally sufficient for Australian use based on the following conditions:

- Wind Loads to AS/NZ1170.2:2011 Admt 3-2012
- Wind Region A, B, C, D
- Wind Terrain Category 2 & 3
- Wind average recurrence interval of 200 years region A and B
- Wind average recurrence interval of 500 years region C and D
- Maximum Building height 20 m
- Timber with joint type classification J5 and J6 are excluded from this certification
- Maximum tilt angle 1° to 60° to the horizontal
- Max. Solar Panel Dimensions 1640×992
- Regional Wind speed:

Wind Zone	A	B	C	D
Wind Speed (m/s)	43	52	69	88

#### ***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.

Yours faithfully,  
Gamcorp (Melbourne) Pty Ltd



Martin Gamble  
Managing Director  
MAICD



Milan Bjelobrk  
MIEAust, CPEng, NPER 2210984,  
RPEQ 12090, RBP EC-38461, NT BPB 139671ES

## Structural Design Documentation

### **Tilt System Interface Spacing Table with Kliplok 700** **According to AS/NZS 1170.2-2011 Amdt 3-2012** **Within Australia** **Terrain Category 2**

For: Xiamen Antai New Energy Tech. Co., Ltd.



Job Number: 1883

Date: September 3, 2015

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**gamcorp**

innovation in design and construction

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www.gamcorp.com.au

ISO 9001:2008 Registered Firm  
Certificate No: AU1222

**Job No: 1883**

**Client: Xiamen Antai New Energy Tech. Co., Ltd.**

**Project: Solar Array Tilt System Spacing Table**

**Address: Within Australia**

**Australian Standards**

AS 1170. 2011 – Structural Design Actions

Part 0 – General Principles

Part 1 – Permanent imposed and other actions

Part 2 – Wind Actions

AS 1664.1 – Aluminium structures - Limit state design

**Wind Terrain Category:**

WTC 2

**Designed: B.C**

**Date: Sep-15**

Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

**Tilt System Interface Spacing Table for Tin Roof**

Type of Rail Rail II  
 Type of Interface Klamp Lok 700  
 Solar Panel Dimension 1640 mm x 992 mm  
 Terrain category **2**

Tilt Angle ( $\Phi$ ) -  $1^\circ \leq \Phi < 15^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	935	1403	848	1273	802	1203		
B	640	959	580	870	548	823		
C	360	540	327	490	309	463		
D	223	335	203	304	191	287		

Tilt Angle ( $\Phi$ ) -  $15^\circ \leq \Phi < 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	466	699	423	634	399	599		
B	319	478	289	433	273	410		
C	179	269	163	244	154	231		
D	111	167	101	151	95	143		

Tilt Angle ( $\Phi$ ) -  $30^\circ \leq \Phi < 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	346	519	314	471	296	445		
B	236	355	214	322	203	304		
C	133	200	121	181	114	171		
D	83	124	75	112	71	106		

Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

**Tilt System Interface Spacing Table for Tin Roof**

Type of Rail Rail III  
 Type of Interface Klamp Lok 700  
 Solar Panel Dimension 1640 mm x 992 mm  
 Terrain category **2**

Tilt Angle ( $\Phi$ ) -  $1^\circ \leq \Phi < 15^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	935	1389	848	1273	802	1203		
B	640	959	580	870	548	823		
C	360	540	327	490	309	463		
D	223	335	203	304	191	287		

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	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	466	699	423	634	517	775		
B	319	478	289	433	273	410		
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	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	346	519	314	471	384	575		
B	236	355	214	322	203	304		
C	133	200	121	181	114	171		
D	83	124	75	112	71	106		

Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

**Tilt System Interface Spacing Table for Tin Roof**

Type of Rail CG-010  
 Type of Interface Klamp Lok 700  
 Solar Panel Dimension 1640 mm x 992 mm  
 Terrain category **2**

Tilt Angle ( $\Phi$ ) -  $1^\circ \leq \Phi < 15^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	935	1141	848	1100	802	1077		
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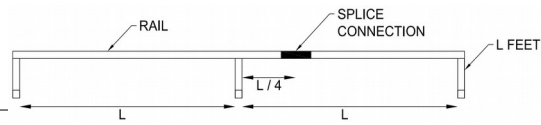
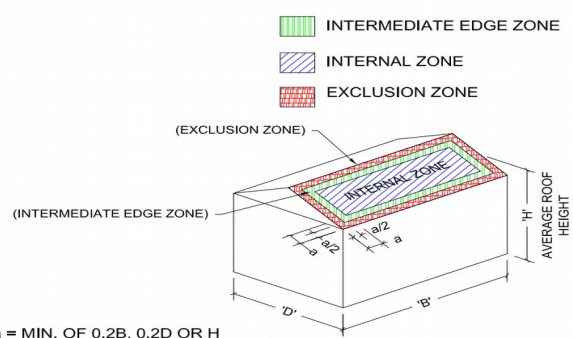
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 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

<b>General Notes</b>																												
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Splice	ATL-TYN-21	Rail Connection																										
Klampl Lok 700		Tin Roof interface																										
Note 7	Terrain category 2 (TC2) refers to open terrain, including grassland, with well-scattered obstructions having heights generally from 1.5 m to 5 m, with no more than two obstruction per obstructions per hectare.																											
Note 8	<p>Splice connection must placed quarter length of the spacing of the L foot. No Splice connection should be placed at the centre of spacing or over the L foot.</p> 																											
Note 9	<p>Figure 1: Shows building dimensions (b,h,d)</p>  <p><b>ROOF REGIONS</b></p> <p>Figure 1</p>																											

## Structural Design Documentation

### **Tilt System Interface Spacing Table with Kliplik 700** **According to AS/NZS 1170.2-2011 Amdt 3-2012** **Within Australia** **Terrain Category 3**

For: Xiamen Antai New Energy Tech. Co., Ltd.



Job Number: 1883  
Date: September 3, 2015

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ISO 9001:2008 Registered Firm  
Certificate No: AU1222

**Job No: 1883**

**Client: Xiamen Antai New Energy Tech. Co., Ltd.**

**Project: Solar Array Tilt System Spacing Table with Kliplik 700**

**Address: Within Australia**

**Australian Standards**

AS 1170. 2011 – Structural Design Actions

Part 0 – General Principles

Part 1 – Permanent imposed and other actions

Part 2 – Wind Actions

AS 1664.1 – Aluminium structures - Limit state design

**Wind Terrain Category:**

WTC3

**Designed: B.C**

**Date: Sep-15**

Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

**Tilt System Interface Spacing Table for Tin Roof**

Type of Rail Rail II  
 Type of Interface Klamp Lok 700  
 Solar Panel Dimension 1640 mm x 992 mm  
 Terrain category **3**

Tilt Angle ( $\Phi$ ) -  $1^\circ \leq \Phi < 15^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	<b>1358</b>	<b>1650</b>	<b>1181</b>	<b>1566</b>	<b>1059</b>	<b>1503</b>		
B	<b>928</b>	<b>1393</b>	<b>807</b>	<b>1211</b>	<b>724</b>	<b>1086</b>		
C	<b>523</b>	<b>784</b>	<b>455</b>	<b>682</b>	<b>408</b>	<b>611</b>		
D	<b>324</b>	<b>486</b>	<b>282</b>	<b>423</b>	<b>253</b>	<b>379</b>		

Tilt Angle ( $\Phi$ ) -  $15^\circ \leq \Phi < 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	<b>676</b>	<b>1014</b>	<b>588</b>	<b>882</b>	<b>527</b>	<b>791</b>		
B	<b>462</b>	<b>694</b>	<b>402</b>	<b>603</b>	<b>361</b>	<b>541</b>		
C	<b>260</b>	<b>391</b>	<b>226</b>	<b>340</b>	<b>203</b>	<b>304</b>		
D	<b>161</b>	<b>242</b>	<b>140</b>	<b>211</b>	<b>126</b>	<b>189</b>		

Tilt Angle ( $\Phi$ ) -  $30^\circ \leq \Phi < 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	<b>502</b>	<b>753</b>	<b>437</b>	<b>655</b>	<b>391</b>	<b>587</b>		
B	<b>343</b>	<b>515</b>	<b>299</b>	<b>448</b>	<b>268</b>	<b>401</b>		
C	<b>193</b>	<b>290</b>	<b>168</b>	<b>252</b>	<b>151</b>	<b>226</b>		
D	<b>120</b>	<b>180</b>	<b>104</b>	<b>156</b>	<b>93</b>	<b>140</b>		

Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

**Tilt System Interface Spacing Table for Tin Roof**

Type of Rail Rail III  
 Type of Interface Klamp Lok 700  
 Solar Panel Dimension 1640 mm x 992 mm  
 Terrain category **3**

Tilt Angle ( $\Phi$ ) -  $1^\circ \leq \Phi < 15^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
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B	<b>928</b>	<b>1393</b>	<b>807</b>	<b>1211</b>	<b>724</b>	<b>1086</b>		
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A	<b>676</b>	<b>1014</b>	<b>588</b>	<b>882</b>	<b>517</b>	<b>775</b>		
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Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

**Tilt System Interface Spacing Table for Tin Roof**

Type of Rail CG-010  
 Type of Interface Klamp Lok 700  
 Solar Panel Dimension 1640 mm x 992 mm  
 Terrain category **3**

Tilt Angle ( $\Phi$ ) -  $1^\circ \leq \Phi < 15^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	1127	1313	1070	1246	1027	1196		
B	928	1219	807	1157	724	1086		
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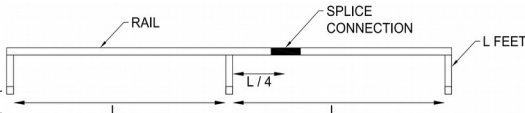
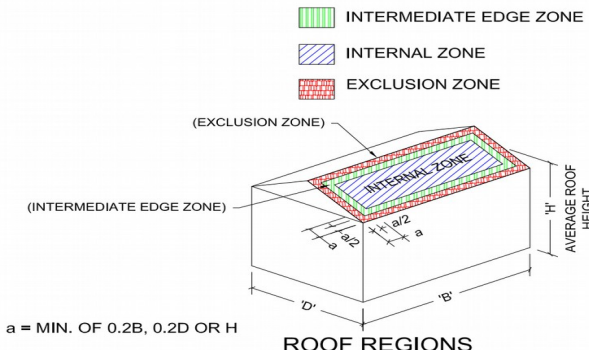
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Note 7	Terrain category 3(TC3) refers to numerous closely spaced obstructions having heights generally from 3 m to 10 m. For example suburban housing or light industrial estates. Refer clause 4.2.1 of AS/NZS 1170.2-2011 Amdt 2-2012 for definition of Terrain category 3.																											
Note 8	<p>Splice connection must placed quarter length of the spacing of the L foot. No Splice connection should be placed at the centre of spacing or over the L foot.</p> 																											
Note 9	<p>Figure 1: Shows building dimensions (b,h,d)</p>  <p><b>ROOF REGIONS</b></p> <p> <span style="color: green;">■</span> INTERMEDIATE EDGE ZONE  <span style="color: blue;">■</span> INTERNAL ZONE  <span style="color: red;">■</span> EXCLUSION ZONE         </p> <p><math>a = \text{MIN. OF } 0.2B, 0.2D \text{ OR } H</math></p>																											

## Structural Design Documentation

### **Tilt System Interface Spacing Table with Kliplik 406** **According to AS/NZS 1170.2-2011 Amdt 3-2012** **Within Australia** **Terrain Category 2**

For: Xiamen Antai New Energy Tech. Co., Ltd.



Job Number: 1883

Date: September 3, 2015

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ISO 9001:2008 Registered Firm  
Certificate No: AU1222

**Job No: 1883**

**Client: Xiamen Antai New Energy Tech. Co., Ltd.**

**Project: Solar Array Tilt System Spacing Table with Kliplik 406**

**Address: Within Australia**

**Australian Standards**

AS 1170. 2011 – Structural Design Actions

Part 0 – General Principles

Part 1 – Permanent imposed and other actions

Part 2 – Wind Actions

AS 1664.1 – Aluminium structures - Limit state design

**Wind Terrain Category:**

WTC 2

**Designed: B.C**

**Date: Sep-15**

Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

**Tilt System Interface Spacing Table for Tin Roof**

Type of Rail Rail II  
 Type of Interface Klamp Lok 406  
 Solar Panel Dimension 1640 mm x 992 mm  
 Terrain category 2

Tilt Angle ( $\Phi$ ) -  $1^\circ \leq \Phi < 15^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	1232	1435	1188	1383	1163	1354		
B	939	1333	851	1277	805	1207		
C	529	793	479	719	453	680		
D	328	492	297	446	281	422		

Tilt Angle ( $\Phi$ ) -  $15^\circ \leq \Phi < 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	684	1026	620	930	586	879		
B	468	701	424	636	401	601		
C	263	395	239	358	226	339		
D	163	245	148	222	140	210		

Tilt Angle ( $\Phi$ ) -  $30^\circ \leq \Phi < 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	508	761	460	691	435	653		
B	347	521	315	472	298	446		
C	195	293	177	266	168	251		
D	121	182	110	165	104	156		



Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

**Tilt System Interface Spacing Table for Tin Roof**

Type of Rail Rail III  
 Type of Interface Klamp Lok 406  
 Solar Panel Dimension 1640 mm x 992 mm  
 Terrain category **2**

Tilt Angle ( $\Phi$ ) -  $1^\circ \leq \Phi < 15^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	1193	1389	1150	1339	1126	1311		
B	939	1290	851	1244	805	1207		
C	529	793	479	719	453	680		
D	328	492	297	446	281	422		

Tilt Angle ( $\Phi$ ) -  $15^\circ \leq \Phi < 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	684	1026	620	930	759	1052		
B	468	701	424	636	401	601		
C	263	395	239	358	226	339		
D	163	245	148	222	140	210		

Tilt Angle ( $\Phi$ ) -  $30^\circ \leq \Phi < 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	508	761	460	691	563	845		
B	347	521	315	472	298	446		
C	195	293	177	266	168	251		
D	121	182	110	165	104	156		

Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

**Tilt System Interface Spacing Table for Tin Roof**

Type of Rail CG-010  
 Type of Interface Klamp Lok 406  
 Solar Panel Dimension 1640 mm x 992 mm  
 Terrain category **2**

Tilt Angle ( $\Phi$ ) -  $1^\circ \leq \Phi < 15^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	<b>980</b>	<b>1141</b>	<b>945</b>	<b>1100</b>	<b>925</b>	<b>1077</b>		
B	<b>911</b>	<b>1060</b>	<b>851</b>	<b>1022</b>	<b>805</b>	<b>1001</b>		
C	<b>529</b>	<b>793</b>	<b>479</b>	<b>719</b>	<b>453</b>	<b>680</b>		
D	<b>328</b>	<b>492</b>	<b>297</b>	<b>446</b>	<b>281</b>	<b>422</b>		

Tilt Angle ( $\Phi$ ) -  $15^\circ \leq \Phi < 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	<b>684</b>	<b>916</b>	<b>620</b>	<b>883</b>	<b>586</b>	<b>864</b>		
B	<b>468</b>	<b>701</b>	<b>424</b>	<b>636</b>	<b>401</b>	<b>601</b>		
C	<b>263</b>	<b>395</b>	<b>239</b>	<b>358</b>	<b>226</b>	<b>339</b>		
D	<b>163</b>	<b>245</b>	<b>148</b>	<b>222</b>	<b>140</b>	<b>210</b>		

Tilt Angle ( $\Phi$ ) -  $30^\circ \leq \Phi < 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	<b>508</b>	<b>761</b>	<b>460</b>	<b>691</b>	<b>435</b>	<b>653</b>		
B	<b>347</b>	<b>521</b>	<b>315</b>	<b>472</b>	<b>298</b>	<b>446</b>		
C	<b>195</b>	<b>293</b>	<b>177</b>	<b>266</b>	<b>168</b>	<b>251</b>		
D	<b>121</b>	<b>182</b>	<b>110</b>	<b>165</b>	<b>104</b>	<b>156</b>		

Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

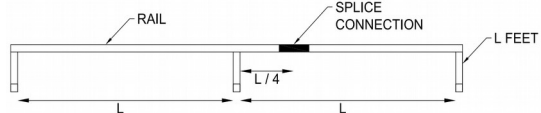
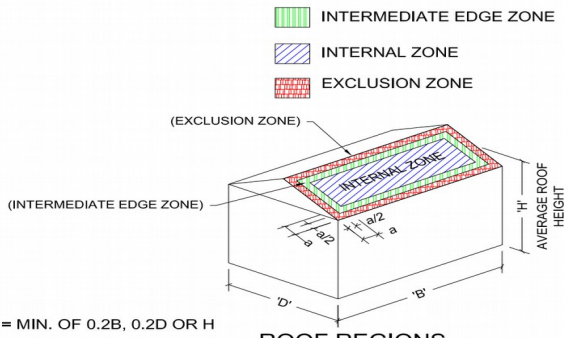
<b>General Notes</b>																												
Note 5	Roof structure supporting the solar array must be checked by qualified structural engineer for the new induced loads produced by the PV panels.																											
Note 6	<p>Following components are satisfied to use according to AS1170.2011</p> <table border="1"> <thead> <tr> <th>Components</th> <th>Part Number</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Standard Rail</td> <td>ATL-TYN-28</td> <td>Antai Rail II</td> </tr> <tr> <td>Light Rail</td> <td>ATL-TYN-53</td> <td>Antai Rail III</td> </tr> <tr> <td>Light Rail</td> <td>CG-010</td> <td>Antai Rail CG-010</td> </tr> <tr> <td>Inter Clamp</td> <td>ATL-FWNY-09</td> <td>Internal fixing between rail and Solar Panel</td> </tr> <tr> <td>End Clamp</td> <td>ALT-TYN-14</td> <td>End fixing between rail and Solar Panel</td> </tr> <tr> <td>Adjustable tilt legs</td> <td>ATL-TYN-57</td> <td>Adjustable back legs</td> </tr> <tr> <td>Splice</td> <td>ATL-TYN-21</td> <td>Rail Connection</td> </tr> <tr> <td>Klarn Lok 406</td> <td></td> <td>Tin Roof interface</td> </tr> </tbody> </table>	Components	Part Number	Description	Standard Rail	ATL-TYN-28	Antai Rail II	Light Rail	ATL-TYN-53	Antai Rail III	Light Rail	CG-010	Antai Rail CG-010	Inter Clamp	ATL-FWNY-09	Internal fixing between rail and Solar Panel	End Clamp	ALT-TYN-14	End fixing between rail and Solar Panel	Adjustable tilt legs	ATL-TYN-57	Adjustable back legs	Splice	ATL-TYN-21	Rail Connection	Klarn Lok 406		Tin Roof interface
Components	Part Number	Description																										
Standard Rail	ATL-TYN-28	Antai Rail II																										
Light Rail	ATL-TYN-53	Antai Rail III																										
Light Rail	CG-010	Antai Rail CG-010																										
Inter Clamp	ATL-FWNY-09	Internal fixing between rail and Solar Panel																										
End Clamp	ALT-TYN-14	End fixing between rail and Solar Panel																										
Adjustable tilt legs	ATL-TYN-57	Adjustable back legs																										
Splice	ATL-TYN-21	Rail Connection																										
Klarn Lok 406		Tin Roof interface																										
Note 7	Terrain category 2 (TC2) refers to open terrain, including grassland, with well-scattered obstructions having heights generally from 1.5 m to 5 m, with no more than two obstruction per obstructions per hectare.																											
Note 8	<p>Splice connection must placed quarter length of the spacing of the L foot. No Splice connection should be placed at the centre of spacing or over the L foot.</p> 																											
Note 9	<p>Figure 1: Shows building dimensions (b,h,d)</p>  <p><b>ROOF REGIONS</b></p> <p><math>a = \text{MIN. OF } 0.2B, 0.2D \text{ OR } H</math></p>																											

Figure 1

## Structural Design Documentation

### **Tilt System Interface Spacing Table with Kliplik 406** **According to AS/NZS 1170.2-2011 Amdt 3-2012** **Within Australia** **Terrain Category 3**

For: Xiamen Antai New Energy Tech. Co., Ltd.



Job Number: 1883  
Date: September 3, 2015

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ISO 9001:2008 Registered Firm  
Certificate No: AU1222

**Job No: 1883**

**Client: Xiamen Antai New Energy Tech. Co., Ltd.**

**Project: Solar Array Tilt System Spacing Table with Kliplik 406**

**Address: Within Australia**

**Australian Standards**

AS 1170. 2011 – Structural Design Actions

Part 0 – General Principles

Part 1 – Permanent imposed and other actions

Part 2 – Wind Actions

AS 1664.1 – Aluminium structures - Limit state design

**Wind Terrain Category:**

WTC3

**Designed: B.C**

**Date: Sep-15**

Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

**Tilt System Interface Spacing Table for Tin Roof**

Type of Rail Rail II  
 Type of Interface Klamp Lok 406  
 Solar Panel Dimension 1640 mm x 992 mm  
 Terrain category **3**

Tilt Angle ( $\Phi$ ) -  $1^\circ \leq \Phi < 15^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	1417	1650	1345	1566			1291	1503
B	1316	1533	1185	1454			1062	1396
C	767	1151	667	1001			598	897
D	476	714	414	621			371	556

Tilt Angle ( $\Phi$ ) -  $15^\circ \leq \Phi < 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	993	1324	863	1256			774	1161
B	679	1018	590	885			529	794
C	382	573	332	499			298	447
D	237	355	206	309			185	277

Tilt Angle ( $\Phi$ ) -  $30^\circ \leq \Phi < 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	737	1105	641	961			574	862
B	504	756	438	657			393	589
C	284	426	247	370			221	332
D	176	264	153	230			137	206

Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

**Tilt System Interface Spacing Table for Tin Roof**

Type of Rail Rail III  
 Type of Interface Klamp Lok 406  
 Solar Panel Dimension 1640 mm x 992 mm  
 Terrain category **3**

Tilt Angle ( $\Phi$ ) -  $1^\circ \leq \Phi < 15^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	1372	1597	1302	1516	1250	1455		
B	1274	1484	1185	1408	1062	1352		
C	767	1151	667	1001	598	897		
D	476	714	414	621	371	556		

Tilt Angle ( $\Phi$ ) -  $15^\circ \leq \Phi < 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	993	1281	863	1216	759	1138		
B	679	1018	590	885	529	794		
C	382	573	332	499	298	447		
D	237	355	206	309	185	277		

Tilt Angle ( $\Phi$ ) -  $30^\circ \leq \Phi < 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	737	1105	641	961	563	845		
B	504	756	438	657	393	589		
C	284	426	247	370	221	332		
D	176	264	153	230	137	206		

Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

**Tilt System Interface Spacing Table for Tin Roof**

Type of Rail CG-010  
 Type of Interface Klamp Lok 406  
 Solar Panel Dimension 1640 mm x 992 mm  
 Terrain category **3**

Tilt Angle ( $\Phi$ ) -  $1^\circ \leq \Phi < 15^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	<b>1127</b>	<b>1313</b>	<b>1070</b>	<b>1246</b>	<b>1027</b>	<b>1196</b>		
B	<b>1047</b>	<b>1219</b>	<b>994</b>	<b>1157</b>	<b>954</b>	<b>1111</b>		
C	<b>767</b>	<b>1009</b>	<b>667</b>	<b>957</b>	<b>598</b>	<b>897</b>		
D	<b>476</b>	<b>714</b>	<b>414</b>	<b>621</b>	<b>371</b>	<b>556</b>		

Tilt Angle ( $\Phi$ ) -  $15^\circ \leq \Phi < 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	<b>904</b>	<b>1053</b>	<b>858</b>	<b>999</b>	<b>774</b>	<b>959</b>		
B	<b>679</b>	<b>978</b>	<b>590</b>	<b>885</b>	<b>529</b>	<b>794</b>		
C	<b>382</b>	<b>573</b>	<b>332</b>	<b>499</b>	<b>298</b>	<b>447</b>		
D	<b>237</b>	<b>355</b>	<b>206</b>	<b>309</b>	<b>185</b>	<b>277</b>		

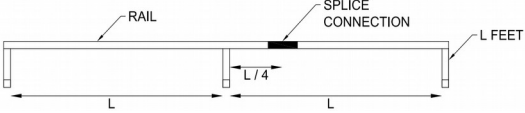
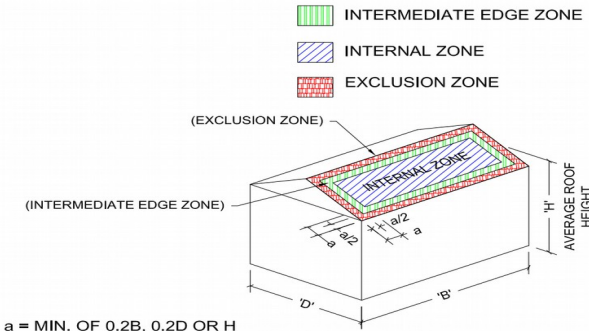
Tilt Angle ( $\Phi$ ) -  $30^\circ \leq \Phi < 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal	Inter-mediate Zone	Internal
A	<b>737</b>	<b>1105</b>	<b>641</b>	<b>961</b>	<b>574</b>	<b>862</b>		
B	<b>504</b>	<b>756</b>	<b>438</b>	<b>657</b>	<b>393</b>	<b>589</b>		
C	<b>284</b>	<b>426</b>	<b>247</b>	<b>370</b>	<b>221</b>	<b>332</b>		
D	<b>176</b>	<b>264</b>	<b>153</b>	<b>230</b>	<b>137</b>	<b>206</b>		



Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **SolarRoof Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1883**  
 Date: **Sep-15**

<b>General Notes</b>																												
Note 5	Roof structure supporting the solar array must be checked by qualified structural engineer for the new induced loads produced by the PV panels.																											
Note 6	<p>Following components are satisfied to use according to AS1170.2011</p> <table border="1"> <thead> <tr> <th>Components</th> <th>Part Number</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Standard Rail</td> <td>ATL-TYN-28</td> <td>Antai Rail II</td> </tr> <tr> <td>Light Rail</td> <td>ATL-TYN-53</td> <td>Antai Rail III</td> </tr> <tr> <td>Light Rail</td> <td>CG-010</td> <td>Antai Rail CG-010</td> </tr> <tr> <td>Inter Clamp</td> <td>ATL-FWNY-09</td> <td>Internal fixing between rail and Solar Panel</td> </tr> <tr> <td>End Clamp</td> <td>ALT-TYN-14</td> <td>End fixing between rail and Solar Panel</td> </tr> <tr> <td>Adjustable tilt legs</td> <td>ATL-TYN-57</td> <td>Adjustable back legs</td> </tr> <tr> <td>Splice</td> <td>ATL-TYN-21</td> <td>Rail Connection</td> </tr> <tr> <td>Tilt System Interface</td> <td>ATL-TYN-56</td> <td>Tin Roof interface</td> </tr> </tbody> </table>	Components	Part Number	Description	Standard Rail	ATL-TYN-28	Antai Rail II	Light Rail	ATL-TYN-53	Antai Rail III	Light Rail	CG-010	Antai Rail CG-010	Inter Clamp	ATL-FWNY-09	Internal fixing between rail and Solar Panel	End Clamp	ALT-TYN-14	End fixing between rail and Solar Panel	Adjustable tilt legs	ATL-TYN-57	Adjustable back legs	Splice	ATL-TYN-21	Rail Connection	Tilt System Interface	ATL-TYN-56	Tin Roof interface
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Standard Rail	ATL-TYN-28	Antai Rail II																										
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Note 7	Terrain category 3(TC3) refers to numerous closely spaced obstructions having heights generally from 3 m to 10 m. For example suburban housing or light industrial estates. Refer clause 4.2.1 of AS/NZS 1170.2-2011 Amdt 2-2012 for definition of Terrain category 3.																											
Note 8	<p>Splice connection must placed quarter length of the spacing of the L foot. No Splice connection should be placed at the centre of spacing or over the L foot.</p> 																											
Note 9	<p>Figure 1: Shows building dimensions (b,h,d)</p>  <p><b>ROOF REGIONS</b> Figure 1</p>																											