

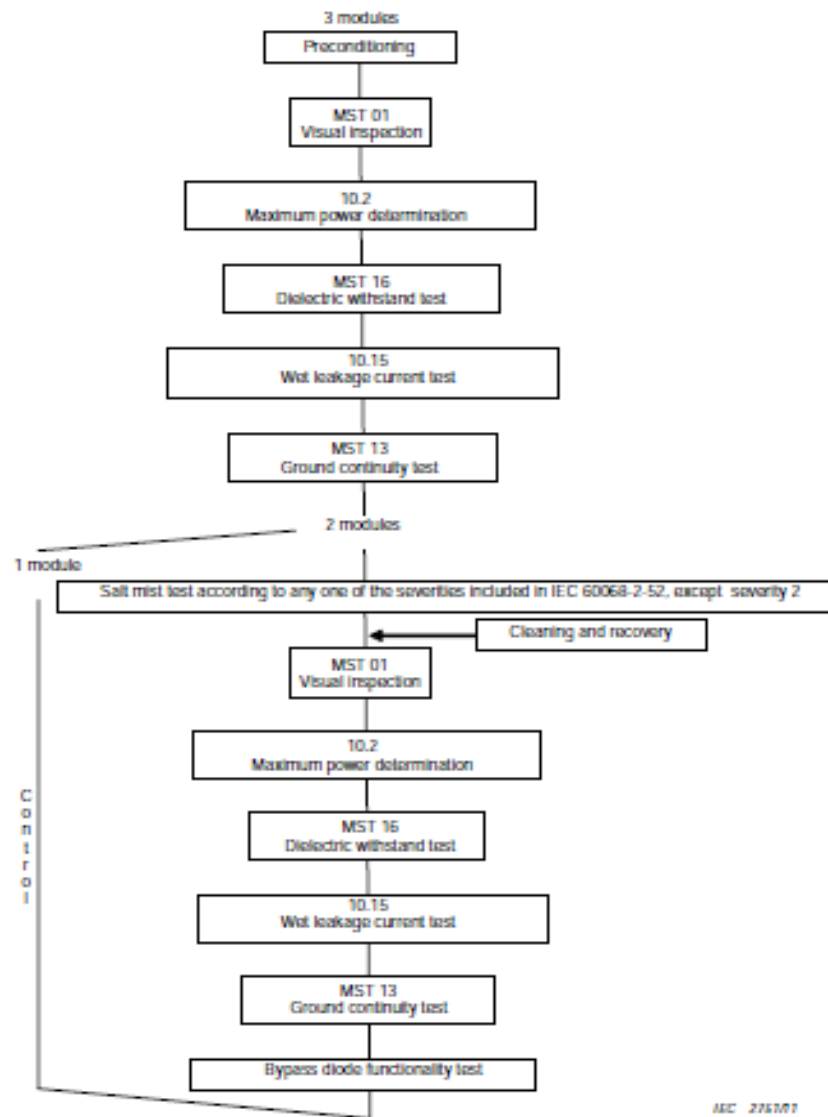


TEST REPORT	
IEC 61701:2020	
TÜV SÜD Test report for salt mist corrosion testing of photovoltaic (PV) modules	
Report reference No.	704062103402-06
Date of issue	2025-04-25
Project handler.....	Chengjun Yin
TÜV SÜD Branch	TÜV SÜD Certification and Testing (China) Co., Ltd Shanghai branch.
Address	3-13F, No.151 Heng Tong Road,200070, Shanghai,P.R.China.
Testing location.....	Changzhou HuaYang Inspection and Testing Technology Co., Ltd. No.8 Lanxiang Road, Wujin Economic Development Zone, Changzhou, Jiangsu, China.
Client	LONGi Green Energy Technology Co.,Ltd.
Client number.....	99333
Address	No. 388, Middle Hangtian Road, Chang'an District, Xi'an, Shaanxi 710100, P.R. China.
Contact person.....	Mr.Guoyi Tang
Standard	This TÜV SÜD test report form is based on the following requirements: IEC 61701:2020
TRF originated by.	TÜV SÜD Product Service GmbH, Dipl.-Ing. Alexander Krenz
Copyright blank test report	This test report is based on the content of the standard (see above). The test report considered selected clauses of the a.m. standard(s) and experience gained with product testing. It was prepared by TÜV SÜD Product Service GmbH. TÜV SÜD Group takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.
Test procedure	☐ GS, ☒ TÜV Mark, ☐ EU-Directive, ☐ without certification
Non-standard test method.....	N/A
National deviations	N/A
Number of pages (Report)	25
Number of pages (Attachments)	3
Compiled by	Chengjun Yin
(+ signature)	
Approved by	Tao Wang
(+ signature)	



Test sample.....:	LRE011136241100601500 LRE011136241100601136 LRE011136241100601375	
Type of test object	Mono-Crystalline Silicon Photovoltaic Module	
Trademark.....:	 or 	
Model and/or type reference	LR8-66HYD-650W	
Rating(s) :	650 W	
Manufacturer.....:	LONGi Solar Technology (Taizhou) Co., Ltd.	
Manufacturer number... ..:	99605	
Address.....:	No.268 Xingtai South Road Hailing District 225300 Taizhou Jaingsu People's republic of China.	
Sub-contractors/ tests (clause)	See page 4 test summary.	
Name.....:	See page 4 test summary.	
Order description... ..:	☒	Complete test according to TRF
	☐	Partial test according to manufacturer's specifications
	☐	Preliminary test
	☐	Spot check
Date of order.....:	2024-07-27	
Date of receipt of test item	2024-07-27	
Date(s) of performance of test	2024-08-03/2024-10-18	

Test item particulars:



NOTE 1 Preconditioning and tests 10.2 and 10.15 are taken from IEC 61215. Tests MST 01, MST 13 and MST 16 are taken from IEC 61730-2.

NOTE 2 The control module should be used as a check every time the test modules are measured to evaluate the effect of the salt mist test.

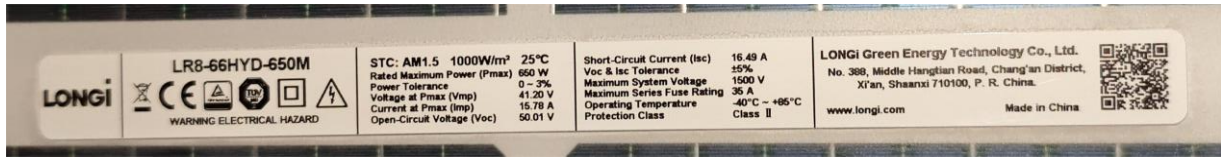
Figure 1 – Salt mist corrosion testing sequence for crystalline silicon PV modules

Attachments: N/A



Summary of testing:	
Tests performed (name of test and test clause): Initial measurements: Preconditioning MST 01: Visual inspection 10.2: Maximum power determination MST 16: Dielectric withstand test 10.15: Wet leakage current test Salt mist corrosion test in accordance with IEC 61701:2020 method 8 test method. Final measurements: MST 01: Visual inspection 10.2: Maximum power determination MST 16: Dielectric withstand test 10.15: Wet leakage current test Bypass diode functionality test.	Testing location: Zhejiang HJE Co., LTD 3-4/F., Building 1, No. 3556, Linggongtang Road, Nanhu District, Jiaxing, Zhejiang, China
Summary of compliance with National Differences: N/A	

Copy of marking plate:





Test item particulars	
Accessories and detachable parts included in the evaluation	N/A
Option included	N/A
Possible test case verdicts:	
- test case does not apply to the test object	N/A
- test object does meet the requirement	P (Pass)
- test object does not meet the requirement	F (Fail)
Abbreviations used in the report:	
STC – Standard Test Conditions	SMC – Salt Mist Corrosion
Imp – Maximum power current	Vmp – Maximum power voltage
Isc – Short circuit current	Voc – Open circuit voltage
Pmp – Maximum power	WL – Wet leakage current
Pr – Relative power	
General remarks:	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report. Throughout this report a point is used as the decimal separator. Summary of contents provided on the last page of this report.	
General product information and considerations:	
Product Electrical Ratings:	
Module type	LR8-66HYD-650W
Voc [V] /Tolerance	50.01
Isc [Adc] /Tolerance	16.49
Vmp [V]	41.20
Imax [Adc]	15.78
Pmp [W] /Tolerance	650
Maximum system voltage [V]	1500
Maximum Over-Current Protection Rating [A]	35
Safety Class	CLASS II



Information for testing sample:

Sample #	Type	Series number
HJE-2024-346-8#	LR8-66HYD-650W	LRE011136241100601500(Control module)
HJE-2024-346-9#	LR8-66HYD-650W	LRE011136241100601136
HJE-2024-346-10#	LR8-66HYD-650W	LRE011136241100601375



A1.1	MODULE TYPE/S
	LR8-66HYD-650W

A1.2	MODULE DESIGN
	Module dimensions (L x W x H) [mm] : 2382×1134×30
	Weights : 33.5Kg
	Front/Rear cover bonding classification : ☐ rigid/flexible ☒ rigid/rigid ☐ flexible/flexible

A1.3	SOLAR CELL
	Cell type reference : M11M0B LONGi Solar Technology Co., Ltd
	Cell dimensions L x W (± %) [mm] : 182.2 (±0.2) x96 (±0.2)
	Cell thickness [μm] : 155±15.5
	Cell area [cm²] : 174.89

A1.4	IDENTIFICATION OF MATERIALS
	Front cover : LONGi Green Energy Technology Co.,Ltd. Thickness: 2.0 mm Type: Coating tempered glass
	Rear cover..... : LONGi Green Energy Technology Co.,Ltd. Thickness: 2.0 mm Type: Coating tempered glass
	Encapsulation material front side : LONGi Green Energy Technology Co.,Ltd. Type: POE, LRPT Thickness: 0.3~ 1.0mm.
	Encapsulation material back side : LONGi Green Energy Technology Co.,Ltd. Type: POE, LRPT Thickness: 0.3~ 1.0mm.
	Frame parts : LONGi Green Energy Technology Co., Ltd. Anodized aluminum alloy, 6005-T6, silver colour
	Mounting parts..... : N/A
	Adhesive for frame : H.B.Fuller(Suzhou) Advanced Material Co.,Ltd Type: 1527,White Silicone adhesive
	Edge sealing..... : N/A
	Internal wiring : N/A
	Cell connector : LONGi Green Energy Technology Co., Ltd Cross section: 0.25*0.6mm Material: Base Cu Coating: Sn60Pb40
	String connector : LONGi Green Energy Technology Co., Ltd Cross section: 0.3 × 3.5 mm&0.3 × 6 mm Material: Base Cu, Coating: Sn60Pb40
	Soldering material : N/A



	Fluxing agent..... :	Singapore Asahi Chemical and Solder Industries Pte Ltd Type: SF56
	Junction box :	LONGi Green Energy Technology Co., Ltd. PV-LR07A, DC 1500 V, 25A, IP 68, -40 °C to 85 °C
	Cable :	LONGi Green Energy Technology Co., Ltd. Type: 62930 IEC 131 1×4mm ² , 1500V DC HALOGEN FREE LOW SMOKE
	Connector..... :	LONGi Green Energy Technology Co., Ltd. Type: PV-LR5, 1500V DC, IP 68
	Bypass diode..... :	LONGi Green Energy Technology Co., Ltd. Type: 40SQ045, IF(AV)=40A, VRRM=45V, T _j =200°C, 25 A, 1x180mil
	Potting material :	CHENDU GUIBAO SCIENCE&TECHNOLOGY CO.,LTD Type: 4808, white silicone adhesive
	Adhesive for junction box :	Sika(Jiangsu)industrial Material Ltd. Type: SIKASIL®AS-165, white silicone adhesive
	Additional material (e. g. fixing tape, insulation tape) :	Fixing Tape Type: BCP-1B LONGi Green Energy Technology Co., Ltd Insulation tape: BEC-201B Suzhou First PV Material Co., Ltd

A1.5	MODULE DESIGN - MINIMUM DISTANCES	
	Between cells :	0.9±0.8mm
	Between cell and accessible surfaces :	13±1mm
	Between any current carrying part and accessible surfaces..... :	13±1mm

A1.6	MODULE DESIGN - ELECTRICAL CONFIGURATION	
	Total number of cells..... :	144
	Serial-parallel connection of cells..... :	48
	Cells per bypass diode..... :	48
	No. of bypass diodes..... :	3

Remark: Only listed the tested module LR7-72HYD-645M



IEC 61701: 2011			
Clause	Requirement + Test	Result--Remark	Verdict
3	Samples		P
	— Three identical samples of the model of PV module or assembly of interest must be subjected to any of the testing sequences included in Figures 1, 2, or 3, depending on the PV technology considered, namely crystalline silicon, thin-film or concentrator photovoltaic (CPV) respectively.	Three samples evaluated	P
	— Full-size sample or representative sample	Full Size Samples	P
	— PV module provided with means for grounding then they constitute a part of the test sample.	With Grounding devices	P
4	Test procedures		P
4.1	— All tests included in Figures 1, 2 or 3, except the bypass diode functionality test, are fully described in the IEC standards.		P
4.2	Bypass Diode Functionality Test		P
5	Preconditioning		P
	— All test samples must be preconditioned with either global or direct normal sunlight according to the specifications given in the applicable Design Qualification and Type Approval IEC standard applicable.	Performed according to IEC 61215:2005.	P
6	Initial Measurements		P
6.1	Crystalline silicon		P
	— Tests according to IEC 61215		P
	a) 10.2: Maximum power determination	See table 6-b)	P
	b) 10.15: Wet leakage current test	See table 6-d)	P
	— Tests according to IEC 61730-2		P
	c) MST 01: Visual inspection	See table 6-a)	P
	d) MST 13: Ground continuity test	See table 6-e)	N/A
	e) MST 16: Dielectric withstand test	See table 6-c)	P
6.2	Thin-film technologies		N/A
	— Tests according to IEC 61646		N/A
	a) 10.2: Maximum power determination	See table 6-b)	N/A
	b) 10.15: Wet leakage current test	See table 6-d)	N/A
	— Tests according to IEC 61730-2		N/A



IEC 61701: 2020			
Clause	Requirement + Test	Result--Remark	Verdict
	c) MST 01: Visual inspection	See table 6-a)	N/A
	d) MST 13: Ground continuity test	See table 6-e)	N/A
	e) MST 16: Dielectric withstand test	See table 6-c)	N/A
6.3	Concentrator photovoltaic (CPV) modules		N/A
	— Tests according to IEC 62108		N/A
	a) 10.1: Visual inspection	See table 6-a)	N/A
	b) 10.2: Electrical performance measurement	See table 6-b)	N/A
	c) 10.3: Ground path continuity test	See table 6-e)	N/A
	d) 10.4: Electrical insulation test	See table 6-c)	N/A
	e) 10.5: Wet insulation test	See table 6-d)	N/A
7	Salt mist corrosion test		P
	Apply to the test samples under study the salt mist test as described in IEC 60068-2-52 following the general conditions, apparatus, characteristics of the salt solution, severities and other specifications included.	See table 7	P
	The severity of the salt mist test shall be chosen according to the atmospheric conditions prevailing in the place where the installation of the PV modules is intended.	Level 6 & Level 1	P
	Severity (2) is not suitable for PV modules as testing conditions are too weak (it is intended for products exposed to corrosive environments from time to time that are normally protected by an enclosure) and should be avoided when applying this Standard.		P
	During testing the face of the PV module normally exposed to solar irradiance shall be inclined 15° to 30° from vertical inside the salt fog chamber.	30° off vertically.	P
	The module can be placed vertically in the humidity chamber used for the humidity storage portion of the test.		P
8	Cleaning and recovery		P
	— After the salt mist test all samples must be washed to remove the adherent salt using running tap water for a maximum time of 5 minutes per square meter of area of the sample.		P
	— The temperature of the water used for washing shall not exceed 35 °C		P
	— During cleaning or drying the use of cloths, gauzes or any other woven material shall be avoided and no scraping is allowed		P



IEC 61701: 2020			
Clause	Requirement + Test	Result--Remark	Verdict
9	Final Measurements		P
9.1	After the salt mist test the test samples shall be subjected to the following tests depending on the PV module technology.		P
9.2	Crystalline silicon		P
	— Tests according to IEC 61215		P
	a) 10.2: Maximum power determination	See table 9-b)	P
	b) 10.15: Wet leakage current test	See table 9-d)	P
	— Tests according to IEC 61730-2		P
	c) MST 01: Visual inspection	See table 9-a)	P
	d) MST 13: Ground continuity test	See table 9-e)	N/A
	e) MST 16: Dielectric withstand test	See table 9-c)	P
	— Tests according to this standard:		P
	f) By pass diode functionality test	See table 9-g)	P
9.3	Thin-film technologies		N/A
	— Tests according to IEC 61646		N/A
	a) 10.2: Maximum power determination after light soaking	See table 9-b)	N/A
	b) 10.15: Wet leakage current test	See table 9-d)	N/A
	c) 10.19: light soaking	See table 9-f)	N/A
	— Tests according to IEC 61730-2		N/A
	d) MST 01: Visual inspection	See table 9-a)	N/A
	e) MST 13: Ground continuity test	See table 9-e)	N/A
	f) MST 16: Dielectric withstand test	See table 9-c)	N/A
	— Tests according to this standard:		N/A
	f) By pass diode functionality test	See table 9-g)	N/A
9.4	Concentrator photovoltaic (CPV) modules		N/A
	— Tests according to IEC 62108		N/A
	a) 10.1: Visual inspection	See table 9-a)	N/A
	b) 10.2: Electrical performance measurement	See table 9-b)	N/A
	c) 10.3: Ground path continuity test	See table 9-e)	N/A
	d) 10.4: Electrical insulation test	See table 9-c)	N/A
	e) 10.5: Wet insulation test	See table 9-d)	N/A
	— Tests according to this standard:		N/A



IEC 61701: 2020			
Clause	Requirement + Test	Result--Remark	Verdict
	f) By pass diode functionality test	See table 9-g)	N/A
10	Requirements		P
10.1	Crystalline silicon		P
	— After the salt mist test, no evidence of major visual defects as described in IEC 61730-2.	See table 9-a)	P
	— After the salt mist test the maximum power shall not decrease by more than 5% of the initial value;	See table 9-b)	P
	— All pass fail criteria corresponding to tests 10.15, MST 13 and MST 16 must be fulfilled.	MST16 see table 9-c) 10.15 see table 9-d) MST13 see table 9-e)	P
	— The requirement for the bypass diode functionality test must be also fulfilled.	See table 9-g)	P
10.2	Thin-film technologies		N/A
	— After the salt mist test, no evidence of major visual defects as described in IEC 61730-2.	See table 9-a)	N/A
	— After the light soaking the maximum power at STC shall not be less than 90% of the minimum value specified by the manufacturer in the marking of the PV module.	See table 9-b)	N/A
	— All pass fail criteria corresponding to tests 10.15, 10.19, MST 13 and MST 16 must be fulfilled.	MST16 see table 9-c) 10.15 see table 9-d) MST13 see table 9-e) 10.19 see table 9-f)	N/A
	— The requirement for the bypass diode functionality test must be also fulfilled.	See table 9-g)	N/A
10.3	Concentrator photovoltaic (CPV) modules		N/A
	— After the salt mist test, no evidence of major visual defects as described in IEC 62108 including also no mechanical deterioration or corrosion of test sample components which would significantly impair their function during their intended life. No significant amount of water should remain inside the test sample.	See table 9-a)	N/A
	— After the salt mist test the relative power degradation shall not exceed 7% if the I-V measurement is under outdoor natural sunlight or 5% if I-V measurement is under solar simulator.	See table 9-b)	N/A
	— All pass fail criteria corresponding to tests 10.3, 10.4 and 10.5 must be fulfilled.	10.4 see table 9-c) 10.5 see table 9-d) 10.3 see table 9-e)	N/A



IEC 61701: 2020			
Clause	Requirement + Test	Result--Remark	Verdict
	— The requirement for the bypass diode functionality test must be also fulfilled.	See table 9-g)	N/A



6-a)	TABLE: Visual inspection (Initial)		P
Test Date [MM/DD/YYYY].....:		12/18/2024	—
Sample No.	Nature and position of initial findings – comments or attach photos		Verdict
HJE-2024-346-8#	No major visual defects		P
HJE-2024-346-9#	No major visual defects		P
HJE-2024-346-10#	No major visual defects		P
Supplementary information: N/A			

6-b	TABLE: I-V characteristic Initial (Front side)					P
Test Date [MM/DD/YYYY]		12/18/2024				—
Radiant Source		☒ Solar simulator ☐ Natural Sunlight				
Module temperature [°C]		25				—
Irradiance [W/m²]		1000				—
Sample No.	Voc [V]	Isc [A]	Vmp [V]	Imp [A]	Pmp [W]	FF[%]
HJE-2024-346-8#	49.134	15.971	43.079	15.180	653.931	83.333
HJE-2024-346-9#	49.170	15.982	43.115	15.237	656.932	83.597
HJE-2024-346-10#	49.077	15.966	43.031	15.198	653.968	83.458
Supplementary information: N/A						

6-b-1)	TABLE: I-V characteristic Initial (Rear side)					P
Test Date [MM/DD/YYYY]		12/18/2024				—
Radiant Source		☒ Solar simulator ☐ Natural Sunlight				
Module temperature [°C]		25				—
Irradiance [W/m²]		1000				—
Sample No.	Voc [V]	Isc [A]	Vmp [V]	Imp [A]	Pmp [W]	FF[%]
HJE-2024-346-8#	48.631	10.981	42.262	10.195	430.845	80.679
HJE-2024-346-9#	48.650	10.908	42.292	10.102	427.217	80.505
HJE-2024-346-10#	48.564	11.016	42.227	10.237	432.278	80.799
Supplementary information: N/A						

6-b-2	TABLE: I-V characteristic Initial (BNPI)					P
Test Date [MM/DD/YYYY]		12/18/2024				—
Radiant Source		☒ Solar simulator ☐ Natural Sunlight				
Module temperature [°C]		25				—
Irradiance [W/m²]		1088-1089				—
Sample No.	Voc [V]	Isc [A]	Vmp [V]	Imp [A]	Pmp [W]	FF[%]



HJE-2024-346-8#	49.200	17.399	41.842	17.059	713.798	83.387
HJE-2024-346-9#	49.290	17.384	41.920	17.066	715.410	83.493
HJE-2024-346-10#	49.203	17.382	41.849	17.060	713.931	83.477
Supplementary information: N/A						

TABLE 1.1: MQT 19.1 ini: Initial Stabilization procedure (front)							P
Light exposure method :				☒ Simulator ☐ Natural sunlight			
Abbreviation: Regarding light source “S” for Solar simulator and “N” for Natural sunlight							
Stabilization criterion x per IEC 61215-1-x :				1			
Sample #	HJE-2024-346-8#	Test Date (YYYY-MM-DD) start/end			2024-12-18/2024-12-23		
Test cycle	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load	P _{max} (W) at the end of cycle	P _{max} – P _{min} / P _{average} (%)	Stable (Yes/No)
Initial	—	—	—	—	653.931	—	—
1	5	800-1000	50±10	3.4	653.577	—	—
2	5	800-1000	50±10	3.4	652.653	0.20	Yes
Sample #	HJE-2024-346-9#	Test Date (YYYY-MM-DD) start/end.....:			2024-12-18/2024-12-23		
Test cycle	Integrated irradiation (kWh/m2)	Irradiance (W/m2)	Module temperature (°C)	Resistive load	Pmax (W) at the end of cycle	Pmax – Pmin) / Paverage (%)	Stable (Yes/No)
Initial	—	—	—	—	656.932	—	—
1	5	800-1000	50±10	3.4	656.296	—	—
2	5	800-1000	50±10	3.4	656.335	0.10	Yes
Sample #	HJE-2024-346-10#	Test Date (YYYY-MM-DD) start/end			2024-12-18/2024-12-23		
Test cycle	Integrated irradiation (kWh/m2)	Irradiance (W/m2)	Module temperature (°C)	Resistive load	Pmax (W) at the end of cycle	Pmax – Pmin) / Paverage (%)	Stable (Yes/No)
Initial	—	—	—	—	653.968	—	—
1	5	800-1000	50±10	3.4	654.084	—	—
2	5	800-1000	50±10	3.4	652.809	0.20	Yes
Supplementary information: N/A							

TABLE 1.1: MQT 19.1 ini: Initial Stabilization procedure (rear side)					
Light exposure method.....		☒ Simulator			☐ Natural sunlight
Abbreviation: Regarding light source “S” for Solar simulator and “N” for Natural sunlight					
Stabilization criterion x per IEC 61215-1-x ...				1	
Sample #	HJE-2024-	Test Date (YYYY-MM-DD) start/end			2024-12-18/2024-12-23



	346-8#						
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	Pmax (W) at the end of cycle	Pmax – Pmin / Paverage (%)	Stable (Yes/No)
Initial	—	—	—	—		—	—
1	5	800-1000	50±10	5.4		—	—
2	5	800-1000	50±10	5.4			Yes
Sample #	HJE-2024-346-9#	Test Date (YYYY-MM-DD) start/end			2024-12-18/2024-12-23		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	Pmax (W) at the end of cycle	Pmax – Pmin / Paverage (%)	Stable (Yes/No)
Initial	—	—	—	—		—	—
1	5	800-1000	50±10	5.4		—	—
2	5	800-1000	50±10	5.4			Yes
Sample #	HJE-2024-346-10#	Test Date (YYYY-MM-DD) start/end			2024-12-18/2024-12-23		
Test cycle	Integrated irradiation (kWh/m ²)	Irradiance (W/m ²)	Module temperature (°C)	Resistive load	Pmax (W) at the end of cycle	Pmax – Pmin / Paverage (%)	Stable (Yes/No)
Initial	—	—	—	—		—	—
1	5	800-1000	50±10	5.4		—	—
2	5	800-1000	50±10	5.4			Yes
Supplementary information: N/A							

6-b-1)		TABLE: Performance at STC after initial stabilization (Front side)					P
Test Date [MM/DD/YYYY]			12/23/2024				—
Radiant Source			☒ Solar simulator			☐ Natural Sunlight	
Module temperature [°C]			25		—		
Irradiance [W/m²]			1000		—		
Sample No.		Voc [V]	Isc [A]	Vmp [V]	Imp [A]	Pmp [W]	FF[%]
HJE-2024-346-8#		49.130	15.925	43.102	15.142	652.653	83.418
HJE-2024-346-9#		49.132	15.957	43.177	15.201	656.335	83.715
HJE-2024-346-10#		49.107	15.944	43.074	15.155	652.809	83.375
Supplementary information: N/A							
6-b-1)		TABLE: I-V characteristic Initial (Rear side)					P
Test Date [MM/DD/YYYY]			12/23/2024				—
Radiant Source			☒ Solar simulator			☐ Natural Sunlight	
Module temperature [°C]			25		—		
Irradiance [W/m²]			1000		—		



Sample No.	Voc [V]	Isc [A]	Vmp [V]	Imp [A]	Pmp [W]	FF[%]
HJE-2024-346-8#	48.630	10.963	42.282	10.176	430.257	80.701
HJE-2024-346-9#	48.620	10.896	42.253	10.124	427.779	80.751
HJE-2024-346-10#	48.604	11.001	42.264	10.222	432.008	80.794

Supplementary information: N/A

6-b-1)	TABLE: I-V characteristic Initial (BNPI)					P
Test Date [MM/DD/YYYY]		12/23/2024				—
Radiant Source		☒ Solar simulator ☐ Natural Sunlight				
Module temperature [°C]		25				—
Irradiance [W/m²]		1088-1089				—
Sample No.	Voc [V]	Isc [A]	Vmp [V]	Imp [A]	Pmp [W]	FF[%]
HJE-2024-346-8#	49.245	17.340	41.896	17.009	712.603	83.453
HJE-2024-346-9#	49.244	17.356	41.895	17.038	713.794	83.517
HJE-2024-346-10#	49.222	17.358	41.881	17.021	712.874	83.436

Supplementary information: N/A

6-c)	Table: Insulation test (Initial)				P
Test Date [YYYY-MM-DD]		12/23/2024			—
Test Voltage applied [V]		8000/1500			—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
HJE-2024-346-8#	18900	>14.81	No dielectric breakdown	X	P
HJE-2024-346-9#	19100	>14.81	No dielectric breakdown	X	P
HJE-2024-346-10#	17300	>14.81	No dielectric breakdown	X	P

Supplementary information: Size of module [m²]: 2.70

6-d)	TABLE: Wet leakage current test (Initial)			P
Test Date [MM/DD/YYYY]		12/23/2024		—
Test voltage applied [V]		1500		—
Solution temperature [°C] :		21.8		—
Solution resistivity [Ω cm] :		2451		—
Sample No.	Measured [MΩ]		Limit [MΩ]	Result



HJE-2024-346-8#	13800	>14.81	P
HJE-2024-346-9#	12900	>14.81	P
HJE-2024-346-10#	13200	>14.81	P
Supplementary information: Size of module [m²]:2.70			

6-e)	MST 13 – Continuity test of equipotential bonding (Initial)			P
	Maximum over-current protection rating (A)	35		
	Current applied (A)	87.5		
	Location of designated grounding point	Grounding point of the long edge		
	Location of second contacting point	Grounding point of the opposite side		
Sample No.	Position in test sequence:	Voltage (V)	Resistance (Ω)	
HJE-2024-346-8#	Initial examination	/	0.002	P
HJE-2024-346-9#	Initial examination	/	0.002	P
HJE-2024-346-10#	Initial examination	/	0.002	P
Supplementary information: N/A				

7	TABLE: Salt mist corrosion test			P
Test method.....:	Test method 8			—
Test cycle sequence.....:	Test method (1, 2, 3,4, 5, 6)	Step 1	Salt mist duration (hour): N/A	
		Step 2	Humid storage (hour): N/A	
		Repeat step 1 and 2	Repeat times: N/A	
		Step 3	Subsequent drying at room temperature (day): N/A	
	Test method (7, 8)	Step 1	Salt mist duration (hour): 2	
		Step 2	Drying condition (hour):4	
		Step 3	Humid Condition (hour)2	
Total duration of one cycle (day)..... :		1/3		—
Number of cycles		180		
Test duration (day).....:		60		
Salt mist temperature(°C)		35±2		—
Salt solution concentration (% by weight).....:		5		
Salt solution PH value.....:		3.5		



Humid storage temperature (°C)	50±2	—
relative humidity (%).....	95	
Drying temperature (°C).....	60±2	—
relative humidity (%).....	30	
Supplementary information: Salt mist test based on IEC 60068-2-52:2017. Test samples are HA2024TL-1069-002X~HA2024TL-1069-003X		
Test duration is from 2025-01-03/2025-03-04		

9-a)	TABLE: Visual inspection (final)		P
Test Date [MM/DD/YYYY].....	03/05/2025		—
Sample No.	Nature and position of initial findings – comments or attach photos	Verdict	
HJE-2024-346-8#	No major visual defects	P	
HJE-2024-346-9#	No major visual defects	P	
HJE-2024-346-10#	No major visual defects	P	
Supplementary information: N/A			

9-b)	TABLE: Maximum power determination (final)						P
Test Date [MM/DD/YYYY] start-end	03/05/2025						—
Module temperature [°C] low-high	25						—
Irradiance [W/m2] low-high.....	1000						—
Sample #	Voc [V]	Isc [A]	Vmp [V]	Imp [A]	Pmp [W]	Degradation [%]	FF[%]
HJE-2024-346-8#	49.129	15.923	42.984	15.185	652.698	-0.01%	83.434
Rear	48.630	10.961	42.648	10.089	430.275	0.00%	80.720
BNPI	49.234	17.350	41.785	17.048	712.335	0.04%	83.392
HJE-2024-346-9#	49.158	15.810	43.114	15.106	651.259	0.77%	83.795
Rear	48.635	10.992	42.076	10.105	425.180	0.61%	79.535
BNPI	49.278	17.192	41.914	16.879	707.439	0.89%	83.503
HJE-2024-346-10#	49.078	15.848	43.078	15.036	647.744	0.78%	83.281
Rear	48.573	11.021	42.178	10.187	429.646	0.55%	80.258
BNPI	49.198	17.270	41.888	16.884	707.225	0.79%	83.239
Supplementary information: N/A							

9-c)	Table: Insulation test (final)				P
Test Date [MM/DD/YYYY]	03/05/2025				—
Test Voltage applied [V]	8000/1500				—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	



HJE-2024-346-8#	17300	>14.81	No dielectric breakdown	X	P
HJE-2024-346-9#	18300	>14.81	No dielectric breakdown	X	P
HJE-2024-346-10#	17600	>14.81	No dielectric breakdown	X	P
Supplementary information: Supplementary information: Size of module [m²]: 2.70.					

9-d)	TABLE: Wet leakage current test (final)			P
Test Date [MM/DD/YYYY].....:		03/05/2025		—
Test voltage applied [V]		1500		—
Module maximum system voltage rating (V, DC)..... :		1500		—
Solution resistivity [Ω cm], < 3,500 Ω cm at 22 $\pm$ 3 $^{\circ}$ C..... :		2438 at 21.9		—
Sample No.	Measured [$M\Omega$]		Limit [$M\Omega$]	Verdict
HJE-2024-346-8#	15900		>14.81	P
HJE-2024-346-9#	15500		>14.81	P
HJE-2024-346-10#	15000		>14.81	P
Supplementary information: Size of module 2.70 [m ²]				

9-e)	TABLE: MST 13 – ground continuity test (final)				P	
	Maximum over-current protection rating (A):		35		—	
	Current applied (A) :		87.5			
	Location of designated grounding point.....:		Indicate in supplementary information		—	
	Location of second contacting point.....:		Indicate in supplementary information		—	
Sample No.		Position in test sequence:		Voltage (V)	Resistance (mΩ)	Result
HJE-2024-346-8#		Initial examination		/	0.002	P
HJE-2024-346-9#		Initial examination		/	0.002	P
HJE-2024-346-10#		Initial examination		/	0.003	P
Supplementary information:						

9-f)		TABLE: Light soaking						N/A	
Abbreviation: Regarding light source “S” for Solar simulator and “N” for Natural sunlight									
Sample #				Test Date (MM/DD/YYYY) start/end					
Test cycle	Light source	Irradiance applied (kWh/m2)	Average irradiance (W/m2)	Module temperature during test (°C)			Pmp(W) at the end of cycle	Change in Pmp in the cycle (%)	
				min	max	avg			
Initial	—	—	—	—	—	—		—	
								N/A	
								N/A	



Supplementary information:								
Sample #		Test Date (MM/DD/YYYY) start/end						
Test cycle	Light source	Irradiance applied (kWh/m2)	Average irradiance (W/m2)	Module temperature during test (°C)			Pmp(W) at the end of cycle	Change in Pmp in the cycle (%)
				min	max	avg		
Initial	—	—	—	—	—	—		—
								N/A
								N/A
Supplementary information:								

9-g)	TABLE: Bypass diode functionality test after bypass diode thermal test- MQT 18.2				P
Test Date [YYYY-MM-DD] :			2025-03-05		—
☐ Method A					—
Ambient temperature [°C]:			—		—
Current flow applied [A]:			—		—
Sample #	VFM	VFMrated	VFM = (N × VFMrated) ± 10 %		Result
—	—	—	☐ Yes ☐ No		—
—	—	—	☐ Yes ☐ No		—
Supplementary information: N/A					
☒ Method B					—
Sample #	Diode		IV curve after shading		Result
HJE-2024-346-9#	Diode 1		Diode turn on		P
	Diode 2		Diode turn on		P
	Diode 3		Diode turn on		P
HJE-2024-346-10#	Diode 1		Diode turn on		P
	Diode 2		Diode turn on		P
	Diode 3		Diode turn on		P
Supplementary information: N/A					



Annex 1: List of measurement equipment

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
1	Visual inspection	Lux meter HJE-013	/	2024/12/06	2025/12/05
		Digital thermohygrometer HJE-036	/	2024/12/03	2025/12/02
2	Maximum power determination	infrared thermometer gun HJE-009	/	2024/06/11	2025/06/10
		Transient simulator HJE-028	A+A+A+	2024/10/22	2025/10/21
3	Insulation test	Insulation withstand voltage tester HJE-004	/	2024/12/03	2025/12/02
				2024/12/24	2025/12/23 (两个证书)
4	Continuity Test of Equipotential Bonding	Ground Continuity Tester HJE-067	/	2024.06.17	2025.06.16
5	Salt mist corrosion testing	Salt spray test chamber HJE-027	/	2024/12/03	2025/12/02
6	Wet leakage current test	Conductivity meter HJE-018	/	2024/12/03	2025/12/02
		Wet leakage test system HJE-003	/	2024/12/03	2025/12/02
		Insulation withstand voltage tester HJE-004	/	2024/12/03	2025/12/02
				2024/12/24	2025/12/23 (两个证书)
7	Initial Stabilization	Automatic weather station HJE-060	/	2024/2/16	2025/2/15
		3C aging box HJE-081	/	2023/12/27	2024/12/26
8	Bypass diode functionality test	Transient simulator HJE-028	A+A+A+	2024/10/22	2025/10/21



Annex 2: Statement of the estimated uncertainty of the test results (K=2)

$P_{\max}$ measurement uncertainty: 2.0%
 V_{oc} measurement uncertainty: 0.8%
 I_{sc} measurement uncertainty: 2.0%

Annex 3: Photos of samples



END OF REPORT