

Peter Turner & Associates Pty. Ltd.

CONSULTING STRUCTURAL, CIVIL AND GEOTECHNICAL ENGINEERS

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Stephen Wu
Microsolar System Pty Ltd
5 Richards Street
Mitcham VIC 3132

24 March 2011

Dear Sir

Re: EzQuik Solar Roof Pv Mounting System for Australian Use

As requested we have reviewed your Code-Compliant Planning and Installation Manual for EzQuik Solar roof system. We find the guide to be structurally sufficient for Australian use based on the following conditions:

1. Wind Loads to AS 1170.2:2002 for regions A B C D in Australia
2. Terrain Category 2
3. Shielding and Topography Multipliers, Ms and Mt taken as unity.
4. Racks mounted on roofs of enclosed buildings on nominal rectangular shape.
5. Wind average recurrence interval of 500 years.
6. Maximum solar panel length of 1.6m by 0.8m width with minimum of 2 rails supporting each panel.
7. Maximum solar panel weight of 20kg/m²

We trust that this satisfies your present requirements.

Yours faithfully,



BP Turner

Peter Turner & Associates Pty Ltd

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**CONSULTING STRUCTURAL, CIVIL, GEOTECHNICAL ENGINEERS,
MECHANICAL & ASSET RELIABILITY ENGINEERING**

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Stephen Wu
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24 June 2011

Dear Sir

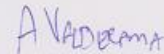
**Re: Roof Mounted Solar Panels
Certificate of Structural Adequacy**

Further to your email request of 15th June 2011 we confirm that we have carried out a structural assessment of the amended roof mounted frames for solar panels designed by Microsolar System Pty Ltd (panel layout attached)

The mounting frames have been designed for either sheet metal roofs attached to metal purlins or tiled roofs on timber rafters and for gust wind speed locations A, B, C, D, as defined in Australian Standard AS 1170.2 SAA Loading Code, Terrain Category 1 (beach front or open country) has been assumed for design purposes.

It is certified that the mounting frames and roof attachments for 1580 x 808 panels are structurally satisfactory for 1650 x 1100 panels provided that Mid Clamps and End clamps bolts are increased to M8 bolts when use in Region C & D areas when installed in accordance with detailed recommendations given in reports prepared by Peter Turner and Associates Pty Ltd dated 9 December 2010 as commissioned by Microsolar System Pty Ltd and Microsolar System

Yours faithfully,



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Peter Turner & Associates Pty Ltd

Peter Turner & Associates Pty. Ltd.

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9 December 2010

Dear Sir

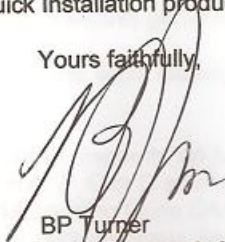
**Re: Roof Mounted Solar Panels
Holding Down Attachment for Solar Panels**

Further to your email dated 5 November 2010 requesting a design for holding down attachments onto either metal sheet roofs or tiled roofs for your solar panels we enclose our report herewith, which notes the attachments required for the various wind speed regions of Australia in accordance with AS 1170 SAA Loading Code.- wind Loads.

With regard to the cast aluminium roof tile hooks, I thought that it would be most appropriate to have this load tested under laboratory conditions as it is very difficult to carry out calculations for it owing to its complex shape. I am making arrangements for load testing at Newcastle University and will let you have the results when they are available.

In the meanwhile I recommend that you use only the galvanized steel roof tile hooks which are part of your Easy Quick Installation products.

Yours faithfully,



BP Turner
Peter Turner & Associates Pty Ltd

MicroSolar Energy – ExQuick Installation
Re: Solar Panels – Roof Attachment
Estimate of Holding Down Attachments Required

Solar Panel Configuration

From the written information provided by Solar Online Australia and the photographs of roof installations provided it appears that the roof mounted solar panels have the following characteristics.

Panel size	0.808m wide x 1.58m long
Kit size	4 No. panels side by side
	Support Structures 2 No. rails per kit 8 roof attachment points i.e. 4 No attachment points per rail length 3.5m (4 panels), and 3 No. roof attachment points per rail length for bar on 2.6m long rod (3 panels) (see sketch drawing)
Application	Either ribbed steel, corrugated roof or tiled roof
Roof Construction	Typically timber roof rafters with 40mm deep battens or cold formed "C" purlins for steel rafter roof construction.

Gust Wind Speeds for Roofs

It is assumed that the solar panels will be used on roofs for housing up to two stories high and on roofs for commercial premises generally single storey.

The pitch of the roof has an effect on the wind loading and the loading is a maximum for a roof of less than 15° pitch.

In general the maximum gust wind speed depends on factors such as location within Australia i.e. locations in Region A, B, C or D as defined in AS 1170.2 SAA Loading Code SAA Loading Code SAA Loading Code SAA Loading Code – Wind Loads. Region C and D are tropical cyclone areas near the coast whilst the region A covers the vast majority of areas in Australia.

The gust wind speed also depends upon the degree of exposure to the wind. (Terrain Categories 1-4 in AS 1170.2) with terrain category 1 being exposed

open terrain with few obstacles (beach and lake front, or open country) and terrain category 4 being terrain with numerous large high and closely spaced obstructions (city centre). Terrain Category 3 is the normal residential rating.

For the purposes of these loading calculations terrain category 1 is used. The outcome of the calculations on holding down attachments is as follows.

Residences in Region A of AS 1170.2 – Steel Roofs

Wind gust speeds 41 metres per second

It is assumed that the feet of the rails will be attached into 40mm deep roof battens using 5mm shank diameter roof screws.

- A) For 4 No. Photovoltaic panels use 4 No. roof screw fixings per rail length, assume 2 No. rails per panel set.
- B) For 3 No. panels use 3 No. roof screw fixings per rail length assuming 2 No. rails per panel set.

Commercial Premises – Steel “C” Section Purlins

If fixing into steel purlins it is recommended that fixing be with 8mm diameter bolts with washes on the inside face of the purlins. The number of fixings to be as noted above.

Residences with Tiled Roofs

It is noted that with tiled roofs the use of the “L” shaped brackets will result in the uplift forces applying a bending moment and deflection into the brackets which will cause them to bend upwards under maximum wind loading conditions.

It is noted that the screw fixing is always to be made into the roof rafters and not into the roof battens. The fixing may be made through the batten but always into the roof rafters (see enclosed sketch drawing)

Residences in Wind Region B – AS 1170.2 – Steel Roofs

Wind gust speed 49 metres/second

(Note: This area includes the northern coast area of NSW and Brisbane as well as other near coastal areas of Queensland, Northern Territory and Western Australia.)

- A) For 4 No. Voltaic panels sets use 5 No. fixings per rail length assuming 2 No. rails per panel set.

- B) For 3 No. panels use 4 No. fixings per rail length assuming 2 No. rails per panel set.

Commercial Premises – Steel “C” section purlins

Use 8mm diameter bolts with washers on the inside face, the number of fixings to be as noted above.

Residences with Tiled Roofs

The use of “L” shaped brackets for attachment to tiled roofs is commented on as above. Also comment regarding fixing into roof rafters is as above.

Residences in Wind Region C and D – AS 1170.2

(Note: This area has gust wind speeds of 57 metres per second and 69 metres per second respectively and affect near coastal regions in the Northern Territory and Western Australia. Region C is a tropical cyclone area and Region D is a severe Tropical Cyclone area.)

Roof panels in these areas would need special construction and it is recommended that three rails per panel set be used and that the fixing through the roof be into a similar rail placed on the underside of the roof rafter and bearing against the underside of the roof rafter. 8mm diameter bolts shall be used.

The number of bolt fixing per rail to be as for a Region B location.

Commercial Premises – Steel Purlins

The same comment with regard to underside rails applies to roofs with steel purlins which would normally be at spacing in the region of 1.0 metres. The top and bottom rails should be placed immediately adjacent to the vertical webs of steel purlins and the middle rail should be placed at a distance mid way between with the underside rail bearing against the underside of the roof sheeting. 8mm diameter bolts and washers should be used to fix the rails as for residences noted above.