

**Technical Report No.: 704062448201-02**

**Date: 2024-06-11**

**Client:** Einnova Solarline Energy Corp. Limited (Nanjing) (076043)  
Room 818, Building 1, No. 58, Yunjin Road, Jianye District, 210000  
Nanjing City, Jiangsu Province, PEOPLE'S REPUBLIC OF CHINA  
Contact person: Ms. Vicky Chen

**Manufacturer:** Einnova Solarline Energy Corp. Limited (Nanjing) (076043)  
Room 818, Building 1, No. 58, Yunjin Road, Jianye District, 210000  
Nanjing City, Jiangsu Province, PEOPLE'S REPUBLIC OF CHINA  
Contact person: Ms. Vicky Chen

**Factory:** Einnova Solarline Energy Corp. Limited (Anhui)  
Building No. 4, Qingxi industrial park phase two, Hanshan County,  
Ma Anshan City, Anhui, China  
Contact person: Nicky Zhang

**Test object:** Product: Crystalline Silicon Photovoltaic modules  
Model: See clause 1.4

**Test specification:** IEC 61215-2:2021, Clause 4.1 Visual Inspection (MQT 01)  
IEC 61215-2:2021, Clause 4.6 Performance at STC (MQT 06.1)  
IEC 61215-2:2021, Clause 4.3 Insulation test (MQT 03)  
IEC 61215-2:2021, Clause 4.15 Wet leakage current test (MQT 15)  
IEC 61215-2:2021, Clause 4.17 Hail test (MQT 17)

**Purpose of examination:**




- Testing and evaluation (visual / partial) according to the test specification

**Test result:** The test results show that the presented product is in compliance with the above listed test specifications.

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## 1. Description of the test object

### 1.1 Picture(s)

 <b>WARNING</b> Arc Flash and Shock Hazard Appropriate PPE and tools required when working on this equipment	 	<b>Type : ESM-440T</b>		Standard Test Condition:AM=1.5,E=1000W/m <sup>2</sup> , Tc=25°C	
		Maximum Power(Pmax)	440W	Power tolerance Range	0/+5W
		Open Circuit Voltage(Voc)	39.40V	Maximum System Voltage	1500V DC
		Short Circuit Current(Isc)	13.79A	Maximum Series Fuse Rating	30A
		Max Power Voltage(Vmp)	33.58V	Weight	21.7Kg
		Max Power Current(Imp)	13.10A	Dimension	1762*1134*30mm

### 1.2 Function

Manufacturer's specification for intended use:

The PV modules for electricity generation systems with max. voltage of 1500 V DC

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### 1.3 Consideration of the foreseeable use

- Not applicable
- Covered through the applied standard
- Covered by the following comment\*
- Covered by attached risk analysis

\*

### 1.4 Technical Data

Sample No.	Module serial No.	Model	Remark
Sample 1 (HA2024TL-0826-001X)	SA2024041800913	ESM-440T	45mm Hail test

## 2. Order

### 2.1 Date of Purchase Order, Customer's Reference

The order dated 2024-04-03

## 2.2 Test Sample(s)

- Reception date(s): 2024-05-30
- Location(s) of reception: Changzhou HuaYang Inspection and Testing Technology Co., Ltd  
No.8 Lanxiang Road, Wujin Economic Development Zone, Changzhou, Jiangsu, China
- Condition of test sample(s): In good condition

## 2.3 Testing

- Testing date(s): 2024-06-07
- Location(s) of testing: Changzhou HuaYang Inspection and Testing Technology Co., Ltd  
No.8 Lanxiang Road, Wujin Economic Development Zone, Changzhou, Jiangsu, China

## 2.4 Points of Non-Compliance or Exceptions of the Test Procedure

- None

## 3. Test Results

- “Decision rule according to IEC Guide 115:2023, clause 4.3.3 was applied.”

3.1 Positive Test Results

- See below details

TABLE 01: MQT 01 Visual inspection		P
Test Date [YYYY-MM-DD]..... :	2024-06-07	—
Sample No.	Nature and position of initial findings – comments or attach photos	—
1	No major visual defects found	P
Supplementary information: N/A		

TABLE 02: MQT 06.1 ini: Performance at STC (initial)							P
Test Date [YYYY-MM-DD]..... :		2024-06-07					—
Test method..... :		<input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight					—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmax [W]	FF [%]	Result
1 (Front)	12.803	38.358	12.089	32.832	396.922	80.83	—
1 (Rear)	9.972	37.949	9.123	33.450	305.178	80.65	—
1 (BNPI)	14.140	38.401	13.314	32.890	437.886	80.64	—
Supplementary information: N/A							

TABLE 03: MQT 03 ini: Initial Insulation test					P
Test Date [YYYY-MM-DD]..... :		2024-06-07			—
Test Voltage applied [V] .....		8000/1500			—
Size of module [m²]..... :		2.0			—
Required Resistance [MΩ]..... :		20.0			—
Sample #	Measured	Dielectric breakdown			Result
	MΩ	Yes (description)	No		
1	>10000	No Dielectric breakdown	x	P	
Supplementary information: the maximum measuring limit of the equipment is 10000MΩ.					

TABLE 04: MQT 15 ini: Initial Wet leakage current test		P
Test Date [YYYY-MM-DD]..... :	2024-06-07	—

Test Voltage applied [V].....:	1500	—	
Solution temperature [°C].....:	21.6	—	
Size of module [m²].....:	2.0	—	
Sample #	Required Resistance [MΩ]	Measured [MΩ]	Result
1	20.0	5630	P
Supplementary information: Solution resistivity 2532 [Ω·cm]			

TABLE 05: MQT 17 - Hail impact test							P
Test Date [YYYY-MM-DD].....:	2024-06-07						—
Sample #	1						—
Ice ball size [mm] .....	1	2	3	4	5	6	—
	44.6	45.2	44.3	44.0	44.5	45.2	
	7	8	9	10	11	/	
Ice ball weight [g] .....	1	2	3	4	5	6	—
	44.2	44.9	43.8	43.2	43.6	45.0	
	7	8	9	10	11	/	
Ice ball velocity [m/s].....:	1	2	3	4	5	6	—
	31.2	29.9	29.6	30.2	30.8	31.1	
	7	8	9	10	11	/	
	30.2	29.6	30.4	31.1	31.5	/	
Number of impact locations .....	11						—
Supplementary information: (impact location descriptions)							

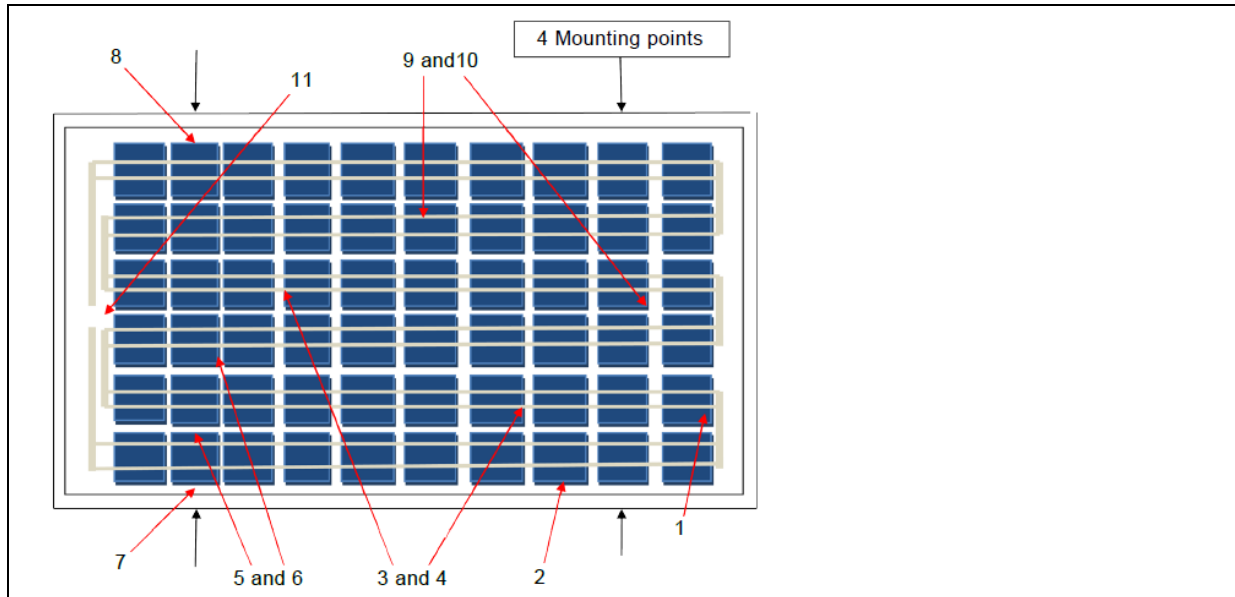


TABLE 06: MQT 01 - Visual inspection (Final)		P
Test Date [YYYY-MM-DD].....:	2024-06-07	—
Sample No.	Nature and position of initial findings – comments or attach photos	—
1	No major visual defects found	P
Supplementary information: N/A		

TABLE 07: MQT 03 - Insulation test (Final)				P
Test Date [YYYY-MM-DD].....:	2024-06-07		—	
Test Voltage applied [V] .....	8000/1500		—	
Size of module [m <sup>2</sup> ].....:	2.0		—	
Required Resistance [MΩ].....:	20.0		—	
Sample #	Measured	Dielectric breakdown		Result
	MΩ	Yes (description)	No	
1	>10000	No Dielectric breakdown	x	P
Supplementary information: the maximum measuring limit of the equipment is 10000MΩ.				

TABLE 08: MQT 15 - Wet leakage current test (Final)		P
Test Date [YYYY-MM-DD].....:	2024-06-07	—

Test Voltage applied [V].....:		1500	—
Solution temperature [°C].....:		21.3	—
Size of module [m²].....:		2.0	—
Sample #	Required Resistance [MΩ]	Measured [MΩ]	Result
1	20.0	3120	P
Supplementary information: Solution resistivity 2438 [Ω·cm]			

<b>TABLE 09: MQT 06.1 - Final Performance at STC</b>									P
Test Date [YYYY-MM-DD].....:		2024-06-07							—
Test method.....:		<input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight							—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmax [W]	FF [%]	Pmax [W] (Lab _GateNo.1)	Power Degradation [%]	Result
1 (Front)	12.784	38.177	12.096	32.586	394.149	80.76	396.922	-0.70	P
1 (Rear)	9.965	37.848	9.225	32.982	304.251	80.67	305.178	-0.30	P
1 (BNPI)	14.121	38.242	13.332	32.609	434.743	80.51	437.886	-0.72	P
Supplementary information: The IV curves didn't show any additional kinks or other unusual characteristics as compared to the initial IV curve.									

**3.2 Points of Non-Compliance according to the test specification**

- None

**4. Test History**

N/A

## 5. Remarks

### 5.1 General

N/A

### 5.2 Factory surveillance cycle

Your production facility is currently on the following surveillance cycle.

- Annual (12 month)
- Bi-Annual (6 month)
- Quarterly (3 month)
- N/A

### 5.3 Additional information for routine tests to be performed by the factory(ies)

#### Routine tests for electrical appliances / equipment:

Routine test requirements for production are described in N/A



6. Documentation

Appendix 1: List of measurement equipment

No.	Description	Main testing Equipment	Calibrate until
1	Visual inspection	Illumination photometer HYJC-YS-070	2024-06-20
2	Performance at STC	Module pulse simulator HYJC-YS-021	2025-01-23
3	Insulation test Wet leakage current test	Programmable control voltage insulation meter HYJC-YS-155	2024-08-07
4	Wet leakage current test	Conductance meter HYJC-YS-171	2024-08-07
6	Hail test	Hail tester HYJC-YS-036	2025-04-02

All equipment used for tests having a significant effect on the accuracy or validity of the result of the test is calibrated before being put into service.

Appendix 2: Statement of the estimated uncertainty of the test results

The power measurement uncertainty is  $U(P_{max})=2.05\%$ ,  $U(V_{oc})=0.97\%$ ,  $U(I_{sc})=2.0\%$  (K=2).

7. Summary

“The test specifications are met”

**TÜV SÜD Certification and Testing (China)Co., Ltd. Shanghai Branch**

Tested by: Rongwei Jing *Jing Rongwei*  
*printed name, function & signature*

Approved by: Ning Tang  
*printed name, function & signature*