

Ref: D19-1501

10/11/2019

JA Solar Australia Pty Ltd
Melbourne, Victoria

Asset Services Pty Ltd
A.B.N. 20 160 421 090

Suite 1A, Level 1
103 Reichardt Road
Winnellie NT 0820
Australia

PO Box 39618
Winnellie NT 0821
Australia

Telephone: (08) 8944 0600
Facsimile: (08) 8944 0699
Email: info@asset.services

Attention: Mr Andrew Zhai

**RE: Wind Pressure Testing of JA Solar Crystalline Silicon Photovoltaic Modules
Type JAM60S10 – 330/PR (330 W)
Design Certification**

Dear Sir,

This Report certifies the Design Wind Pressure for the JA Solar Type JAM60S10 – 330/PR PV Module for wind loads in Cyclonic Region C. We verify that the PV Module is capable of withstanding a design wind load as specified in Table 1.

A pressure test was conducted and observed by this office on the 29th October 2019 in Darwin, Northern Territory. The testing officer was Michael Hatton from this office.

The test module (serial number 198M6C60AC090013) was mounted front side up in a test bed. The size of the module was measured as 1.0 m wide x 1.69 m long. The fixing of the module was fixed using the Clenergy mounting brackets and rails. The fixings were spaced at 800 mm centres giving a maximum cantilever overhang of 445 mm of the module. The rails were fixed to the test bed. The perimeter frame of the module is 35 x 35 x 1.2 mm aluminium angle all round.

An air bag was used to apply constant pressure to the back of the module. The air bag was inflated with pressure to the required design pressure and held for 1 minute at maximum pressure.

A calibrated deflection meter was used to measure deflection at mid panel and was recorded at 1 kPa intervals. The electrical continuity of the panels was not measured during the pressure test. The behaviour of the module and supporting fixtures were observed and recorded. Photographs were taken before and at maximum pressure of the test.

A design maximum pressure that was adopted was 12 kPa. This figure was chosen on past tests and it also allows the modules to be placed on the roofs of multi storey buildings subject to the variability factor. The applied factor of variability, for single test specimen and adopting a coefficient of variation of structural characteristics of 10 percent, from AS 1170.0 Table B1 when applying to the allowable design wind capacity is 1.46.

The module sustained a test pressure of 8.8 kPa (short of the design pressure) and showed no signs of cracking of the polycarbonate protective covering glazing. A deflection of 77.5 mm was recorded at mid panel at the 7 kPa test pressure. The load was then increased to failure. Deflection recording was disconnected after 7 kPa as deflection went beyond the limits of recording device. A maximum test pressure of 8.8 kPa was achieved prior to failure of panel frame yielding. The module was removed from the test bed for further inspection. From our inspection the cross member at the end of the panels had started to yield. We consider that even though the frame started to yield, the panel remained on the test rails with no further damage. We consider the maximum pressure of the module can sustain 8.8 kPa without forming a debris hazard.

Table 1

Module Sn	Support Points	Max Applied Load	Variability Factor AS 1170.0 Table B1	Ultimate Strength Limit State Design Capacity
198M6C60AC090013	800 mm	8.8 kPa	1.46	6.0 kPa

We hereby certify the JA Solar Type JAM60S10 – 330/PR PV Module with support points located at 800 mm is suitable for a cyclonic design wind pressure of 6.0 kPa. It is our technical opinion that the same pressure can be maintained with support points at 900 mm. Note that the test is for the PV module only and its support fixings and rails are not part of this test.

This certification excludes the module fixing clamps, the support rail or fixing to the roof as this may limit the maximum design wind pressure.

<u>CERTIFICATION BY STRUCTURAL ENGINEER</u>			
Company Name if certification issued on behalf of a corporation Asset Services Pty Ltd		Company NT Registration Number 152941ES	
I certify that reasonable care has been taken to ensure that the structural engineering aspects of the works as described above have been designed in accordance with the requirements of the Building Code of Australia and the Northern Territory Building Regulations.			
Name (see *below) Michael Hatton Nominee for Asset Services Pty Ltd	Nominee/Individual NT Registration Number 14704ES	Signature 	Date 10/11/2019

Should you require any further information in relation to this report please contact this office.

Yours faithfully,



Michael Hatton
Senior Structural Engineer | Senior Building Surveyor
Asset Services Pty Ltd