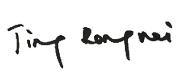
TEST REPORT
IEC 61730:2023
TUV SUD Test report for PV Module Safety Qualification – Part 1: Requirements for construction and Part 2: Requirements for testing

Report No.: Date of issue: Project handler:	704062316712-01 part 2 of 2 October 28, 2024 Rongwei Jing
Testing laboratory: Address: Testing location:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch No. 151 Heng Tong Road, Shanghai 200070, P. R. China Yangzhou Opto-Electrical Products Testing Institute No. 10 West Kaifa Road, Yangzhou, 225009 Jiangsu, P. R. China
Client: Client number: Address:	Q-SUN Anhui Co., Ltd. 104991 West of Jingliu Road, North of Weisan Road, 239300 Tianchang City, Anhui Province, PEOPLE'S REPUBLIC OF CHINA
Standard:	This TUV SUD test report form is based on the following requirements: IEC 61730-2:2023 in conjunction with IEC 61730-1:2023
TRF number and revision*:*	TRF IEC 61730:2023 Rev.4:2024
Copyright blank test report:	
General disclaimer:	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 TUV SUD Product Service. TUV SUD 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. This report is the result of a single examination of the object in question and is not generally applicable evaluation of the quality of other products in regular production.
Scheme:	☒ TUV Mark ☐ without certification ☐ AoC/CoC for EU-Directive / EU-Regulation: ☐ GS Mark ☐ NRTL Mark ☐ other:
Non-standard test method: National deviations:	☒ No ☐ Yes, see details under *Summary of testing* N/A
Number of pages *(Report)*:	75

Compiled by: (+ signature)	Rongwei Jing 	Approved by: (+ signature)	Ning Tang 

Test sample: Trademark:	Photovoltaic (PV) Module(s) QSUN solar
Model/Type reference:	QN-720HT-01, QN-615HT-05, QN-650HT-06 (representative testing models)
Rating(s):	refer to pages 8~11
Manufacturer: Manufacturer number: Address:	Q-SUN Anhui Co., Ltd. 104991 West of Jingliu Road, North of Weisan Road, 239300 Tianchang City, Anhui Province, PEOPLE'S REPUBLIC OF CHINA

Name and address of factory(ies)

1. Q-SUN Anhui Co., Ltd.
West of Jingliu Road, North of Weisan Road, 239300 Tianchang City, Anhui Province, PEOPLE'S REPUBLIC OF CHINA
Factory No.: 104991

2. Q-SUN Jiangsu Co., Ltd.
Fengfu No. 4 Road, Precision Manufacting Industrial Park, 224200 DongTai City, Jiangsu Province, PEOPLE'S REPUBLIC OF CHINA
Factory No.: 118795

Order description:	☒ Complete test according to TRF
	☐ Partial test according to manufacturer's specifications
	☐ Preliminary test
	☐ Spot check
	☐ Others:

Date of order:	October 17, 2024
Date of receipt of test item:	October 12, 2024
Date(s) of performance of test:	October 21, 2024 to October 23, 2024

Test item particulars:

See below for details

Characteristic data *(not shown on the marking plate)*:

N/A

Attachments:

Annex 1: List of test equipment used

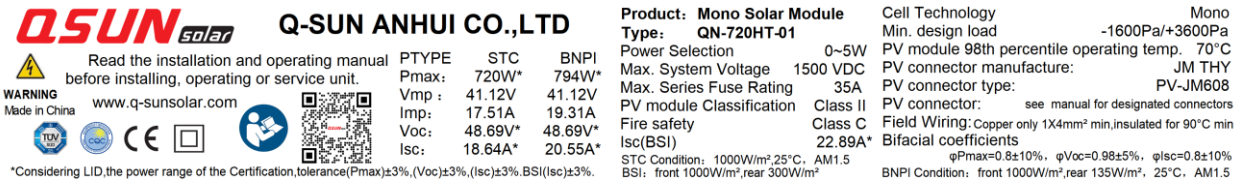
Annex 2: PRODUCT DESCRIPTION SHEET (MANUFACTURERS AND TYPE REFERENCES)

Annex 3: DRAWINGS AND CIRCUITS

If additional information is necessary, please provide

N/A

Copy of marking plate:



Summary of testing:

Based on previous project 704062316712-00, following modifications were included:
1. Extended the power range and updated the ratings for below model families (within 10%):
QN-xxxHT-01, xxx = 670 to 720 in steps of 5;
QN-xxxHT-01, xxx = 610 to 655 in steps of 5;
QN-xxxHT-05, xxx = 570 to 615 in steps of 5;
QN-xxxHT-05, xxx = 520 to 565 in steps of 5;
QN-xxxHT-05, xxx = 470 to 515 in steps of 5;
QN-xxxHT-05, xxx = 425 to 460 in steps of 5;
QN-xxxHT-06, xxx = 605 to 650 in steps of 5;
QN-xxxHT-06, xxx = 555 to 600 in steps of 5;
QN-xxxHT-06, xxx = 510 to 550 in steps of 5;
QN-xxxHT-06, xxx = 465 to 500 in steps of 5;
QN-xxxHT-06, xxx = 415 to 450 in steps of 5;
QN-xxxHT-06, xxx = 370 to 400 in steps of 5;
Gate No. 1 verification was performed in IEC 61215 TRF 704062316712-01 part 1 of 2.
Construction check was conducted according to IEC 61730-1:2023.

☐ deviation(s) found

☒ no deviations found

Additional information on non-standard test method(s)

Sub clause:	N/A
Page:	N/A
Rational:	N/A

Possible test case verdicts:

test case does not apply to the test object:	N/A (not applicable / not included in the order)
test object does meet the requirement:	P (Pass)
test object does not meet the requirement:	F (Fail)

General remarks:

"(see remark #)" refers to a remark appended to the report.
"(see appended table)" refers to a table appended to the report.
Throughout this report **a comma** is used as the decimal separator.
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 testing laboratory.

Use of uncertainty of measurement for decisions on conformity (decision rule) :

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other: … (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:
The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.
IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.
Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

Test item particulars ..... :	N/A
Accessories and detachable parts included in the evaluation ..... :	
Mounting system used ..... :	Refer to user manual
Other options 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:	
Pmax – Maximum power	HF – Humidity Freeze
Vmp – Maximum power voltage	DH – Damp Heat
Imp – Maximum power current	TC – Thermal Cycling
Isc – Short circuit current	α – Current temperature coefficient
Voc – Open circuit voltage	β – Voltage temperature coefficient
FF – Fill factor	δ – power temperature coefficient
STC – Standard Test Conditions (25°C, 1 000 W/m²)	
VFM – Measured diode(s) forward voltage	VFMrated – Rated diode(s) forward voltage
MQT – Module Quality Tests	NP – Nameplate
m_1 – the measurement uncertainty in % of laboratory for Pmax	m_2 – the measurement uncertainty in % of laboratory for Voc
m_3 – the measurement uncertainty in % of laboratory for Isc	t_1 – the manufacturer's rated lower production tolerance in % for Pmax
t_2 – the manufacturer's rated upper production tolerance in % for Voc	t_3 – the manufacturer's rated upper production tolerance in % for Isc
r – Pmax measurement reproducibility	
BNPI – Bifacial nameplate irradiance	BSI – Bifacial stress irradiance
G_{BNPI} – Equivalent bifacial nameplate irradiance	aBSI – Applied bifacial stress irradiance
φ – Bifaciality refers to the ratios between the main I-V characteristics of the rear side and the front side of a bifacial device, typically at Standard Test Conditions (STC) unless otherwise specified. It is quantified with reference to bifaciality coefficients, namely as φ.	
φ_{Pmax} – Maximum power bifaciality coefficient	φ_{Voc} – Open-circuit voltage bifaciality coefficient
φ_{Isc} – Short-circuit current bifaciality coefficient	
Testing Dates [YYYY-MM-DD]	
Date of first test item received ..... :	2024-10-12
Dates of tests (beginning/end) ..... :	2024-10-21 to 2024-10-23

General remarks:	
"(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 ☐ comma / ☒ point is used as the decimal separator.** The originator of this TRF acknowledges the contribution of CTL ETF-9, UL LLC, and VDE in creation of this TRF.	
Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... :	☐ Yes ☒ Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (factories).....:	Refer to page 2

Product Electrical Ratings:				
Module type	QN-715HT-01	QN-720HT-01	QN-650HT-01	QN-655HT-01
Voc [V] /Tolerance	48.60±3%	48.69±3%	44.47±3%	44.52±3%
Vmp [V]	40.95	41.12	37.27	37.45
Imp [A]	17.46	17.51	17.44	17.49
Isc [A] /Tolerance	18.58±3%	18.64±3%	18.46±3%	18.52±3%
Pmp [W] /Tolerance	715± 3%	720± 3%	650.00±3%	655±3%
Maximum system voltage [V]	1500	1500	1500	1500
Maximum Over-Current Protection Rating [A]	35	35	35	35
Module type	QN-605HT-05	QN-610HT-05	QN-615HT-05	QN-555HT-05
Voc [V] /Tolerance	52.31±3%	52.40±3%	52.49±3%	48.29±3%
Vmp [V]	44.32	44.53	44.73	40.72
Imp [A]	13.65	13.70	13.75	13.63
Isc [A] /Tolerance	14.60±3%	14.66±3%	14.72±3%	14.50±3%
Pmp [W] /Tolerance	605±3%	610±3%	615±3%	555±3%
Maximum system voltage [V]	1500	1500	1500	1500
Maximum Over-Current Protection Rating [A]	30	30	30	30
Module type	QN-560HT-05	QN-565HT-05	QN-505HT-05	QN-510HT-05
Voc [V] /Tolerance	48.47±3%	48.65±3%	44.21±3%	44.43±3%
Vmp [V]	40.94	41.15	37.11	37.34
Imp [A]	13.68	13.73	13.61	13.66
Isc [A] /Tolerance	14.56±3%	14.62±3%	14.40±3%	14.46±3%

Pmp [W] /Tolerance	560±3%	565±3%	505±3%	510±3%
Maximum system voltage [V]	1500	1500	1500	1500
Maximum Over-Current Protection Rating [A]	30	30	30	30
Module type	QN-515HT-05	QN-455HT-05	QN-460HT-05	QN-640HT-06
Voc [V] /Tolerance	44.65±3%	40.08±3%	40.37±3%	56.33±3%
Vmp [V]	37.56	33.48	33.72	47.98
Imp [A]	13.71	13.59	13.64	13.34
Isc [A] /Tolerance	14.52±3%	14.30±3%	14.36±3%	14.34±3%
Pmp [W] /Tolerance	515±3%	455±3%	460±3%	640±3%
Maximum system voltage [V]	1500	1500	1500	1500
Maximum Over-Current Protection Rating [A]	30	30	30	30
Module type	QN-645HT-06	QN-650HT-06	QN-555HT-06	QN-560HT-06
Voc [V] /Tolerance	56.44±3%	56.52±3%	50.62±3%	50.86±3%
Vmp [V]	48.17	48.36	42.86	43.08
Imp [A]	13.39	13.44	12.95	13.00
Isc [A] /Tolerance	14.40±3%	14.46±3%	13.82±3%	13.88±3%
Pmp [W] /Tolerance	645±3%	650±3%	555±3%	560±3%
Maximum system voltage [V]	1500	1500	1500	1500
Maximum Over-Current Protection Rating [A]	30	30	30	30
Module type	QN-565HT-06	QN-570HT-06	QN-575HT-06	QN-580HT-06

Voc [V] /Tolerance	51.13±3%	51.41±3%	51.63±3%	51.86±3%
Vmp [V]	43.30	43.51	43.73	43.91
Imp [A]	13.05	13.10	13.15	13.20
Isc [A] /Tolerance	13.94±3%	13.99±3%	14.05±3%	14.11±3%
Pmp [W] /Tolerance	565±3%	570±3%	575±3%	580±3%
Maximum system voltage [V]	1500	1500	1500	1500
Module type	QN-585HT-06	QN-590HT-06	QN-595HT-06	QN-600HT-06
Voc [V] /Tolerance	52.10±3%	52.31±3%	52.40±3%	52.55±3%
Vmp [V]	44.15	44.36	44.57	44.78
Imp [A]	13.25	13.30	13.35	13.40
Isc [A] /Tolerance	14.17±3%	14.23±3%	14.28±3%	14.34±3%
Pmp [W] /Tolerance	585±3%	590±3%	595±3%	600±3%
Maximum system voltage [V]	1500	1500	1500	1500
Module type	QN-540HT-06	QN-545HT-06	QN-550HT-06	QN-490HT-06
Voc [V] /Tolerance	48.37±3%	48.54±3%	48.72±3%	44.33±3%
Vmp [V]	40.82	41.04	41.26	37.18
Imp [A]	13.23	13.28	13.33	13.18
Isc [A] /Tolerance	14.08±3%	14.14±3%	14.19±3%	13.95±3%
Pmp [W] /Tolerance	540±3%	545±3%	550±3%	490±3%
Maximum system voltage [V]	1500	1500	1500	1500
Module type	QN-495HT-06	QN-500HT-06	QN-445HT-06	QN-450HT-06
Voc [V] /Tolerance	44.52±3%	44.71±3%	40.39±3%	40.68±3%

Vmp [V]	37.41	37.65	33.74	33.99
Imp [A]	13.23	13.28	13.19	13.24
Isc [A] /Tolerance	14.01±3%	14.06±3%	13.89±3%	13.95±3%
Pmp [W] /Tolerance	495±3%	500±3%	445±3%	450±3%
Maximum system voltage [V]	1500	1500	1500	1500
Module type	QN-395HT-06	QN-400HT-06	-	
Voc [V] /Tolerance	36.15±3%	36.41±3%	-	
Vmp [V]	29.99	30.26	-	
Imp [A]	13.17	13.22	-	
Isc [A] /Tolerance	13.79±3%	13.85±3%	-	
Pmp [W] /Tolerance	395±3%	400±3%	-	
Maximum system voltage [V]	1500	1500	-	
Maximum Over-Current Protection Rating [A]	30	30	-	
Remarks: N/A				

Product Safety Ratings		
Maximum systems voltage (Vsys) :	1500	V
Maximum over-current protection rating :	35/30	A
Class in accordance with IEC 61140 :	See clause 5.1	
Intended use (list details) :	See clause 5.5	
The modules are intended for a maximum operating altitude [meters above sea level] of :	≤ 2000	m
Recommended maximum series/parallel module configurations :	Refer to manual document	

General product information:

Modifications:

☐ Initial module design qualification

☒ Extension of module design qualification

☒ Original test report ref. no. : 704062316712-00

Model differences and modification:

☒ Test programs for WBT PV modules (including c-Si)

- ☐ 4.2.1 Modification to frontsheet
- ☐ 4.2.2 Modification to encapsulation system
- ☐ 4.2.3 Modification to cell technology (specific to wafer-based technologies (WBT))
- ☐ 4.2.4 Modification to cell and string interconnect material (specific to WBT)
- ☐ 4.2.5 Modification to backsheet
- ☐ 4.2.6 Modification to electrical termination
- ☐ 4.2.7 Modification to bypass diode
- ☐ 4.2.8 Modification to electrical circuitry (specific to WBT)
- ☐ 4.2.9 Modification to edge sealing
- ☐ 4.2.10 Modification to frame and/or mounting structure
- ☐ 4.2.11 Change in PV module size
- ☐ 4.2.12 Higher or lower output power with the identical design and size and using the identical cell process
- ☐ 4.2.13 Increase of over-current protection rating
- ☐ 4.2.14 Increase of system voltage by more than 5%
- ☐ 4.2.15 Change in cell fixing or internal insulation tape (specific to WBT)
- ☒ Others (see summary of testing)

☐ Test programs for MLI thin-film PV modules

- ☐ 4.3.1 Modification to frontsheet
- ☐ 4.3.2 Modification to encapsulation system
- ☐ 4.3.3 Modification to front contact (e. g. TCO)
- ☐ 4.3.4 Modification to cell technology
- ☐ 4.3.5 Modification to cell layout
- ☐ 4.3.6 Modification to back contact
- ☐ 4.3.7 Modification to edge deletion
- ☐ 4.3.8 Modification to interconnect material or technique
- ☐ 4.3.9 Modification to backsheet
- ☐ 4.3.10 Modification to electrical termination
- ☐ 4.3.11 Modification to bypass diode
- ☐ 4.3.12 Modification to edge sealing
- ☐ 4.3.13 Modification to frame and/or mounting structure
- ☐ 4.3.14 Change in PV module size
- ☐ 4.3.15 Higher or lower output power with the identical design and size
- ☐ 4.3.16 Increase of over-current protection rating

	☐ 4.3.17 Increase of system voltage ☐ 4.3.18 Change in labe material (external nameplate label) ☐ 4.3.19 Change from monofacial to bifacial module ☐ 4.3.20 Changes to module operating temperature ☐ 4.3.21 Changes affecting compatibility with variants of the same model ☐ 4.3.22 Changes to documentation
NOTE: The clause references for modifications are excerpted from IEC TS 62915	

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

6 SAMPLING			
	☒ The modules tested (modules and laminate) were taken at random from a production batch and subjected to manufacturer's normal quality control and inspection for safety testing		P
	☐ The modules tested (modules and laminate) were prototypes of a new design and not taken from a production batch.		N/A
	☒ Preconditioning of test samples was performed within IEC 61215 performance testing		P
	☐ Preconditioning of test samples was performed separately from IEC 61215 performance testing		N/A
Supplementary information:			

Module group assignment:				
Sample #	Sample Group ID	Type/model	Sample S/N	Remark
-	-	-	-	-
Remarks: N/A				

Note (1) Use the "General product information" field to give any information on model differences within a product type family covered by the test report and describe the range of electrical and safety ratings, if the TRF covers a type family of modules.

Note (2) Use Annex 2 to list the used materials and components of the module (manufacturer/supplier and type reference)

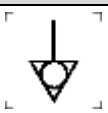
Note (3) The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3 of IEC 62915

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

IEC 61730 PART 1: REQUIREMENTS FOR CONSTRUCTION

5 Classification, applications and intended use			
5.1 General			
	The module has been evaluated for the following Class (IEC 61140) ……:	☐ Class 0 ☒ Class II ☐ Class III	—
5.5 Rating categories and special applications			
	PV modules are installed in the following special applications:		—
	Building attached PV (BAPV)	☒ yes ☐ no	—
	Building integrated PV (BIPV)	☐ yes ☒ no	—
	Applications in areas where snow and / or wind load exceeding loads as tested in IEC 61730-2	☐ yes ☒ no	—
	other (please specify)	☐ yes, as follows: ☒ no	—
6 Requirements for design and construction			
6.1 General			—
	PV module suitable for operation in unprotected outdoor locations, exposed to direct and indirect (albedo) solar radiation and up to 100 % relative humidity as well as to rain.		P
	Product shipped from the factory as	☒ completely assembled ☐ subassemblies	—
	The provided assemblies of the product do not involve any action that is likely to affect compliance with the requirements of the IEC 61730 series.		N/A
	Incorporation of a PV module into the final assembly does not require any alteration of the PV module from its originally evaluated form.		N/A
	Equipotential bonding continuity is not interrupted by installation		P
	Any adjustable or movable structural part is provided with a locking device		N/A
	PV modules have no accessible burrs, sharp edges or sharp points	See Table 42	P
	Parts are prevented from loosening or turning	See Table 44 and 45	P
6.2 Marking and documentation			
6.2.1	Instructions related to safety are in an official language of the country where the equipment is to be installed.	In English	P

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
6.2.2 Marking			
6.2.2.1 General			
	Each PV module includes the following clear and indelible markings:		—
	a) Name, registered trade name, or registered trade mark of manufacturer	QSUN Solar (logo)	P
	b) Type or model number designation	Marked on label	P
	c) Serial number	Provided under superstrate near the top rail of frame	P
	d) Date and place of manufacture; alternatively serial number assuring traceability of date and place of manufacture	serial number allowing to trace the date and place of manufacture	P
	e) "Maximum system voltage" or "V_{sys}"	1500V DC	P
	f) Class of protection against electrical shock, in accordance with Clause 5 of IEC 61730-1:2023	Class II	P
	g) "Voltage at open-circuit" or "V_{OC}" including manufacturing tolerances. For bifacial modules, open-circuit voltage is reported at two irradiance levels as defined in IEC 61215-1.	Marked on label	P
	h) "Current at short-circuit" or "I_{SC}" including manufacturing tolerances. For bifacial PV modules, short-circuit current is reported at STC, BNPI and aBSI.	Marked on label	P
	i) "PV module maximum power" or "P_{max}" including manufacturing tolerances. For bifacial modules, P_{max} is reported at two irradiance levels as defined in IEC 61215-1	Marked on label	P
	j) For bifacial PV modules, clear indication of the front side, or if both are designed for prolonged exposure to direct sunlight (> 300 W/m^2)		P
	k) For flexible modules, the minimum radius of curvature		N/A
	l) Positive ("+" or downward) and negative ("−" or upward) design load ratings in pascal (Pa) excluding the test load safety factor, as verified in the static mechanical load test (MST 34)		P
	m) Maximum overcurrent protection rating	See Table 31	P
	n) A module temperature rating of 70 °C, (or if tested to IEC TS 63126 Level1 or Level 2, 80 °C or 90°C)	70 °C	P
	o) Connector manufacturer and model used; refer to manual for designated mating connectors		P
	p) a link (website or QR code) to required documentation if a paper copy of the documentation required is not included with the module		P

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Compliance of the nameplate is verified according to the visual inspection (MST 01) and the durability of markings (MST 05) of IEC 61730-2.	See Table 41	P
	International symbols are used where applicable.		P
	PV connectors or wiring are marked in accordance to IEC 62852 with a symbol ”Do not disconnect under load”.		P
	Symbol or warning notice are imprinted or labelled close to connector		P
	PV connectors are clearly marked indicating the terminal polarity.		P
	For Class II and Class 0 PV modules, the  (IEC 60417-6042: Caution, risk of electric shock) symbol is applied near the PV module electrical connection means.		P
	PV modules are marked to indicate the class	☒ class II:  ☐ class III:  ☐ class 0: no symbol	P
	PV modules provided with a functional earth connection (see section 6.2.2.2.2)		—
	PV modules with terminals for field wiring rated only for use with copper wire are marked, at or adjacent to the terminals, with the statement "Use copper wire only", "Cu only", or the equivalent.		N/A
	PV modules with terminals for field wiring rated only for use with a different specific wiring material are marked with a similar statement referring to the rated material.		N/A
6.2.2.2 Symbols			
6.2.2.2.1 Equipotential bonding			
	Bonding conductor for equipotential bonding is identified with:	☒  ; ☐ 	P
	No other terminal or location is identified in this manner		P
6.2.2.2.2 Functional earthing			
	Field installed functional earthing conductor is identified with the symbol:		N/A
6.2.3 Documentation			
6.2.3.1 General			
	Documentation describing electrical and mechanical installation is provided.		P

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The documentation states the class for protection against electrical shock under which the PV module was qualified and any specific limitations required for that class.		P
	The documentation assures that installers and operators receive appropriate and sufficient instructions for safe installation, use and maintenance of the PV modules that it accompanies.		P
	The documentation is supplied in at least one of the official languages of the country where the PV modules will be installed.		P
	Assembly instructions are provided with a product shipped in subassemblies, and are detailed and adequate to the degree required to facilitate complete and safe assembly of the product..		P
	Documentation is provided in paper form in each shipping unit or as an electronic link.		—
	– The web address is marked on the device or provided in an information sheet enclosed with each shipping unit.		P
	– The web address is in the form of a Uniform Resource Locator (URL – http://www.___.com/___/), or a Quick Response Code (QRcode).		P
	– The web address link takes the user to an internet page containing the required information or a direct link to the required information.		P
	– The file is in a file format that is commonly used and is downloadable.		P
	The needs for maintaining and supporting information during the life cycle of the supported product is taken into account when planning the preparation of information for use as in IEC/IEEE 82079-1.		P
	The documentation contains the following information:		—
	– Name, registered trade name, or registered trade mark of manufacturer		P
	– Type or model number designation		P
	– “Maximum system voltage” or ”V_{sys}”		P
	– Class of protection against electrical shock		P
	– “Voltage at open-circuit” or “V_{OC}” including manufacturing tolerances. For bifacial modules, open-circuit voltage is reported at two irradiance levels as defined in IEC 61215-1.		P
	– “Current at short-circuit” or “I_{SC}” including manufacturing tolerances. For bifacial PV modules, short-circuit current is reported at STC, BNPI and aBSI.		P

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
	– “PV module maximum power” or “P_{max}” including manufacturing tolerances. For bifacial modules, P_{max} is reported at two irradiance levels as defined in IEC 61215-1		P
	– For bifacial PV modules, clear indication of the front side, or if both are designed for prolonged exposure to direct sunlight (> 300 W/m^2)		P
	– For flexible modules, the minimum radius of curvature		N/A
	– Positive ("+" or downward) and negative ("−" or upward) design load ratings in pascal (Pa) excluding the test load safety factor, as verified in the static mechanical load test (MST 34)		P
	– Maximum overcurrent protection rating	See Table 31	P
	– A module temperature rating of 70 °C, (or if tested to IEC TS 63126 Level1 or Level 2, 80 °C or 90°C)	70 °C	P
	– Connector manufacturer and model used; refer to manual for designated mating connectors		P
	– a link (website or QR code) to required documentation if a paper copy of the documentation required is not included with the module		P
	– Recommended maximum series / parallel PV module configurations		P
	– Temperature coefficient for voltage at open-circuit		P
	– Temperature coefficient for maximum power		P
	– Temperature coefficient for short-circuit current		P
6.2.3.2 Suitable environmental and mounting conditions			
	The documentation states the environmental and mounting conditions for which the module has been qualified, including:		—
	The maximum rated altitude the PV module is designed for:	[2000] m	P
	Indication of the negative (upward) and positive (downward) design load ratings during the static mechanical load test according to MST 34		P
	For bifacial PV modules, the exposure side meets the following requirements:		P
	– Clear indication of which side(s) of the module have been tested for the front side exposure		P
	– The back side is restricted for use with indirect or limited direct sunlight (less than 300 W/m^2) unless tested as a front side		P

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
	– Each side meets the requirements for front side if both sides of a module are intended for use with prolonged exposure to direct sunlight (>300 W/m²)		N/A
	Temperature range from a lower limit of environmental temperature of −40 °C to the upper limit set by a 98th percentile module operating temperature of 70 °C, (80 °C or 90 °C if tested to Level 1 or Level 2 conditions as described in IEC TS 63126)		P
	Guidance on geographic areas, mounting conditions and system design and installation factors where the anticipated 98th percentile module operating temperature will be greater than 70 °C (or 80°C or 90°C if tested to Level 1 or Level 2 conditions)		P
	Factors that can increase voltage or current beyond the STC values are given in the documentation, including the following or equivalent statements:		P
	– "A photovoltaic module is likely to experience conditions that produce higher current and/or voltage than reported at standard test conditions. Factors to consider include module temperature and front side irradiance (and, for bifacial modules, ground or roof albedo, row spacing, and installation height). Accordingly, the values of V_{OC} and I_{SC} (or for bifacial modules, $I_{SC\text{-}aBSI}$) marked on this PV module should be multiplied by a factor of 1,25 when determining voltage and current ratings for components connected to the PV output."		P
	– "The safety factor of 1,25 given for the minimum voltage rating of the components in the example statement above may be modified during the design of a system according to the minimum temperature of the location of the installation and the temperature coefficient for V_{OC}. The safety factor of 1,25 given for conductor current ratings values for I_{SC} (or for bifacial modules, $I_{SC\text{-}aBSI}$) may be adjusted based on the maximum values of irradiance incident on the front side of the module (and the rear side for bifacial modules). To this purpose, a full simulation for the specific location and module orientation (and for bifacial modules, ground albedo, row spacing and installation height) is required. Further guidance for the choice of a safety factor other than 1,25 is given in IEC 62548."		P

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
	A statement advising that artificially concentrated sunlight producing a PV module's current above the value reported on the nameplate shall not be directed onto the front side or the back side of the PV module.		P
	Evaluation of the following standards:		P
	– IEC 61701	Test method 6	P
	– IEC 62716	crystalline Si	P
	– IEC 62109-3 (MIE Type A or B)		N/A
	– IEC TS 63126 (temperature Level 1 or 2)		N/A
6.2.3.3 Mounting			
	The documentation includes adequate information and instructions for each mounting methods listed in the manufacturer's mounting instructions as well as:		—
	– A statement indicating the minimum mechanical means for securing the PV module evaluated during the mechanical load test (MST 34 of IEC 61730-2) and the conformity to the mechanical load requirements of the series IEC 61215		P
	– Limitations to the mounting situation (e.g.slope, orientation, mounting means, cooling, specific spacing and any other condition that can influence the safety of the PV module installation)		P
	– Type of adhesive and the allowable substrates if adhesives are used for mounting (i.e.flexible modules)		N/A
	– The manufacturer and unique part number of the adhesive, the required surface preparation, adhesive application process, and curing condition if adhesives are specified for use in the field to provide mechanical securement to specific roof coverings or mounting systems		N/A
6.2.3.4 Connectors/wiring			
	The documentation includes a detailed description of the following information related to the connectors and wiring method:		—
	– Minimum cable diameters, rated voltage, current and temperature of cables for PV modules intended for field wiring and compliance with IEC 62930, type 131 or type 133; or EN 50618		P
	– Limitations on wiring methods and wire management that apply to the junction box for the PV module		P
	– Statement that wiring to interconnect modules shall be rated for the application, and it is important that the user is aware of national installation codes.		P
	– Type of terminals for field wiring		N/A

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
	– Specific model / types together with the manufacturer name/brand of the PV connector(s) to which the PV module connectors can be mated		P
	– The bonding method(s) to be used, if applicable, is specified either all provided or specified hardware		P
	– The type and ratings of bypass diode to be used (if applicable)		P
6.2.3.5 Fire ratings			—
	– A statement indicating	☒ fire rating(s) and applied standards ☐ statement regarding resistance to external fire sources not evaluated	P
	– Limitations to the achieved ratings (e.g. installation slope, sub structure or other applicable installation information)		P
	– A statement indicating the minimum mechanical means for securing the PV module	See Table 27 and Table 35	P
	– A statement indicating the maximum altitude		P
	– For roof mounrting, specific parameter(s) are provided when the fire rating is dependent on a specific mounting structure , specific spacing, or specific means of attachment to the roof or structure.		P
6.3 Electrical components and insulation			
6.3.2 Internal wiring			
	Internal wiring has sufficient current carrying capacity for the relevant application.	See Table 31	P
6.3.3 External wiring and cables			
	External wires and cables fulfil the requirements of	☒ EN 50618 (alternative to IEC 62930 type 131) ☒ IEC 62930 (type 131 or type 133)	P
6.3.4 Module overcurrent protection rating			
	Overcurrent protecting rating is determined according to IEC 60269-6.	Compliance verified by reverse current overload test (MST 26) See Table 31	P
6.3.5 Connectors			
	External DC connectors fulfil the requirements of IEC 62852 and additional requirements in 6.5.2.2.		P
	Connectors are marked in accordance with 6.2.2.		P

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict
6.3.6 Junction boxes for PV modules			
	Junction boxes for PV modules fulfil the requirements of IEC 62790 and additional requirements in 6.5.2.2.3.		P
	Module level testing is performed to validate adhesion/connection of the junction box to the module and minimum clearance and creepage distances.	See Table 11, 24 and 26	P
6.3.7 Frontsheets and backsheets			
	Frontsheet material:	☒ Glass ☐ Polymeric material ☐ Others.	—
	Backsheet material:	☒ Glass ☐ Polymeric material ☐ Others.	—
	Polymeric frontsheets and backsheets fulfil the requirements of IEC 62788-2-1.		N/A
	Backsheets are restricted for use with indirect or limited direct sunlight equal to or lower than 300 W/m^2.		N/A
	The DTI requirements listed in Table 3 and Table 4 of IEC 61730-2 are fulfilled by single or multiple layers of RUI as described in IEC 62788-2-1	See Table 1	N/A
	Adhesion of frontsheet and backsheet toencapsulant or glass is appropriate.	Compliance is checked at module level by test sequences of IEC 61730-2 listed in this report.	P
6.3.8 Insulation barriers			
	Polymeric insulation barrier meets the relevant requirements of 6.5.2	See 6.5.2	N/A
	Barrier held in place while keeping its required electrical and mechanical properties		N/A
	Removal of barrier only possible by using a tool		N/A
6.3.9 Electrical connections			
6.3.9.1 General			
	Terminations are so designed, that the contact pressure is not transmitted through insulating material except ceramic, mica or other adequate material. Compliance checked by MST 01		P
	Measures are taken to prevent connections becoming loose, e.g. by using a washer.	See Table 9 and Table 45	P
	End of a stranded conductor is not consolidated by soft soldering.		P
	Measures are taken to prevent contact stress impairing electrical conductivity.		P
6.3.9.2 Terminals for external cables and PV connector ribbons			

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Clause	Requirement + Test	Result - Remark	Verdict
	Terminals for electrical connections are suitable for the type and range of conductor cross-sectional areas, and they meet the relevant requirements of IEC 62790 and additional RTE, RTI, and TI requirements of 6.5.2.2.3.		N/A
	Insulated terminals are designed to prevent a reduction of clearances and creepage distances by any possible displacement.		N/A
6.3.9.3 Splices and connections inside a PV module			
	Splices and connections are mechanically secured and provide electrical continuity.		P
	Electrical connections are soldered, welded, conductively adhered, crimped, or otherwise securely connected.		P
	A soldered or conductively adhered joint is additionally mechanically secured.		P
6.3.10 Encapsulants			
	Thermal properties are sufficient for intended application.	Compliance checked by IEC 61730-2:2023 tests for pollution degree 2 listed in this report.	P
	The insulation properties according to 6.5.2.2 are met, if applicable.	Compliance checked by IEC 61730-2:2023 tests for pollution degree 2 listed in this report.	P
6.3.11 Bypass diodes			
	Bypass diodes are rated to withstand the current and voltage for their intended use.	See Table 29 and Table 43	P
6.4 Mechanical and electromechanical connections			
6.4.1 General			
	Type of connection:	☒ Connection within frame ☒ Mounting interfaces via adhesive ☒ frame to clamp a mounting system ☒ Equipotential bonding ☒ Attachment of junction box ☒ mechanical connections within the laminate:	P
	Mechanical connections are durable to withstand the thermal, mechanical, and environmental stresses occurring in the application.	See Table 9, Table 27 and Table 35	P
	Removable parts are only detachable with the aid of tools.		P
	Lids attached without screws have one or several detectable feature(s) to avoid damaging the lid or the feature(s).		P

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Clause	Requirement + Test	Result - Remark	Verdict
	No contact of tools with the live parts when the lid is removed.		P
	No friction between surfaces as the sole means to inhibit the turning or loosening of a part, unless provisions to prevent unintended movement or rotation of the component is given.		P
6.4.2 Screw connections			
	Screws and mechanical connections withstand the mechanical stresses occurring in normal use.		P
	Screws are not made of a material which is soft or liable to creep.		P
	Screws used to provide mechanical stability and continuity for equipotential bonding withstand the mechanical stresses occurring in normal use.		P
	At least one screw per electrical- mechanical connection ensures the electrical connection between the metallic components.		P
	Screws used for mechanical and electrical connections with a nominal diameter of less than 3 mm are screwed into metal.		P
	For screws used for mechanical and electrical connections two full threads are engaged into the metal.		P
	Screwed and other fixed connections are in such a way that they do not come loose through torsion, bending stresses, vibration, etc.		P
6.4.3 Rivets			
	Rivets that have the double function of being concurrently electrical and mechanical connections are locked against loosening.		N/A
6.4.4 Thread-cutting screws			
	Thread-cutting and self-tapping screws are not used for interconnection of current-carrying parts made of a material which is soft or liable to creep.		N/A
	No thread-forming or thread-cutting (self-tapping) screws (sheet metal screws) are used for the connection of current-carrying parts.		N/A
	Thread-cutting (self-tapping) screws are not used if they are likely to be operated by the user or installer.		N/A
	Thread-cutting and thread-forming screws, used to provide continuity for equipotential bonding, are such that it is not necessary to disturb the connection in normal use.		N/A
	For equipotential bonding one screw is permitted if two full threads engage the metal.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.4.5 Form/press/ tight fit			
	Form/press/tight fits of metallic components which are not separately equipotentially bonded are electrically connected.		P
	Requirements of MST 01, MST 32 and MST 34 are met, continuity of equipotential bonding (MST 13) is performed before and after the MST 32 and MST 34 tests	See Table 9, Table 27 and Table 35	P
6.4.6 Connections by adhesives			
	Compliance is checked by tets of IEC 61730-2:2023	Compliance checked by MST 13, MST 17, MST 32, MST 34, and MST 42	P
	The specific substrate(s) that was (were) adhered to the flexible module in the tests are noted in the documentation.		N/A
	Adhesion of a polymer relied upon for insulation to another insulating layer is appropriate for the application.		N/A
	Requirements for adhesive materials are met	See 6.5.4	P
	Connection by adhesive which is considered as cemented joint fulfils the requirements of 6.6.4.3.	See 6.6.4.3	P
6.4.7 Other connections			
	Other connections such as, welded or soldered, as well as materials and processes for creating the connections are appropriate for the application and for the intended use.	Compliance checked by MST 01 and MST 13.	P
	Other connections which are relied upon for equipotential bonding fulfil the requirements of (MST 13).	Compliance checked by MST 13.	P
6.5 Materials			
6.5.2 Polymeric materials			
6.5.2.1 General			
	Polymeric materials are able to durably and safely withstand the electrical, mechanical, thermal, environmental, and corrosive stresses occurring in the application.	Assessed polymeric parts see Annex 2 (BOM). Test results see subsequent sections	P
	Polymeric materials are resistant to electrical and mechanical property degradation.	Test results see subsequent sections	P
	Components meet the requirements of the following standards on the component level:		P
	– IEC 62788-2-1 for frontsheets and backsheets		N/A
	– IEC 62790 for junction-boxes for PV modules		P
	– IEC 62852 for connectors for DC-application in PV systems		P

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Clause	Requirement + Test	Result - Remark	Verdict
	– IEC 62930 (or EN 50618 for type 131) for electric cables for PV systems		P
6.5.2.2 Polymeric materials used as electrical insulation			
6.5.2.2.1 General			
	The material which serves as functional insulation is appropriate according to 6.6.4.4.	See Table 7 and Table 46	P
	The material relied upon for insulation in thin layers is appropriate for the application according to 6.6.4.2.	See 6.6.4.2	N/A
	Insulation is not impaired by short-term or long-term thermal stresses that can occur in manufacturing processes, transportation, and during normal operation by electrical stress and weathering to an extent that it does not comply with the requirements of IEC 61730-1 and IEC 61730-2.		P
6.5.2.2.2 Endurance to electrical stress			
	Materials used as electrical insulation are in compliance with the insulation coordination requirements	See 6.6.3	P
	Materials relied upon for insulation (RUI) have sufficient breakdown strength and comply with 6.6.4.2.		N/A
	The polymeric material which is part of a potential tracking path is resistant to surface tracking, in coordination with the design dimensions in 6.6.3.		P
6.5.2.2.3 Endurance to thermal stress			
	Materials used as relied upon insulation have a minimum RTE, RTI or TI in accordance with IEC 60216-5 or IEC 60216-1 of at least 90 °C.	☐ TI : ☐ RTE : ☒ RTI : 105 for Adhesive Assessed polymeric parts see Annex 2 (BOM)	P
6.5.2.2.4 Endurance to environmental stress			
	The material's endurance to withstand simulated environmental stress is checked by compliance with IEC 61730-2 at module level.		P
	Components comply with the requirements in the individual applicable international Standards.		P
6.5.2.3 Flammability			
	BAPV and BIPV comply with specific fire-related safety requirements originating from national building codes.		N/A
	External polymeric parts of the PV module whose deterioration could impair the safety comply with all the following additional requirements:		—
	– minimum flammability class V-1		P
	– Ignitability test (MST 24) in final application (laminated or the PV module)		P

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Clause	Requirement + Test	Result - Remark	Verdict
	– Polymeric parts which are not components of the laminate fulfil the requirements of ignitability test	Assessed polymeric parts see Annex 2 (BOM)Compliance checked by MST 24	P
	Polymeric materials between two parts of different potential that is recatogorized as described in 6.6.4.4, the encapulant(s) meet(s) the requirements:		P
	- flammability class minimum HB	Assessed polymeric parts see Annex 2 (BOM)	N/A
	- or method to verify spacings is established in the production process		N/A
6.5.2.4 Rigid polymeric materials used for mechanical functions			
	Rigid polymeric materials used for mechanical functions pass the following tests:		N/A
	– Mechanical strength at lower temperatures, IEC 62790:2020, 5.3.8 followed by MST 01 (visual inspection) of IEC 61730-2.		N/A
	– Weather resistance test, IEC 62790:2020, 5.3.11 followed by MST 01 (visual inspection) of IEC 61730-2.		N/A
	– minimum flammability class V-1		N/A
	– RTI/RTE/TI (≥ 90 °C)	☐ TI : ☐ RTE : ☐ RTI : Assessed polymeric parts see Annex 2 (BOM)	N/A
6.5.3 Metallic materials			
6.5.3.1 General			
	Metallic components withstand a minimum corrosion atmospheric category level C2 in ISO 9224:2012.		P
	Metal parts are not in contact to metal parts having a difference of their electrochemical potentials of more than 600 mV.	Assessed parts see Annex 2 (BOM)	P
	Iron or mild steel is plated, painted, or enamelled for protection against corrosion.		N/A
	Corrosion protection is at least equivalent to a zinc coating of 0.015 mm thickness	Assessed parts see Annex 2 (BOM) Compliance checked by MST 01	P
6.5.3.2 Current carrying parts			
	Assessed parts:	See Annex 2 (BOM)	P
	Current-carrying parts have sufficient mechanical strength and electrical conductivity.	Compliance checked by MST 13 and MST 26	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Current-carrying materials are protected against corrosion.		P
	The coating for protective coated metal is capable of preventing corrosion according to either one of the listed standards.	☐ ISO 1456 ☐ ISO 1461 ☐ ISO 2081 ☐ ISO 2093	N/A
	Coated metal not used if the current-carrying parts are stressed by abrasion.		N/A
6.5.4 Adhesives			
	Adhesives are appropriate for the application.	Compliance checked by MST 01, MST 11, MST 17, MST 34, MST 35, MST 36, and MST 42	P
	Adhesive as part of the relied upon electrical insulation meets the requirements of 6.5.2.2.3	See 6.5.2.2.3	N/A
6.6 Protection against electric shock			
6.6.1 General			
	Adequate protection against contact with hazardous live parts is provided.		P
	Specimen poses no risk of electric shock.		P
6.6.2 Protection against accessibility to hazardous live parts			
6.6.2.1 General			
	Class of module	See safety ratings	—
	For class 0 and Class II modules adequate protection against accessibility to hazardous live parts (> 35 V DC) provided.	Compliance checked by MST 01 and MST 11	P
	For Class 0 PV modules, accessible parts are separated from hazardous live parts by at least basic insulation.	Table 2 of 6.6.2.3 of IEC 61730-1 Compliance checked by MST 01 and MST 11	N/A
	Class II PV modules are constructed and enclosed that only parts separated from hazardous live parts by double or reinforced insulation are accessible.	Table 2 of 6.6.2.3 of IEC 61730-1 Compliance checked by MST 01 and MST 11	P
	For Class III PV modules, live parts of different polarity are separated by at least functional insulation.	Table 2 of 6.6.2.3 of IEC 61730-1 Compliance checked by MST 01 and MST 11	N/A
	Polymeric Materials used for realizing protection against accessibility of hazardous live parts by means of enclosure, insulation barrier or relied upon insulation comply with the requirements of 6.5.2.		P
6.6.2.2 Protection by means of enclosures and insulation barriers			

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Clause	Requirement + Test	Result - Remark	Verdict
	Enclosures or insulation barriers are so designed that, after mounting, the live parts are not accessible (even after possible deformation).		P
	Degree of protection of the housing is not impaired by any possible deformation.		P
	Parts of enclosures and insulation barriers that provide protection are not removable without the use of a tool.		P
	Lids which are attached without screws have one or several detectable features, e.g. recesses,		P
	Tool to open the lid do not come into contact with the live parts if lid is removed correctly.		P
	Insulation barriers are held in place and are not affected by influences expected during normal operation. Electrical and mechanical properties don't fall below the minimum acceptable values for the application.		P
	Parts are prevented from loosening or turning.		P
6.6.2.3 Protection by means of insulation of live parts			
	Insulation materials providing the sole insulation between a live part and an accessible metal part, or between uninsulated live parts not of the same potential, are of adequate thickness and of a material appropriate for the application in compliance with Table 2 of IEC 61730-1.	Compliance verified by evaluation of materials and components.	P
6.6.3 Insulation coordination			
6.6.3.1 General			
	Clearance and creepage distances fulfil the requirements in Table 3 and Table 4 of IEC 61730-1.	See Table 1 and Table 2.	P
6.6.3.2 Influencing factors			–
6.6.3.2.1	Pollution degree	See Table 1 Compliance checked by the required tests in IEC 61730-2	P
6.6.3.2.2	Material group	See Table 1 and 6.6.4.3	—
6.6.3.3 Creepage distance			
	Minimum values for creepage distance are in accordance with Table 3 or Table 4 of IEC 61730-1. Compliance is checked by MST 57.	See Table 1	P
6.6.3.4 Clearance			
	Clearance values are met for air gaps between conductive parts. Compliance is checked by MST 57.	See Table 1	N/A P

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Clause	Requirement + Test	Result - Remark	Verdict
	Derating factor for altitude above 2000 m is considered.	See Table 2 Compliance checked by MST 14	N/A
	Minimum clearance distance requirements between live parts of different potential inside the junction box are verified according to Table 3 and Table 4 of IEC 61730-1 related to the relevant working voltage.	See Table 1	P
6.6.4 Distance through functional and replied upon insulation			
6.6.4.1 General			
	Polymeric materials for cemented insulation parts and insulation in thin layers withstand environmental, thermal, electrical and mechanical stresses as far as they occur.	See 6.5.2	N/A
	Distances through insulation (d.t.i.) of solid insulation comply with the minimum distance as required:		N/A
	System voltage…….:	See safety ratings	—
	Distance through insulation req./meas. (mm):		N/A
	The insulation fulfils the material classification as given in IEC 60216-1, IEC 60216-2 and IEC 60216-5 (RTE/TI/RTI).	See Annex 2	N/A
6.6.4.2 Thin layers – relied upon insulation			
	Relied upon insulation in thin layers is applied at	☐ Backsheet ☐ Front sheet ☐ insulation within laminate ☐ others	—
	Frontsheets and backsheets fulfil the requirements of IEC 62788-2-1.	See 6.3.7	N/A
	Thickness of the other insulation materials used for RUI, except glass or ceramic materials, are verified by MST 04 (insulation thickness test) and MST 16 (insulation test) after MST 12 (cut susceptibility test).	See Table 46 and Table 38	N/A
	The thickness requirement (DTI) of row 4) of Table 3 and Table 4 is fulfilled.	See Table 1	N/A
	For a single-layer construction that the RUI layers contributing to the DTI fulfils the following requirements:		—
	– Minimum thickness complies with thin-layers requirements in Table 3 or Table 4 of IEC 61730-2.	See Table 1 and Annex 2	N/A
	– RTE/TI/RTI complies with 6.5.2.2.3.	See Annex 2	N/A
	– Insulation provides sufficient dielectric strength. Test voltage (2000V + 4 times system voltage) …….: V	See Annex 2	—

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Clause	Requirement + Test	Result - Remark	Verdict
	For a multiple-layer construction that the RUI layers contributing to the DTI fulfils the following requirements:		—
	– Each layer providing RUI meeth the following requirements:		—
	– RTE/TI/RTI complies with 6.5.2.2.3	See Annex 2	
	– One layer meets the dielectric strength requirements for reinforced insulation; or at least two layers each meet the dielectric strength requirements for basic insulation (1 000 V + 2 times the system voltage) ….: V		N/A
	– The full construction meets the following requirements:		—
	– The full multilayer construction meets the following requirements:		
	– DTI value is in compliance with values according to line 4) "DTI" of Table 3 and Table 4 of IEC 61730-1.		N/A
	– Test voltage for entire multi-layer sheet providing relied upon insulation (2000V + 4 times system voltage) …….: V	See Annex 2	N/A
6.6.4.3 Cemented joints			
	Cemented joints were considered as	☐ Edge seal ☒ Interface between junction box and mounting surface ☐ Others ☐ No cemented joints	—
	Distances through cemented joints comply with the minimum distances as required in table 3 or table 4:		—
	System voltage…….:	See safety ratings	—
	Distance through cemented joints, req./meas. [mm]:	3.5 / 7.4 for J-box JM37xy	P
	A distance between two rigid parts other than used for junction boxes is considered as cemented joint if following requirements are met:		—
	– Neither cracks nor voids in the insulating compounds have been occurred which either by themselves or in combination		N/A
	– No breakdown at MST 16 (initial and final tests) with a 1.35 times higher test voltage occurred.		N/A
	– No breakdown at MST 17 (initial and final tests) with a 1.35 times higher test voltage occurred.		N/A
	– The electrically insulating adhesive / sealant has a volume resistivity of bigger than 50 × 10^6 Ω cm (dry) / bigger than 10 × 10^6 Ω cm (wet)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– Peel test (MST 35) was passed (rigid / flexible or flexible / flexible)	See Table 36	N/A
	– Lap shear strength test (MST 36) was passed (rigid / rigid)	See Table 37	N/A
	A distance between two rigid parts or rigid to flexible parts used for junction boxes is considered as cemented joint if following requirement is met:		—
	– The measured distances through cemented joints at adhesive area of junction box do not fall below the minimum values listed in Tables 3 and 4.	Verified by MST 57	P
	Supplement information: Above mentioned tests have to be performed for each cemented joint. Also, the materials and their properties have to be listed in annex 2		
6.6.4.4 Distance through functional insulation			
	Distance through functional insulation meets the requirements described in line 3) a) of Table 3 and Table 4 of IEC 61730-1.	See Table 1	N/A
	The values in line 3) b) of Table 3 and Table 4 of IEC 61730-1 is used as the following requirements are met:		—
	– the MST 57 insulation thickness test is passed		N/A
	– ☐the encapsulant meets flammability requirements, minimum HB according to IEC 60695-11-10 ☐a method to verify spacings is included in the production process		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

Table 1	**Clearance and creepage distances (Clause 6.6.3.3 and 6.6.3.4 of IEC 61730-1:2023) and Evaluation of clearances, creepage distances and distance through functional insulation (MST 57 of IEC 61730-2:2023)**								
Sample no.									
Clearance (cl) and creepage distance (cr) at/of/between:	Line of table 3or 4	Type of insulation	Pollution degree	CTI Material group	Working voltage [V]	Clearance[a] cl & Creepage cr [mm]			
						Required	Design	Measured (initial)	Measured (final)
Position 1: Shortest distance string connector – module edge	1	☐ Functional ☐ Basic ☐ Suppl. ☒ Reinforced	☒ 1 ☐ 2 ☐ 3	☒ I ☐ II ☐ IIIa	1500V DC	Cl: 19.4	Cl: 10.5 ~12.5	Cl: N/A	Cl: N/A
						Cr:10.4	Cr: 10.5 ~12.5	Cr: N/A	Cr: N/A
Position 2: Shortest distance cell – module edge	1	☐ Functional ☐ Basic ☐ Suppl. ☒ Reinforced	☒ 1 ☐ 2 ☐ 3	☒ I ☐ II ☐ IIIa	1500V DC	Cl: 19.4	Cl: 10.5 ~12.5	Cl: N/A	Cl: N/A
						Cr:10.4	Cr: 10.5 ~12.5	Cr: N/A	Cr: N/A
Position 3: Cell to cell	2	☒ Functional ☐ Basic ☐ Suppl. ☐ Reinforced	☒ 1 ☐ 2 ☐ 3	☒ I ☐ II ☐ IIIa	~0.7 V DC	Cl: N/A	Cl: 0.45~1.45	Cl: N/A	Cl: N/A
						Cr: N/A	Cr: 0.45~1.45	Cr: N/A	Cr: N/A
Position 4: String to string	2	☒ Functional ☐ Basic ☐ Suppl. ☐ Reinforced	☒ 1 ☐ 2 ☐ 3	☒ I ☐ II ☐ IIIa	<35V DC	Cl: 0.1	Cl: 2.0~3.0	Cl: N/A	Cl: N/A
						Cr: 0.2	Cr: 2.0~3.0	Cr: N/A	Cr: N/A
Position 5: between terminal and outer JB enclosure	1	☐ Functional ☐ Basic ☐ Suppl. ☒ Reinforced	☒ 1 ☐ 2 ☐ 3	☒ I ☐ II ☐ IIIa	1500V DC	Cl: 19.4	Cl: ≥11.7	Cl: N/A	Cl: N/A
						Cr:10.4	Cr: ≥11.7	Cr: N/A	Cr: N/A
Supplementary information: see photographs/drawings/illustrations on annex 2 (for QN-xxxHT-01 series) Adhesive area under the rigid bottom of JB was demonstrated as cemented joint distance by testing, and J-box fulfils the requirements of IEC 62790.									
[a] List relevant position and test voltage for each clearence which is verified by Impulse voltage test according to IEC 60664-1.									

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Table 2: 6.6.3.4 - Clearance evaluated by Impulse voltage test								
Test Date [YYYY-MM-DD] .....:								
Results								
☐ No evidence of dielectric breakdown or surface tracking observed								—
Supplementary information:								
Clearance (cl) at/of/between: Sample#	Line of table 3or 4	Type of insulation	Working voltage	Impulse voltage	Measured			Verdict
					Voltage Peak kV	T_1 µs	T_2 µs	--
Position 1:		☐ Functional ☐ Basic ☐ Suppl. ☐ Reinforced						—
Position		☐ Functional ☐ Basic ☐ Suppl. ☐ Reinforced						—
Position:		☐ Functional ☐ Basic ☐ Suppl. ☐ Reinforced						—
Supplementary information:								

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Clause	Requirement + Test	Result - Remark	Verdict

IEC 61730 PART 2: REQUIREMENTS FOR TESTING

8 Testing
Test sequences see IEC 61730-2 Deviations from test sequence are possible but must be documented. See also table 3.

10 TEST PROCEDURES			
10.1 General: Safety qualification testing included the following Module Safety Tests (MST) of IEC 61730-2			
Initial Testing			
10.2	MST 01 – Visual inspection .....:	See appended Table 4	N/A
10.3	MST 02 - Performance at STC .....:	See appended Table 5	N/A
10.4	MST 03 – Maximum power determination .....:	See appended Table 6	N/A
10.13	MST 16 – Insulation test .....:	See appended Table 7	N/A
10.14	MST 17 – Wet leakage current test .....:	See appended Table 8	N/A
10.11	MST 13 – Continuity test of equipotential bonding:	See appended Table 9	N/A
10.9	MST 11 – Accessibility test.....:	See appended Table 10	N/A
Sequence A			
10.26	MST 37 – Materials creep test.....:	See appended Table 11	N/A
10.11	MST 13 – Continuity test of equipotential bonding:	See appended Table 9	N/A
10.9	MST 11 – Accessibility test.....:	See appended Table 10	N/A
Sequence B			
10.30	MST 53 – Damp heat test 200h.....:	See appended Table 12	N/A
10.31	MST 54 – UV test (front side) 60kWh/m².....:	See appended Table 13	N/A
10.31	MST 54 – UV test (back side) 60kWh/m² .....:	See appended Table 14	N/A
10.29	MST 52 – Humidity freeze test .....:	See appended Table 15	N/A
Sequence B1			
10.32	MST 55 – Cold conditioning.....:	See appended Table 16	N/A
10.33	MST 56 – Dry heat conditioning .....:	See appended Table 17	N/A
10.29	MST 52 – Humidity freeze test .....:	See appended Table 18	N/A
10.32	MST 55 – Cold conditioning.....:	See appended Table 19	N/A
10.29	MST 52 – Humidity freeze test .....:	See appended Table 20	N/A

Sequence C			
10.31	MST 54 – UV test 15kWh/m² .....:	See appended Table 21	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
10.28	MST 51 – Thermal cycling 50 test .....:	See appended Table 22	N/A
10.29	MST 52 – Humidity freeze test .....:	See appended Table 23	N/A
10.27	MST 42 – Robustness of terminations test.....:	See appended Table 24	N/A
Sequence D			
10.30	MST 53 – Damp heat test.....:	See appended Table 25	N/A
10.27	MST 42 – Robustness of terminations test.....:	See appended Table 26	N/A
10.23	MST 34 – Static mechanical load test .....:	See appended Table 27	N/A
Sequence E			
10.28	MST 51 – Thermal cycling 200 test .....:	See appended Table 28	N/A
Sequence F			
10.19	MST 25 – Bypass diode thermal test.....:	See appended Table 29	N/A
10.16	MST 22 – Hot-spot endurance Test.....:	See appended Table 30	N/A
10.20	MST 26 – Reverse current overload test.....:	See appended Table 31	N/A
Sequence G			
10.12	MST 14 – Impulse voltage test .....:	See appended Table 32	N/A
Other tests			
10.17	MST 23 – Fire Test .....:	See appended Table 33	N/A
10.18	MST 24 – Ignitability test .....:	See appended Table 34	N/A
10.21	MST 32 – Module breakage test.....:	See appended Table 35	N/A
10.24	MST 35 – Peel test .....:	See appended Table 36	N/A
10.25	MST 36 – Lap shear strength test .....:	See appended Table 37	N/A
Final Testing			
10.10	MST 12 – Cut susceptibility test .....:	See appended Table 38	N/A
10.11	MST 13 – Continuity test of equipotential bonding:	See appended Table 9	N/A
10.9	MST 11 – Accessibility test.....:	See appended Table 10	N/A
10.4	MST 03 – Maximum power determination.....:	See appended Table 39	N/A
10.1	MST 01 – Visual inspection .....:	See appended Table 40	N/A
10.6	MST 05 – Durability of markings.....:	See appended Table 41	N/A
10.7	MST 06 – Sharp edge test.....:	See appended Table 42	N/A
10.8	MST 07 – Bypass diode functionality test.....:	See appended Table 43	N/A
10.22	MST 33a – General screw connections test.....:	See appended Table 44	N/A
10.22	MST 33b – Locking Screw connections test.....:	See appended Table 45	N/A
10.5	MST 04 – Insulation thickness test.....:	See appended Table 46	N/A
Supplementary information: N/A			

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Table 3: Overview of MST items for each test sample														
MST item	Sample No.													
	'	'	'	'	'	'	'	'	'	'	'	'	'	'
Control module														
MST 01 – Visual inspection														
MST 02 – Performance at STC														
MST 03 – Maximum power determination														
MST 04 – Insulation thickness test														
MST 05 – Durability of markings														
MST 06 – Sharp edge test														
MST 07 – Bypass diode functionality test														
MST 11 – Accessibility test														
MST 12 – Cut susceptibility test														
MST 13 – Continuity test of equipotential bonding														
MST 14 – Impulse voltage test														
MST 16 – Insulation test														
MST 17 – Wet leakage current test														
MST 22 – Hot-spot endurance Test														
MST 23 – Fire Test														
MST 24 – Ignitability test														
MST 25 – Bypass diode thermal test														
MST 26 – Reverse current overload test														
MST 32 – Module breakage test														
MST 33 – Screw connections test														
MST 34 – Static mechanical load test														
MST 35 – Peel test														
MST 36 – Lap shear strength test:														
MST 37 – Materials creep test:														
MST 42 – Robustness of terminations test														
MST 51 – Thermal cycling test 50														
MST 51 - Thermal cycling test 200														
MST 52 – Humidity freeze test														
MST 53 – Damp heat test 200 h														
MST 53 – Damp heat test 1000 h														
MST 54 – UV test 15 KWh/m²														
MST 54 – UV test 60 KWh/m²														
MST 55 – Cold conditioning														
MST 56 – Dry heat conditioning														
Legend: X ····· Test performed,														

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Clause	Requirement + Test	Result - Remark	Verdict

Table 4: MST 01 - Initial Visual inspection			
Test Date [YYYY-MM-DD] .....:			—
Sample #	Findings .....:	☐ Yes ☐ No	—
	Nature and position of findings – comments or attach photos		—
Sample #	Findings .....:	☐ Yes ☐ No	—
	Nature and position of findings – comments or attach photos		—
Sample #	Findings .....:	☐ Yes ☐ No	—
	Nature and position of findings – comments or attach photos		—
Sample #	Findings .....:	☐ Yes ☐ No	—
	Nature and position of findings – comments or attach photos		—
Supplementary information: For creepage distances and clearances see Table 1 and Table 2			

Table 5: MST 02 - Performance at STC						
Sample test .....:						—
Test Date [YYYY-MM-DD] .....:						—
Irradiance [W/m^2] .....:			1000			—
Module temperature [°C] .....:			25			—
Test method .....:			☐ Simulator ☐ Natural sunlight			—
Rated I_{SC} including manufacturing tolerances ...:						—
Rated V_{OC} including manufacturing tolerances..:						—
Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]	Result
						—
Supplementary information:						

Table 6: MST 03 - Maximum power determination							
Test Date [YYYY-MM-DD] .....:							—
Irradiance [W/m^2] .....:			1000				—
Module temperature [°C] .....:			25				—
Test method .....:			☐ Simulator ☐ Natural sunlight				—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]	Result
							—
							—
							—

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Clause	Requirement + Test	Result - Remark	Verdict

							—
Supplementary information:							

Table 7: MST 16 - Initial Insulation test					
Test Date [YYYY-MM-DD] .....:					—
Cemented joints.....:	☐ Yes ☐ No				—
Test Voltage applied [V, DC] .....:					—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	—
					—
					—
					—
					—
Supplementary information: Size of module [m²]					

Table 8: MST 17 - Initial Wet leakage current test			
Test Date [YYYY-MM-DD] .....:			—
Cemented joints.....:	☐ Yes ☐ No		—
Test Voltage applied [V, dc] .....:			—
Solution resistivity [Ω cm] .....:	< 3500 Ω cm at 22 ± 2°C		—
Solution temperature [°C] .....:			—
Sample #	Measured [MΩ]	Required [MΩ]	Result
			—
			—
			—
			—
Supplementary information: Size of module [m²]			

Table 9: MST 13 - Continuity test of equipotential bonding		
Test Date Initial examination [YYYY-MM-DD] ....:		—
Test Date Final examination [YYYY-MM-DD] ....:		—
Maximum over-current protection rating [A] .....:		—
Current applied [A] .....:		—
Location of designated grounding point.....:		—
Location of second contacting point .....:		—

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #	Position in test sequence:	Voltage [V]	Resistance [Ω]	
	Initial examination			—
	Preconditioning: MST 54, MST 51, MST 52, MST 42, MST 12			—
	Final examination			—
	Initial examination			—
	Preconditioning: MST 51, MST 12			—
	Final examination			—
	Initial examination			—
	Preconditioning: MST 53, MST 34, MST 12			—
	Final examination			—
	Initial examination			—
	Preconditioning: MST 37			—
	Final examination			—
	Initial examination			—
	Preconditioning: MST 53, MST 54, MST 52, MST 12			—
	Final examination			—
	Initial examination			—
	Preconditioning: MST 53, MST 54, MST 52, MST 12			—
	Final examination			—
	Initial examination			—
	Preconditioning: MST 55, MST 56, MST 52, MST 55, MST 52, MST12			—
	Final examination			—
Supplementary information:				

Table 10: MST 11 - Accessibility test			
Test Date **Initial** examination [YYYY-MM-DD] ..:			—
Test Date **Final** examination [YYYY-MM-DD] ...:			—
Sample #	Position in test sequence:		
	Initial examination, access?	☐ Yes ☐ No	—
	Preconditioning: MST 54, MST 51, MST 52, MST 42, MST 12, MST 13		—
	Final examination, access?	☐ Yes ☐ No	—
	Initial examination, access?	☐ Yes ☐ No	—
	Preconditioning: MST 51, MST 12, MST 13		—

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Clause	Requirement + Test	Result - Remark	Verdict

	Final examination, access?	☐ Yes ☐ No	—
	Initial examination, access?	☐ Yes ☐ No	—
	Preconditioning: MST 53, MST 34, MST 12, MST 13		—
	Final examination, access?	☐ Yes ☐ No	—
	Initial examination, access?	☐ Yes ☐ No	—
	Preconditioning: MST 37, MST 13		—
	Final examination, access?	☐ Yes ☐ No	—
	Initial examination, access?	☐ Yes ☐ No	—
	Preconditioning: MST 53, MST 54, MST 52, MST 12, MST 13		—
	Final examination, access?	☐ Yes ☐ No	—
	Initial examination, access?	☐ Yes ☐ No	—
	Preconditioning: MST 53, MST 54, MST 52, MST 12, MST 13		—
	Final examination, access?	☐ Yes ☐ No	—
	Initial examination, access?	☐ Yes ☐ No	—
	Preconditioning: MST 55, MST 56, MST 52, MST 55, MST 52, MST12		—
	Final examination, access?	☐ Yes ☐ No	—
Supplementary information:			

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Clause	Requirement + Test	Result - Remark	Verdict

SEQUENCE A				
Sample #				—
Table 11: MST 37 - Materials creep test				
Test Date [YYYY-MM-DD] start/end .....:				—
Duration [h] .....:		200		—
Applied temperature [°C] .....:		90		—
MST 01: Visual inspection after materials creep test				—
Test Date [YYYY-MM-DD].....:				—
Findings ..... :		☐ Yes.....☐ No		
Nature and position of findings – comments or attach photos				—
Supplementary information: For clearance and creepage distances see table XYZ				
MST 16: Insulation test after materials creep test				—
Test Date [YYYY-MM-DD[.....:				—
Cemented joint.....:		☐ Yes ☐ No		
Test Voltage applied [V, dc].....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
MST 17: Wet leakage current test after materials creep test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joint.....:		☐ Yes ☐ No		—
Test Voltage applied (V, dc) .....:				—
Solution resistivity (Ω cm) .....:		< 3500 Ω cm at 22 ± 2°C		—
Solution temperature (°C).....:				—
Measured(MΩ)		Required (MΩ)		Result
				—
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

SEQUENCE B					
Table 12: MST 53 - Damp heat test					
Test Date [YYYY-MM-DD] start/end .....:					—
Applied load [N] .....:		5			—
Duration [h] .....:		200			—
Sample #		—			—
		—			—
		—			—
MST 01: Visual inspection after Damp heat test					—
Test Date [YYYY-MM-DD].....:					—
Sample #	Findings .....:	☐ Yes	☐ No		—
	Nature and position of findings – comments or attach photos				—
Sample #	Findings .....:	☐ Yes	☐ No		—
	Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after Damp heat test					—
Test Date [YYYY-MM-DD].....:					—
Cemented joints .....:		☐ Yes	☐ No		—
Test Voltage applied [V, DC] .....:					—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
					—
					—
Supplementary information:					

Table 13: MST 54 - UV test (front side)			
Sample #			
Test Date [YYYY-MM-DD] start/end .....:			—
Module temperature [°C] .....:	60		—
Irradiation total [kWh/ m²] .....:	60		—
Open circuits .....:	☐ Yes	☐ No	—
MST 01: Visual inspection after UV test			—
Test Date [YYYY-MM-DD].....:			—

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Clause	Requirement + Test	Result - Remark	Verdict

Findings ..... :	☐ Yes ☐ No			—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after UV test				—
Test Date [YYYY-MM-DD]..... :				—
Cemented joints ..... :	☐ Yes ☐ No			—
Test Voltage applied [V, DC] ..... :				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
Supplementary information: —				

Table 14: MST 54 - UV test (back side)				
Sample #				
Test Date [YYYY-MM-DD] start/end ..... :				—
Module temperature [°C] ..... :	60			—
Irradiation total [kWh/ m²] ..... :	60			—
Open circuits ..... :	☐ Yes ☐ No			—
MST 01: Visual inspection after UV test				—
Test Date [YYYY-MM-DD]..... :				—
Findings ..... :	☐ Yes ☐ No			—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after UV test				—
Test Date [YYYY-MM-DD]..... :				—
Cemented joints ..... :	☐ Yes ☐ No			—
Test Voltage applied [V, DC] ..... :				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
Supplementary information:				
Table 15: MST 52 - Humidity freeze test				
Test Date [YYYY-MM-DD] start/end ..... :				—
Total cycles ..... :	10			—
Open circuits ..... :	☐ Yes ☐ No			—

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #				
	—			
	—			
MST 01: Visual inspection after Humidity freeze test				—
Test Date [YYYY-MM-DD].....:				—
Findings ..... :	☐ Yes	☐ No		—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after Humidity freeze test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints .....:	☐ Yes	☐ No		—
Test Voltage applied [V, DC] .....:				—
Sample #	Measured	Required	Dielectric breakdown	Result
	MΩ	MΩ	Yes (description) / No	
				—
				—
MST 17: Wet leakage current test after humidity freeze 10 test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints.....:	☐ Yes	☐ No		—
Test Voltage applied [V, dc].....:				—
Solution resistivity [Ω cm) .....:	< 3500 Ω cm at 22 ± 2°C			—
Solution temperature [°C] .....:				—
Sample #	Measured (MΩ)	Required (MΩ)		Result
				—
				—
Supplementary information:				

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

SEQUENCE B1				
Sample #				—
Table 16: MST 55 - Cold conditioning				
Test Date [YYYY-MM-DD] start/end .....:				—
Temperature [°C] Duration [h] .....:	-40 / 48			—
MST 01: Visual inspection after Cold conditioning				—
Test Date [YYYY-MM-DD].....:				—
Findings ..... :	☐ Yes	☐ No		—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after Cold conditioning				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints .....:	☐ Yes	☐ No		—
Test Voltage applied [V, DC] .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
Supplementary information: --				

Table 17: MST 56 - Dry heat conditioning				
Test Date [YYYY-MM-DD] start/end .....:				—
Temperature [°C] Duration [h] ..... :	90 / 200			—
MST 01: Visual inspection after Dry heat conditioning				—
Test Date [YYYY-MM-DD].....:				—
Findings ..... :	☐ Yes	☐ No		—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after Dry heat conditioning				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints .....:	☐ Yes	☐ No		—
Test Voltage applied (V, DC) .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

Table 18: MST 52 - Humidity freeze test				
Test Date [YYYY-MM-DD] start/end .....:				—
Total cycles ..... :	10			—
Open circuits ..... :	☐ Yes	☐ No		—
MST 01: Visual inspection after Humidity freeze test				—
Test Date [YYYY-MM-DD].....:				—
Findings ..... :	☐ Yes	☐ No		—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after Humidity freeze test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints .....:	☐ Yes	☐ No		—
Test Voltage applied [V, DC] .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
Supplementary information:				

Table 19: MST 55 - Cold conditioning				
Test Date [YYYY-MM-DD] start/end .....:				—
Temperature [°C] / Duration [h] ..... :	-40 / 48			—
MST 01: Visual inspection after Cold conditioning				—
Test Date [YYYY-MM-DD].....:				—
Findings ..... :	☐ Yes	☐ No		—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after Cold conditioning				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints .....:	☐ Yes	☐ No		—
Test Voltage applied (V, DC) .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

Table 20: MST 52 - Humidity freeze test				
Test Date [YYYY-MM-DD] start/end .....:				—
Total cycles .....:	10			—
Open circuits .....:	☐ Yes	☐ No		—
MST 01: Visual inspection after Humidity freeze test				—
Test Date [YYYY-MM-DD].....:				—
Findings ..... :	☐ Yes	☐ No		—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after Humidity freeze test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints .....:	☐ Yes	☐ No		—
Test Voltage applied [V, DC] .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
MST 17: Wet leakage current test after humidity freeze test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints .....:	☐ Yes	☐ No		—
Test Voltage applied [V, dc].....:				—
Solution resistivity [Ω cm].....:	< 3500 Ω cm at 22 ± 2°C			—
Solution temperature [°C] .....:				—
Measured [MΩ]	Required [MΩ]			Result
				—
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

SEQUENCE C				
Sample #				—
Table 21: MST 54 - UV test				
Test Date [YYYY-MM-DD] start/end .....:				—
Module temperature [°C] .....:	60			—
Irradiation total [kWh/ m²] .....:	15			—
Open circuits .....:	☐ Yes	☐ No		—
MST 01: Visual inspection after UV test				—
Test Date [YYYY-MM-DD].....:				—
Findings ..... :	☐ Yes	☐ No		—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after UV test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints.....:	☐ Yes	☐ No		—
Test Voltage applied [V, DC] .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
Supplementary information:				

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Table 22: MST 51 - Thermal cycling test				
Test Date [YYYY-MM-DD] start/end .....:				—
Total cycles .....:	50			—
Applied current [A] .....:				—
Applied load [N] .....:	5			—
Limiting voltage [V)].....:				—
Open circuits .....:	☐ Yes	☐ No		—
MST 01: Visual inspection after Thermal cycling test				—
Test Date [YYYY-MM-DD].....:				—
Findings ..... :	☐ Yes	☐ No		—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after Thermal cycling test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints.....:	☐ Yes	☐ No		—
Test Voltage applied [V, DC] .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
Supplementary information: --				

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Clause	Requirement + Test	Result - Remark	Verdict

Table 23: MST 52 - Humidity freeze test				
Test Date [YYYY-MM-DD] start/end .....:				—
Total cycles .....:	10			—
Open circuits .....:	☐ Yes	☐ No		—
MST 01: Visual inspection after Humidity freeze test				—
Test Date [YYYY-MM-DD].....:				—
Findings ..... :	☐ Yes	☐ No		—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after Humidity freeze test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints..... :	☐ Yes	☐ No		—
Test Voltage applied [V, DC] .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
MST 17: Wet leakage current test after humidity freeze test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints..... :	☐ Yes	☐ No		—
Test Voltage applied [V, dc].....:				—
Solution resistivity [Ω cm].....:	< 3500 Ω cm at 22 ± 2°C			—
Solution temperature [°C] .....:				—
Measured [MΩ]	Required [MΩ]			Result
				—
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

Table 24: MST 42 - Robustness of terminations test				
Test Date [YYYY-MM-DD].....:				—
MQT 14.1: Retention of junction box on mounting surface				
Applied force in all directions parallel to the mounting surface and parallel to the module edges [N] .....:				—
Applied force perpendicular to the mounting surface [N] .....:				—
Supplementary information:				
MST 01: Visual inspection after retention of junction box on mounting surface				
Test Date [YYYY-MM-DD].....:				—
Findings .....:	☐ Yes ☐ No			—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after retention of junction box on mounting surface				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints.....:	☐ Yes ☐ No			—
Test Voltage applied [V, DC] .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
MST 17: Wet leakage current test after retention of junction box on mounting surface				
Test Date [YYYY-MM-DD].....:				—
Cemented joints.....:	☐ Yes ☐ No			—
Test Voltage applied [V] .....:				—
Solution resistivity [Ω cm].....:	< 3500 Ω cm at 22 ± 2°C			—
Solution temperature [°C] .....:				—
Measured [MΩ]	Required [MΩ]			Result
				—
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

SEQUENCE D				
Sample #				—
Table 25: MST 53 - Damp heat test				
Test Date [YYYY-MM-DD] start/end .....:				—
Applied load [N] .....:		5		—
Total hours .....:		1000		—
MST 01: Visual inspection after damp heat test				—
Test Date [YYYY-MM-DD].....:				—
Findings ..... :		☐ Yes ☐ No		—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after damp heat test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints..... :		☐ Yes ☐ No		—
Test Voltage applied [V, DC] .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
MST 17: Wet leakage current test after damp heat test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints..... :		☐ Yes ☐ No		—
Test Voltage applied [V, dc].....:				—
Solution resistivity [Ω cm].....:		< 3500 Ω cm at 22 ± 2°C		—
Solution temperature [°C] .....:				—
Measured [MΩ[		Required [MΩ]		Result
				—
Supplementary information:				

Table 26: MST 42 - Robustness of terminations test		
Test Date [YYYY-MM-DD].....:		—

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Clause	Requirement + Test	Result - Remark	Verdict

MQT 14.1: Retention of junction box on mounting surface				
Applied force in all directions parallel to the mounting surface and parallel to the module edges [N] .....:				—
Applied force perpendicular to the mounting surface [N] .....:				—
Supplementary information:				
MST 01: Visual inspection after retention of junction box on mounting surface				
Test Date [YYYY-MM-DD].....:				—
Findings ..... :	☐ Yes ☐ No			—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after retention of junction box on mounting surface				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints.....:	☐ Yes ☐ No			—
Test Voltage applied [V, DC] .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
MST 17: Wet leakage current test after retention of junction box on mounting surface				
Test Date [YYYY-MM-DD].....:				—
Cemented joints.....:	☐ Yes ☐ No			—
Test Voltage applied [V] .....:				—
Solution resistivity [Ω cm].....:	< 3500 Ω cm at 22 ± 2°C			—
Solution temperature [°C] .....:				—
Measured [MΩ]	Required [MΩ]			Result
				—
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

Table 27: MST 34 - Static mechanical load test			
Test Date [YYYY-MM-DD].....:			—
Mounting method .....:			—
Design Load [Pa] / Safety factor ɣm.....:			—
Load applied to.....:	front side	back side	—
Mechanical load [Pa].....:			—
First cycle time (start/end) .....:	1h	1h	—
Intermittent open circuit (yes/no) .....:	No	No	—
Second cycle time (start/end) .....:	1h	1h	—
Intermittent open circuit (yes/no) .....:	No	No	—
Third cycle time (start/end) .....:	1h	1h	—
Intermittent open circuit (yes/no) .....:	No	No	—
Supplementary information: Maximum bending at module centre xx mm.			

MST 01: Visual inspection after Static mechanical load test				—
Test Date [YYYY-MM-DD].....:				—
Findings ..... :	☐ Yes	☐ No		—
Nature and position of findings – comments or attach photos				—

MST 16: Insulation test after Static mechanical load test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints.....:	☐ Yes	☐ No		—
Test Voltage applied [V, DC] .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—

MST 17: Wet leakage current test after Static mechanical load test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints.....:	☐ Yes	☐ No		—
Test Voltage applied [V, dc] ..... :				—
Solution resistivity [Ω cm) .....:	< 3500 Ω cm at 22 ± 2°C			—
Solution temperature [°C] ..... :				—
Measured [MΩ]	Required [MΩ]			Result
				—
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

SEQUENCE E				
Sample #				—
Table 28: MST 51 - Thermal cycling test				
Test Date [YYYY-MM-DD] start/end .....:				—
Total cycles .....:	200			—
Applied current [A] .....:				—
Applied load [N] .....:	5			—
Limiting voltage [V] .....:				—
Open circuits .....:	☐ Yes	☐ No		—
MST 01: Visual inspection after Thermal cycling test				—
Test Date [YYYY-MM-DD].....:				—
Findings ..... :	☐ Yes	☐ No		—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after Thermal cycling test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints.....:	☐ Yes	☐ No		—
Test Voltage applied [V, DC] .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
MST 17: Wet leakage current test after Thermal cycling test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints.....:	☐ Yes	☐ No		—
Test Voltage applied [V, dc].....:				—
Solution resistivity [Ω cm].....:	< 3500 Ω cm at 22 ± 2°C			—
Solution temperature [°C] .....:				—
Measured [MΩ]	Required [MΩ]			Result
				—
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

SEQUENCE F					
Sample #					—
Table 29: MST 25 - Bypass diode thermal test					
Test Date [YYYY-MM-DD] start/end .....:					—
Module temperature [°C].....:					—
Number of diodes in junction box .....:					—
Diode manufacturer .....:					—
Diode type designation .....:					—
Max. permissible junction temperature Tjmax [°C] (according to diode datasheet).....:					—
Step 1, Determination of *VD* versus *TJ* characteristic					—
Ambient temperature of the junction box [°C] ....:	30 ± 2	50 ± 2	70 ± 2	90 ± 2	—
Pulsed current .....:					—
Voltage drop [V] .....:					—
VD versus TJ characteristic.....:					
Max. permissible junction temperature Tj_{max} [°C] (according to diode datasheet) ..... :					—
Step 2, Bypass diode thermal test					—
	Diode 1	Diode 2	Diode 3		Result
Current flow applied* [A] .....:					—
Max. diode surface temperature allowed Tjmax [°C],.....:					—
Voltage drop [V] after 1h.....:					—
Calculated max. junction temperature Tjcalc [°C] .....:					—
Tjcalc < Tjmax (test passed)? yes/no.....:					—
Current flow** (1.25 * Isc) [A].....:					—
Bypass diode remain(s) functional (yes/no).....:					—
Supplementary information: See Table 43 for the test details of bypass diode functionality test. For bifacial modules, * current for the 1st hour shall be I_{SC} (aBSI), ** current for the 2nd hour shall be 1.25 x I_{SC} (aBSI).					
MST 01: Visual inspection after Bypass diode thermal test					—
Test Date [YYYY-MM-DD].....:					—
Findings ..... :	☐ Yes	☐ No			—
Nature and position of findings – comments or attach photos					—

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Clause	Requirement + Test	Result - Remark	Verdict

MST 16: Insulation test after Bypass diode thermal test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints.....:	☐ Yes ☐ No			—
Test Voltage applied [V, DC] .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
MST 17: Wet leakage current test after Bypass diode thermal test				—
Test Date [YYYY-MM-DD]:.....				—
Cemented joints.....:	☐ Yes ☐ No			—
Test Voltage applied [V]:.....				—
Solution resistivity [Ω cm].....:	< 3500 Ω cm at 22 ± 2°C			—
Solution temperature [°C] .....:				—
Measured [MΩ]	Required [MΩ]			Result
				—
Supplementary information:				

Table 30: MST 22 - Hot-spot endurance test		
Test Date [YYYY-MM-DD] start/end .....:		—
Cell interconnection circuit.....:	☐ S ☐ SP ☐ PS	—
Irradiance during each cycle……..…..:		—
Module temperature at thermal equilibrium in each cycle [°C] .....:		—
Determination of worst case cell		—
Maximum measured cell temperature in each cycle [°C] .....:		—
Shading rate [%] or number of cells shaded.....:		—
Test hours for each cycle.....:		—
Supplementary information: For bifacial PV modules, the exposure was performed under aBSI which is equal to 1000W/m² + φ•300W/m².		
MST 01: Visual inspection after hot-spot endurance test		—
Test Date [YYYY-MM-DD].....:		—
Findings ..... :	☐ Yes ☐ No	—
Nature and position of findings – comments or attach photos		—
MST 02: Maximum power determination after hot-spot endurance test		—
Test Date [YYYY-MM-DD].....:		—

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Clause	Requirement + Test	Result - Remark	Verdict

Module temperature [°C].....:					—
Irradiance [W/m²].....:					—
Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]
					—
MST 16: Insulation test after hot-spot endurance test					—
Test Date [YYYY-MM-DD].....:					—
Cemented joints.....:	☐ Yes ☐ No				—
Test Voltage applied [V] .....:					—
Measured	Required	Dielectric breakdown			Result
MΩ	MΩ	Yes (description)		No	
					—
MST 17: Wet leakage current test after hot-spot endurance test					—
Test Date [YYYY-MM-DD].....:					—
Cemented joints.....:	☐ Yes ☐ No				—
Test Voltage applied [V] .....:					—
Solution resistivity [Ω cm].....:	< 3500 Ω cm at 22 ± 2°C				—
Solution temperature [°C] .....:					—
Measured [MΩ]	Required [MΩ]				Result
					—
Supplementary information:					

Table 31: MST 26 - Reverse current overload test		
Test Date [YYYY-MM-DD] ..... :		—
Module over-current protection rating [A].....:		—
Test current [A].....:		—
Range of applied voltage [V] .....:		—
Test duration .....:	2 hours	—
Observations		Result
Maximum external module surface temperature during the test [°C] :		—
MST 01: Visual inspection after Reverse current overload test		—
Test Date [YYYY-MM-DD].....:		—
Findings ..... :	☐ Yes ☐ No	
Nature and position of findings – comments or attach photos		—

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Clause	Requirement + Test	Result - Remark	Verdict

MST 16: Insulation test after Reverse current overload test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints .....:		☐ Yes ☐ No		—
Test Voltage applied [V, DC] .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
MST 17: Wet leakage current test after Reverse current overload test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints .....:		☐ Yes ☐ No		—
Test Voltage applied [V, dc].....:				—
Solution resistivity [Ω cm].....:		< 3500 Ω cm at 22 ± 2°C		—
Solution temperature [°C] .....:		23		—
Measured [MΩ]		Required [MΩ]		Result
				—
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

SEQUENCE G				
Sample #:				—
Table 32: MST 14 - Impulse voltage test				
Test Date [YYYY-MM-DD] .....:				—
Maximum system voltage [V] .....:				—
Required Impulse voltage [V].....:				—
Measured Impulse voltage [V] .....:				—
T_1 [µs].....:				—
T_2 [µs].....:				—
Thickness of conductive foil [mm] .....:				—
Results				
☐ No evidence of dielectric breakdown or surface tracking observed ☐ No evidence of major visual defects (see table MST 01 below)				—
MST 01: Visual inspection after Impulse voltage test				—
Test Date [YYYY-MM-DD].....:				—
Findings ..... :	☐ Yes ☐ No			—
Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after Impulse voltage test				—
Test Date [YYYY-MM-DD].....:				—
Cemented joints..... :	☐ Yes ☐ No			—
Test Voltage applied [V, DC] .....:				—
Measured	Required	Dielectric breakdown		Result
MΩ	MΩ	Yes (description)	No	
				—
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

OTHER TESTS		
Sample #:		—
Table 33: MST 23 - Fire test		
Test Date [YYYY-MM-DD] .....:		—
Module fire resistance class (A, B, C) .....:		—
No. of modules provided to create the test assembly .....:		—
☐ The module complies with the requirements for the fire resistance class		—
Supplementary information:		

Sample #:			—
– **Table 34: MST 24 - Ignitability test**			
Test Date [YYYY-MM-DD].....:			—
Flame application point.....:			—
Surface exposure.....:	☐ Yes	☐ No	—
Backsheet foil exposure.....:	☐ Yes	☐ No	—
Frame adhesive exposure .....:	☐ Yes	☐ No	—
Edge exposure .....:	☐ Yes	☐ No	—
Junction box adhesive exposure .....:	☐ Yes	☐ No	—
Type label exposure.....:	☐ Yes	☐ No	—
Backrail adhesive exposure.....:	☐ Yes	☐ No	—
Ignition occurs .....:	☐ Yes	☐ No	—
Flame spread less as 150 mm	☐ Yes	☐ No	—
Length of destroyed area.....:			—
Supplementary information:			

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #:		—
Table 35: MST 32 - Module breakage test		
Test Date [YYYY-MM-DD] .....:		—
Weight of impactor [kg] .....:	45	—
Thickness of sample [mm].....:		—
Mounting technique used .....:		—
Module breakage .....:	☐ No breakage	—
	☐ No separation from frame or mounting structure	—
	☐ Breakage occurred, no shear or opening large enough for a 76 mm diameter sphere to pass freely developed	—
	☐ Breakage occurred, no particles larger than 65 cm² ejected from sample	—
	☐ Continuity of equipotential bonding provided, see table 10.11	—
Nature and position of findings – comments or attach photos		Result
		—
Supplementary information:		

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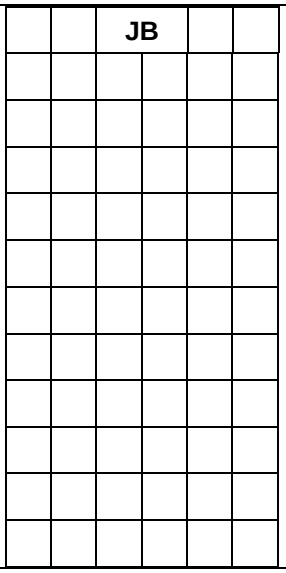
Sample #:	14-1, 14-2, 19	—
Table 36: MST 35 - Peel test (only for cemented joints)		
Test Date [YYYY-MM-DD] .....:		—
Location	☐ Flexible Frontsheet ☐ Flexible Backsheet ☐ Rigid Frontsheet ☐ Rigid Backsheet ☐ Other areas	—
Width of cemented joint	☐ ≤ 10 mm ☐ > 10mm	—
Description of area		—
Arithmetic mean M1 of adhesion force of unconditioned samples [N]		—
Arithmetic mean M2 of adhesion force of samples conditioned with sequence B [N]		—
Loss of adhesion force: $\frac{\sum_1^n M2}{\sum_1^n M1} > 0{,}5$ $0.5 < \frac{\sum_1^n M2}{\sum_1^n M1}$		—
Supplementary information:		

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Clause	Requirement + Test	Result - Remark	Verdict

Sample #:		—
Table 37: MST 36 - Lap shear strength test (only for cemented joints)		
Test Date [YYYY-MM-DD] .....:		—
Preconditioning:		
MST 53 Test Date [YYYY-MM-DD] start/end ....:		—
MST 54 Test Date [YYYY-MM-DD] start/end ....:		—
MST 52 Test Date [YYYY-MM-DD] start/end ....:		—
MST 54 Test Date [YYYY-MM-DD] start/end ....:		—
MST 52 Test Date [YYYY-MM-DD] start/end ....:		—
Arithmetic mean M1 of adhesion force of unconditioned samples [N]		—
Arithmetic mean M2 of adhesion force of samples conditioned with sequence B [N]		—
Loss of adhesion force: $\frac{\sum_1^{10} M2}{\sum_1^{10} M1} > 0{,}5 \;\; 0.5 < \frac{\sum_1^{n} M2}{\sum_1^{n} M1}$		—
Supplementary information:		

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Clause	Requirement + Test	Result - Remark	Verdict

Table 38: MST 12 - Cut susceptibility test					
Test Date [YYYY-MM-DD].....:					—
Applied force [N].....:		8,9			—
MST 01 Visual inspection after cut test					—
Test Date [YYYY-MM-DD].....:					—
Sample #	Findings .....:	☐ Yes	☐ No		—
	Nature and position of findings – comments or attach photos				—
Sample #	Findings .....:	☐ Yes	☐ No		—
	Nature and position of findings – comments or attach photos				—
Sample #	Findings .....:	☐ Yes	☐ No		—
	Nature and position of findings – comments or attach photos				—
Sample #	Findings .....:	☐ Yes	☐ No		—
	Nature and position of findings – comments or attach photos				—
MST 16: Insulation test after cut test					—
Test Date [YYYY-MM-DD].....:					—
Cemented joints .....:		☐ Yes	☐ No		—
Test Voltage applied [V, DC] .....:					—
Sample #	Measured	Required	Dielectric breakdown		Result
	MΩ	MΩ	Yes (description)	No	
					—
					—
					—
					—

MST 17: Wet leakage current test after cut test			
Test Date [YYYY-MM-DD].....:			—
Cemented joints .....:	☐ Yes	☐ No	—
Test Voltage applied [V, dc].....:			—
Solution resistivity [Ω cm].....:	< 3500 Ω cm at 22 ± 2°C		—
Solution temperature [°C] .....:			—
Sample #	Measured [MΩ]	Required [MΩ]	Result
			—
			—

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Clause	Requirement + Test	Result - Remark	Verdict

			—
			—
Supplementary information:			

Table 39: MST 03 - Maximum power determination final						
Test Date [YYYY-MM-DD].....:						—
Module temperature [°C].....:			25			—
Irradiance [W/m²].....:			1000			—
Sample #	Isc [A]	Voc [V]	Imp [A]	Vmp [V]	Pmp [W]	FF [%]
						—
						—
						—
						—
Supplementary information:						

Table 40: MST 01 - Final Visual inspection			
Test Date [YYYY-MM-DD].....:			—
Sample #	Findings .....:	☐ Yes ☐ No	—
	Nature and position of findings – comments or attach photos		—
Sample #	Findings .....:	☐ Yes ☐ No	—
	Nature and position of findings – comments or attach photos		—
Sample #	Findings .....:	☐ Yes ☐ No	—
	Nature and position of findings – comments or attach photos		—
Sample #	Findings .....:	☐ Yes ☐ No	—
	Nature and position of findings – comments or attach photos		—
Supplementary information:			

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Clause	Requirement + Test	Result - Remark	Verdict

Table 41: MST 05 - Durability of markings						
Test Date [YYYY-MM-DD].....:						—
Sample #	Markings legible		Not easily removable		No curling	Result
	☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes ☐ No	—
	☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes ☐ No	—
	☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes ☐ No	—
	☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes ☐ No	—
Supplementary information:						

Table 42: MST 06 - Sharp edge test			
Test Date [YYYY-MM-DD].....:			—
Sample #	The black indicating tape is visible through the resulting cut.		Result
	☐ Yes	☐ No	—
	☐ Yes	☐ No	—
	☐ Yes	☐ No	—
	☐ Yes	☐ No	—
Supplementary information:			

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Clause	Requirement + Test	Result - Remark	Verdict

Table 43: MST 07 - Bypass diode functionality test

Test Date [YYYY-MM-DD].....:		—
☐ **Method A**		—
Ambient temperature [°C].....:		—
Current flow applied [A].....:		—

Sample #	VFM	VFMrated	VFM = (N × VFMrated) ± 10 %	Result
			☐ Yes ☐ No	—
			☐ Yes ☐ No	—
			☐ Yes ☐ No	—
			☐ Yes ☐ No	—

☐ **Method B** —

Sample #	IV curve after shading						Result
	Diode 1 working properly		Diode 2 working properly		Diode 3 working properly		
	☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No	—
	☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No	—
	☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No	—
	☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No	—

Supplementary information:

IEC 61730-2			
Clause	Requirement + Test	Result - Remark	Verdict

Table 44: MST 33a - Test for general screw connections			
Test Date [YYYY-MM-DD]..... :			—
Sample #	Thread diameter [mm]	Torque [Nm]	Result
			—
			—
			—
			—
Supplementary information:			

Table 45: MST 33b - Test for locking screws			
Test Date [YYYY-MM-DD]..... :			—
Sample #	Thread diameter [mm]	Torque [Nm]	Result
			—
			—
			—
			—
Supplementary information:			

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Clause	Requirement + Test	Result - Remark	Verdict

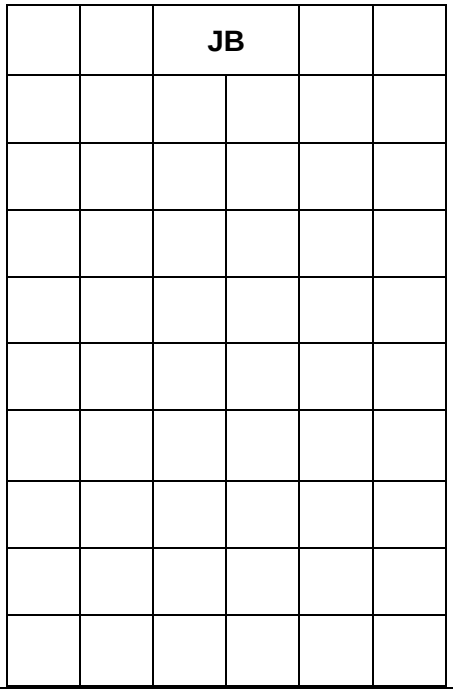
Sample #		—

Table 46: MST 04 - Insulation thickness test

Test Date [YYYY-MM-DD] ..... :		—
Max. System voltage ..... :		—
Test location 1	Centre, near the junction box, between two busbars	—
Test location 2	Edge cell, between two busbars	—
Test location 3	Corner cell, above a busbar	—
Thickness of insulation acc. datasheet ..... :		—
Required thickness of insulation ..... :		—
Measurement uncertainty ..... :		—

—	Measured thickness (including uncertainty)			Result
	Test location 1	Test location 2	Test location 3	
Thickness layer 1 [µm]				—
Thickness layer 2 [µm]				—
Thickness layer 3 [µm]				—
Total thickness [µm]				—

Supplementary information:
Min. requirement acc. to table 3/4 of IEC 61730-1.
Samples taken from positions as below (module view from backside):



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ANNEX 1: LIST OF TEST EQUIPMENT USED:

A completed list of used test equipment shall be provided in the Test Reports when a Manufacturer Testing Laboratory according to CTF stage 1 or CTF stage 2 procedure has been used.
Note: This page may be removed when CTF stage 1 or CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
-	-	-	-	-	-

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ANNEX 2: PRODUCT DESCRIPTION SHEET (MANUFACTURERS AND TYPE REFERENCES)

A1.1	MODULE TYPE/S
	—

A1.2	MODULE DESIGN	
	Module dimensions (L x W x H) [mm] ..... :	—
	Weights ..... :	—
	Front/Rear cover bonding classification ..... :	☐ rigid/flexible ☐ rigid/rigid ☐ flexible/flexible

A1.3	SOLAR CELL	
	Cell type reference ..... :	—
	Cell dimensions L x W x T (± %) [mm] ..... :	—
	Cell thickness [µm] ..... :	—
	Cell area [cm²] ..... :	—

A1.4	IDENTIFICATION OF MATERIALS	
	Front cover ..... :	—
	Rear cover ..... :	—
	Encapsulation material front side ..... :	—
	Encapsulation material back side ..... :	—
	Frame parts ..... :	—
	Mounting parts ..... :	—
	Adhesive for frame ..... :	—
	Edge sealing ..... :	—
	Internal wiring ..... :	—
	Cell connector ..... :	—
	String connector ..... :	—
	Soldering material ..... :	—
	Fluxing agent ..... :	—
	Junction box ..... :	—
	Cable ..... :	—

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	Connector ..... :	—
	Bypass diode ..... :	—
	Potting material ..... :	—
	Adhesive for junction box ..... :	—
	Additional material (e. g. fixing tape, insulation tape) ..... :	—

A1.5	MODULE DESIGN - MINIMUM DISTANCES	
	Between cells ..... :	—
	Between cell and accessible surfaces ..... :	—
	Between any current carrying part and accessible surfaces ..... :	—

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

ANNEX 3: DRAWINGS AND CIRCUITS

N/A