

NORTHERN TERRITORY OF AUSTRALIA

STRUCTURAL ENGINEERING CERTIFICATE OF COMPLIANCE

SECA REFERENCE: 22041

Date of Issue: 8 March 2022

Jinko Solar Australia Holdings CO Pty Ltd
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**Design Certification for the Jinko Solar Panel Module, Model: Jinko JKM415M-54HL4-V
with support points 800 mm & 1200 mm**

SUMMARY

This Certificate of Compliance verifies that the Jinko Solar Panel Module, **Model: Jinko JKM415M-54HL4-V 1722 x 1134 x 30mm** can resist vertical loads with the corresponding support points as follows:

Panel 1 Serial: 66XX02210731110533870325	Supports at: 800mm centres	Design Pressure: 4.79 kPa
Panel 2 Serial: 66XX02210728110533450095	Supports at: 1200mm centre	Design Pressure 5.14 kPa

SCOPE

Structural Engineering Consultants Australia (SECA) Pty Ltd were engaged by Dan Su of Jinko Solar Australia Holdings CO Pty Ltd to carry out and witness two individual mechanical load tests (simulated static, wind load strength test). The test procedure followed was similar to the method outlined in AS4040.2:1992, Static Strength Test Regime. The testing was performed on new panels supplied by the client.

TEST PROCEDURE

The solar panel module(s) were mounted front side up and were free to deflect, this was to imitate a real-world situation. The electrical continuity or the cells themselves were not monitored during or after the tests. The load was applied by an airbag to the back of the panel and the centre deflection was monitored at 1kPa intervals as the load was applied by slowly inflating an air bag. A calibrated digital manometer was used to measure and track the test pressures, while a calibrated digital deflection meter was used to measure the centre (vertical) deflection of the solar panel.

The tests were observed by Ray Colley and Wisnu Lim on behalf of SECA on the 8th March 2022 in Darwin, Northern Territory. A total of two panels were tested, one supported at 800mm centres and one supported at 1200mm centres, each test was carried out once. The applied factor for variability (for 1 test unit) in accordance with AS/NZS 1170.0 Table B1 when determining the allowable design capacity is 1.46.

Test Results

Test No.1 - Model: Jinko JKM415M-54HL4-V, Serial Number: 66XX02210731110533870325

The panel **1722 x 1134 x 30mm** was mounted to the test rig with support points at **800mm** centres apart on each side with a cantilever/ overhang of approximately **461mm** at each end (measured from centre of supports).

The solar panel was observed to be able to support an equivalent design test pressure of **7.0 kPa** with a centre vertical deflection of **84.0mm**. The panel began to slip away from the fixing clamps due to the excessive deflection so pressure was released.

Test No.2 - Model: Jinko JKM415M-54HL4-V, Serial Number: 66XX02210728110533450095

The panel **1722 x 1134 x 30mm** was mounted to the test rig with support points at **1200mm** centres apart on each side with a cantilever/ overhang of approximately **261mm** at each end (measured from centre of supports).

The solar panel was observed to be able to support an equivalent design test pressure of **7.5 kPa** with a centre vertical deflection of **76.0mm**. The panel failed due to the compression flange or buckling of the bottom flange of the end rail at 8.0kPa.

Table 1: Test Summary
Recommended Ultimate Design Strength, Limit Design Capacity

Test	Panel Manufacturer, Model & Size (mm)	Support Points (mm)	Maximum Applied Load (kPa)	Material Variability Factor AS/NZS 1170.0 Table B1 – kt	Recommended Ultimate Design Strength Limit State Design Capacity (kPa)
No.1	Jinko JKM415M-54HL4-V 1722 x 1134 x 30mm Serial Number: 66XX02210731110533870325	800	7.0	1.46	4.79
No.2	Jinko JKM415M-54HL4-V 1722 x 1134 x 30mm Serial Number: 66XX02210728110533450095	1200	7.5	1.46	5.14

In accordance with AS/NZS 1170.0 Table B1, where no reliable data for the co-efficient of variation of structural characteristics (V_{sc}) are available, a value of 10.0% maybe adopted for roof assembly cyclic testing, as recommended in Clause 6.1 of *The Draft Guide to LHL Cyclic Testing (Version 1)*, dated 9 April 2009 and issued by the Cyclone Testing Station.

Mechanical Properties

No. of Cells	108 (6 x 18 cells)
Dimensions (L x W x Frame thickness)	1722 x 1134 x 30mm
Weight	22.0 kg
Frame	Anodized Aluminium Alloy



Summary



We recommended and certify that the **Jinko JKM415M-54HL4-V** Solar Panel Module, can resist vertical design capacities, Ultimate Strength Limit State, as listed for the following support conditions:

When supported on battens at 800mm centres	4.79 kPa
When supported on battens at 1200mm centres	5.14 kPa

Limitations

This certificate of compliance has been prepared on behalf of and for the exclusive use of Jinko Solar Australia Holdings CO Pty Ltd and forms part of the A.I.P certificate of compliance. These design capacities are only applicable for the panel size, model and support spacing as used in these tests. We accept that the wattage of the panel may vary, however this certificate is no longer valid if the any of the applicable Mechanical Properties used in the manufacture of these solar panel module or if the manufacturing processes or techniques is changed or altered in any way. It is the responsibility of the manufacturer to advise or confirm if they are altered in any way as new tests and certification will be required.

Please note: The panel fixing clamps, the support rail or their associated fixings, may limit the structural design for installation.

<div>Ray Colley Director Structural Engineering Consultants Australia Pty Ltd</div> <div></div>		Company NT Registration Number 169894ES	
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			
<div>Name Wisnu Lim</div> <div>Nominee for Structural Engineering Consultants Australia Pty Ltd</div>	<div>Nominee/Individual NT Registration Number</div> <div>145651ES</div>	<div>Signature</div> <div></div>	<div>Date</div> <div>8 March 2022</div>

Appendix A

Test Results

Test Pressure	Test 1 800mm C/C Supports	Test 2 1200mm C/C Supports
Load Applied (kPa)	Recorded Deflection (mm)	Recorded Deflection (mm)
1	18.0	20.3
2	30.2	29.7
3	43.7	37.8
4	54.0	46.5
5	64.2	55.8
6	74.2	65.4
7	84.0	72.0
7.5		76.0 Max load 7.5 76mm deflection

Test Arrangement Photograph

