Prüfbericht-Nr.: *Test Report No.:*	**50165747 004**	**Auftrags-Nr.:** *Order No.:*	154375691	Seite 1 von 131 *Page 1 of 131*
Kunden-Referenz-Nr.: *Client Reference No.:*	621693	**Auftragsdatum:** *Order date:*	21/11/2018	
Auftraggeber: *Client:*	GCL System Integration Technology Co., Ltd. Jianghai Economic Zone,Nanqiao Town, Fengxian District, Shanghai 201406 P. R. China			
Prüfgegenstand: *Test item:*	Photovoltaic (PV) modules			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	See module type designation list on page 3			
Auftrags-Inhalt: *Order content:*	Design qualification and type approval of photovoltaic (PV) modules			
Prüfgrundlage: *Test specification:*	Photovoltaic (PV) modules IEC 61215-1:2016. IEC 61215-1-1:2016. IEC 61215-2:2016. IEC 61730-1:2016. IEC 61730-2:2016			

Wareneingangsdatum: *Date of receipt:*	06/11/2018	Detaillierte Fotodokumentation siehe Anlage zu diesem Bericht *Detailed photo documentation see appendix to this report*
Prüfmuster-Nr.: *Test sample No.:*	See page 11-15	
Prüfzeitraum: *Testing period:*	20/12/2018 – 29/05/2019	
Ort der Prüfung: *Place of testing:*	TÜV Rheinland (Shanghai) Co., Ltd.	
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shanghai) Co., Ltd.	
Prüfergebnis*: *Test result*:*	Pass	

geprüft von / *tested by*:			**kontrolliert von / *reviewed by*:**		
03/06/2019	Jane Zhang / Project Engineer		03/06/2019	Angela Yao / Technical Reviewer	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*:
- Extension to alternative materials.
- Refer to page 5-7 and Constructional Data Form (CDF) in appendix 1 for more details.

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:*	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.

Liste der verwendeten Prüfmittel
List of used test equipment

Prüfmittel *Test equipment*	**Prüfmittel-Nr. / ID-Nr.** *Equipment No. / ID-No.*	**Nächste Kalibrierung** *Next calibration*
All equipment used for tests, including equipment for subsidiary measurements having a significant effect on the accuracy or validity of the result of the test is calibrated before being put into service. The laboratory of TÜV Rheinland (Shanghai) Co., Ltd. has an established programme and procedure for the calibration of its equipment according to EN ISO/IEC 17025(Reg. no.: D-PL-11097-02-01). Refer to appendix 4 for equipment list.		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

1 Produktdetails
Product details

Approved module types:
With 6” mono cells:
GCL-M6/72Hxxx (xxx=320-385, in steps of 5, 72 cells)
GCL-M6/60Hxxx (xxx=270-320, in steps of 5, 60 cells)
With 6” poly cells:
GCL-P6/72Hxxx (xxx=310-375, in steps of 5, 72 cells)
GCL-P6/60Hxxx (xxx=260-310, in steps of 5, 60 cells)

2 Verwendete Materialien
Used materials

See Constructional Data Form (CDF) in appendix 1 of this test report.

3 Adresse(n) der Fertigungsstätte(n)
Address(es) of the manufacturing site(s)

Name / Description:	Zhangjiagang GCL System Integration Technology Co., Ltd.
Street:	288# Chenfeng Road, Yangshe Town, Zhangjiagang City,
Postcode / City, Country:	215600 / Jiangsu Province, P. R. China
Type of production:	Crystalline PV-module
Inspection report No:	15086194.004

Name / Description:	Jiangsu Ds Photovoltaic Technology Co., Ltd.
Street:	No.6 Konggang New District,
Postcode / City, Country:	212434 / Guozhuang Town, Jurong, Jiangsu Province, P.R.China
Type of production:	Crystalline PV-module
Inspection report No:	15078794.007

Name / Description:	Vina Solar Technology Co., Ltd.
Street:	Lot CN-03, Factory E12, Van Trung Industry Park
Postcode / City, Country:	BacGiang province, Vietnam
Type of production:	Crystalline PV-module
Inspection report No:	15103891.003

Name / Description:	Jinzhai GCL System Integration Technology Development Co., Ltd.
Street:	East of Baimafeng Road, Modern Industrial Park, Jinzhai county,
Postcode / City, Country:	Anhui Province, P.R.China
Type of production:	Crystalline PV-module
Inspection report No:	50081674.003

Name / Description:	Funing GCL System Integration Technology Co., Ltd.
Street:	No. 888(A) Hong Kong Road, Funing Ecnomic Development Zone, Yangcheng City,
Postcode / City, Country:	Jiangsu Province P.R. China
Type of production:	Crystalline PV-module
Inspection report No:	15104102.003

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4 Zusammenfassung der Prüfergebnisse
Summary of test results

- All of the requirements of standard IEC 61215-1:2016, IEC 61215-1-1:2016, IEC 61215-2:2016, IEC 61730-1:2016 and IEC 61730-2:2016 were fulfilled and passed according to their regulations of the pass criteria.

Summary of test locations:
All tests were performed at TÜV Rheinland (Shanghai) Co., Ltd.

Description of similarity (differences) between the applied model and the previously tested model:
- Extension to alternative materials in below table. The relevant tests were performed on representative models and test results are documented in this test report.

Object	Manufacturer / trademark	Type / model	Technical data / ratings	Representative model for testing
Front cover	XINYI PV PRODUCTS(ANHUI) HOLDINGS LTD	External AR Coating Glass	Thickness = 3.2 mm	Module GCL-P6/72H325 (BOM 1) in this test report.
Remark: Refer to test report No. 15067426.001 for Hail test (MQT 17) .				
Rear cover	Cybrid Technologies Inc.	Cynagard 225A(R)	Thickness=0.315mm (PVDF/PET/coating) System voltage=1500V	
Remark: This rear cover can only be used with encapsulation material 15296P(near glass) and 15297W (near back sheet). The fire test were performed and documented in the report No. 15093637.003.				
Encapsulation material	Changzhou Sveck PV New Material Co.,Ltd.	15296P(near glass)	Thickness =0.5mm/0.65mm	
		15297W (near back sheet)	Thickness =0.5mm	
Remarks: 0.65mm is extended from 0.5mm with the similar component and manufacturing process parameters. No additional testing is considered necessary. The fire test regarding to above EVA were performed and documented in the report 15067427.021.				
Solar cell	United Renewable Energy Co., Ltd.	NP6W	United Renewable Energy Co.,Ltd.	
Remarks: This solar cell can only be used with encapsulation material 15296P(near glass) and 15297W (near back sheet).				
Light redirecting film	Changzhou Sveck PV New Material Co.,Ltd.	SV-FG01	1.2mm for 5BB thickness=0.115mm	
Remarks: This LRF can only be used with fluxing agent 8000T8 and EVA 15296P(near glass) and 15297W (near back sheet).				
New combination: Fluxing agent 8000T8 + EVA 15296P(near glass) and 15297W (near back sheet).				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

Object	Manufacturer / trademark	Type / model	Technical data / ratings	Representative model for testing
New combination: Backsheet Cynagard 225A(R)+ EVA F406P(near glass) and F806W (near back sheet)				Module GCL-P6/72H325 (BOM 2) in this test report.
Adhesive	Shanghai Huitian New Material Co., Ltd.	HT906Z	Silicon	Remark: Alternative junction box adhesive, potting materials and bypass diodes was added for junction box GCL-S1xy (x=1, y=1), no additional test was considered necessary, since the junction box were tested according to junction box standard IEC 62790: 2014 (junction box certificate No. 50360667).
Adhesive	Jiangsu CREVO Science& Technology Co., Ltd.	CV709	Silicon	
Potting material	Shanghai Huitian New Material Co., Ltd.	HT-5299W-S	Silicon	
Potting material	Jiangsu Crevo Science&Technology Co., Ltd.	CV315	Silicon	
Bypass diode	QC Solar (Suzhou) Corporation	SB3050DY	Tj max=200°C	
Bypass diode	PAN JIT INTERNATIONAL INC	SB3050DY	Tj max=200°C	
Bypass diode	Yangzhou Hongyang Electonics Co., Ltd.	SPA2045	Tjmax=200℃	
Cable	Jiangsu Tonglin Electric Co., Ltd.	H1Z2Z2-K 1x1.5….35mm²	Max. Voltage = 1500VDC Max. Current = N/A	
Connector	Jiangsu Tonglin Electric Co., Ltd.	TL-CABLE01S	Max. Voltage = 1500VDC Max. Current = 30A	
Rear cover	ZHONGTIAN PHOTOVOLTAIC MATERIALS CO.,LTD	ZTT-KPO350	Thickness=0.365mm (PVDF/PET/PO) System voltage=1500V	Module GCL-P6/72H325 (BOM 3) in this test report.
Remark: Since the materials of each layer is the same with backsheet ZTT-KPO290, the fire test performed with backsheet ZTT-KPO290 can cover ZTT-KPO350, refer to report No. 15067427.022 for details.				
Encapsulation material	shanghai HIUV new materials Co.,LTD	S201MP1 (near glass)	Thickness =0.6mm	
		S201W (near back sheet)	Thickness =0.5mm	
Remarks: The fire test regarding to above EVA were performed and documented in the report 15093637.009.				
New combination: Fluxing agent 8000T8 + EVA S201MP1 (near glass)and S201W (near back sheet) and backsheet ZTT-KPO350 + EVA S201MP1 (near glass)and S201W (near back sheet)				
Rear cover	Crown Advanced material CO.,LTD	BE-D5	Thickness=0.410mm (PVDF/PET/PO) System voltage=1500V	Module GCL-P6/72H325 (BOM 4) in this test report.
The fire test were performed and documented in the report No. 15093637.007.				
New combination: Backsheet Cynagard 225A(R)+ EVA S201MP1 (near glass)and S201W (near back sheet).				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

Object	Manufacturer / trademark	Type / model	Technical data / ratings	Representative model for testing
New combination: Backsheet BE-D5+ EVA F406P(near glass) and F806W (near back sheet).				Module GCL-P6/72H325 (BOM 5) in this test report.
New combination: Backsheet ZTT-KPO350 + EVA 15296P(near glass) and 15297W (near back sheet). Remark: Since the materials of each layer is the same with backsheet ZTT-KPO290, the relevant tests were performed on module type GCL-P6/72325 with backsheet ZTT-KPO290 under system voltage 1000V, refer to report No. 50091800 007 for details.				
Front cover	JIANGSU XIUQIANG GLASSWORK CO.,LTD.	External AR Coating Glass	Thickness = 3.2 mm	-
Front cover	FLAT SOLAR GLASS GROUP CO.,LTD.	External AR Coating Glass	Thickness = 3.2 mm	
Front cover	SHANXI TOPRAY SOLAR CO., LTD	External AR Coating Glass	Thickness = 3.2 mm	
Remark: Based on the declaration in appendix 5, since the light transmittance, manufacturing process and coading solution is the same with glass from Xinyi, no additional test was considered necessary.				
Light redirecting film stick on the cell connector	Suzhou golden electrical technology co., Ltd.	GS-1200-090-01 (Only combine with EVA4)	Thickness = 0.12mm Width = 1.2mm	Refer to test report 50230291 001 (1000V)
New combination: ZTT-KPO350+EVA F406P(near glass) and F806W(near backsheet). Remark: Since the materials of each layer is the same with backsheet ZTT-KPO290, the relavant tests performed with backsheet ZTT-KPO290 can cover ZTT-KPO350, refer to report No. 50091800 007 for details.				Refer to report No. 50091800 007 for details.
Solar cell	WKC（suzhou）Energy Technology Co., Ltd.	WKC-P156-B5 (dotted 5 busbars, Poly cell)	156.75mm×156.75mm×200um±20um	
Remarks: The solar cell can only be used with F406P(near glass) and F806W (near backsheet).				
New combination: Fluxing agent 8000T8 + EVA F406P(near glass) and F806W (near backsheet).				
Cell connectors	Xi'an Telison New Materials Co., Ltd	Sn60Pb40	Ø=0.35	Refer to test report No. 15095371.013
Remarks: Only for cell type GCLP156N12BB.				

This test report includes the following appendices:
Appendix 1: Constructional Data Form (CDF)
Appendix 2: Photo documentation
Appendix 3: Measurement report
Appendix 4: Equipment list
Appendix 5: Additional documentation

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

—	**Test specification**		
	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements	IEC 61215-1:2016	—
	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules	IEC 61215-1-1:2016	
	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 2: Test procedures	IEC 61215-2:2016	
	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction	IEC 61730-1:2016	
	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing	IEC 61730-2:2016	

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

—	**Abbreviations used in the report**
NMOT	Nominal Module Operating Temperature
STC	Standard Test Conditions
Pmax	Maximum power
Impp	Maximum power point current
Vmpp	Maximum power point voltage
Isc	Short circuit current
Voc	Open circuit voltage
FF	Fill factor
α	Current temperature coefficient
β	Voltage temperature coefficient
γ	Power temperature coefficient
S	Series connection
SP	Series-parallel connection
SPS	Series-parallel-series connection
MQT	Module quality test
MST	Module safety test
PD	Pollution degree
MG	Material groups
CTI	Comparative tracking index
PTI	Proof tracking index
RTI	Relative temperature index
RTE	Relative thermal endurance index
TI	Temperature index
Cl	Clearances
Cr	Creepage distances
Dti	Distance through insulation
This test report includes a measurement report in appendix “Messbericht/Measurement report”.	

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

Statement of the estimated uncertainty of the test verdicts

- Electrical performance rating is outside the scope of IEC 61215:2016 qualification testing. The verdicts of performance rating are only related to the test samples that were subjected to the tests. They cannot be generalised to the modules from the series production.
- The calibration to STC was performed with a class AAA solar simulator. The extended measurement uncertainty is:
  - 2σ (P_{mpp}) ≤ ± 3.0 %
  - 2σ (I_{SC}) ≤ ± 2.8 %
  - 2σ (V_{OC}) ≤ ± 0.9 %
- The reproducibility parameter r with the solar simulator is 0.8%.
- Relative measurements were performed with a flash type solar simulator.

—	**Marking**	
Name, monogram or symbol of manufacturer	GCL	P
Type or model number	Marked on rating label	P
Serial number	Encapsulated inside module	P
Polarity of terminals or leads	Marked on connectors	P
Maximum system voltage	Marked on rating label	P
Date and place of manufacture	Traceable from serial number	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

—	**List of test samples**

BOM 1:
Module type: GCL-P6/72H335 for sample 1-1 to 1-6
Module type: GCL-P6/72H340 for sample 1-7 to 1-13

Sample No.	Sample S/N	Remarks/constructional characteristics (e.g. cell, backsheet, frame type)	
1-1	271808089040127	Glass: 3.2mm thickness External AR Coating Glass from XINYI **Cell: NP6W (dotted 5 busbars, Poly cell) from United Renewable Energy** **EVA: 15296P(near glass) / 15297W (near back sheet) from Changzhou Sveck** **Backsheet: 0.315mm thickness Cynagard 225A(R)from Cybrid** Frame: 6063-T5, 35mm from JiangYin HAIDA Cell connector / String connector: 0.9*0.25mm / 0.35*6.0mm from Jiangsu Sun technology Frame & junction box adhesive: HT-8258 from Jiangsu tianchen New materials Junction box: GCL-S1xy (x=1, y=1) from GCL Potting material: HT-6360 from Jiangsu Tianchen New Materials Insulation tape: Cynagard 115E from Cybrid Fluxing agent: 8000T8 from Huaihui Shenzhenshi Electronic Material	MQT 06.1, 04 ,07
1-2	271808089040140		MST 21, MQT 09, MST 26
1-3	271808089040135		MST 11, 12,42,51,52 MQT 10, 11, 12
1-4	271808089040137		
1-5	271808089040139		MST 11,12, MQT 10, 11, 12
1-6	271808089040134		
1-7	271808089040132		MST 11,12, 13, MQT 13, 16
1-8	271808089040141		MQT 13
1-9	271808089040142		MST 32
1-10	271808089040131		MST 24
1-11*	271808089040150		MST 14
1-12	271808089040143		MST 37, 52, 55, 56
1-13	271808089040144		MST 52, 53, 54, 04

Supplementary information:
* Sample No. 1–11 is laminate for impulse voltate test (MST 14).

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

BOM 2:
Module type: GCL-P6/72H345 for sample 2-1 and 2-2
Module type: GCL-P6/72H340 for sample 2-3 to 2-8

Sample No.	Sample S/N	Remarks/constructional characteristics (e.g. cell, backsheet, frame type)	
2-1	271808089040055	Glass: 3.2mm thickness External AR Coating Glass from XINYI **Cell: GCL-P156N5BB (dotted 5 busbars, poly cell) from GCL** **EVA: F406P(near glass) / F806W(near backsheet) from Hangzhou First** **Backsheet: 0.315mm thickness Cynagard 225A（R）from Cybrid** Frame: 6063-T5, 35mm from JiangYin HAIDA Cell connector / String connector: 0.9*0.25mm / 0.35*6.0mm from Jiangsu Sun technology **Frame & junction box adhesive: HT906Z from Shanghai Huitian New Material** Junction box: GCL-S1xy (x=1, y=1) from GCL **Potting material: HT5299W-S from Shanghai Huitian New Material** Insulation tape: Cynagard 115E from Cybrid Fluxing agent: 8000T8 from Huaihui Shenzhenshi Electronic Material	MQT 06.1
2-2	271808089040056		MST 11, 12,42,51,52 MQT 10, 11, 12
2-3	271808089040057		
2-4	271808089040046		MST 11,12, MQT 13
2-5	271808089040059		
2-6*	271808089040029		MST 14
2-7	271808089040051		MST 37, 52, 55, 56
2-8	271808089040060		MST 52, 53, 54

Supplementary information:
* Sample No. 2–6 is laminate for impulse voltate test (MST 14).

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

Module type: GCL-P6/72H325 (BOM 3)

Sample No.	Sample S/N	Remarks/constructional characteristics (e.g. cell, backsheet, frame type)	
3-1	271808089040097	Glass: 3.2mm thickness External AR Coating Glass from XINYI **Cell: GCL-P156N5BB (dotted 5 busbars, poly cell) from GCL** **EVA: S201MP1（near glass）/ S201W (near back sheet) from Shanghai HIUV** **Backsheet: 0.365mm thickness ZTT-KPO350 from HONGTIAN PHOTOVOLTAIC MATERIALS** Frame: 6063-T5, 35mm from JiangYin HAIDA Cell connector / String connector: 0.9*0.25mm / 0.35*6.0mm from TELISON Frame & junction box adhesive: 1527 from TONSAN Junction box: GCL-S1xy (x=1, y=1) from GCL Potting material: 1521 from TONSAN Insulation tape: Cynagard 115E from Cybrid Fluxing agent: 8000T8 from Huaihui Shenzhenshi Electronic Material	MQT 06.1
3-2	271808089040096		MST 21, MQT 09
3-3	271808089040092		MST 11, 12,42,51,52 MQT 10, 11, 12
3-4	271808089040093		
3-5	271808089040094		MST 11,12, MQT 13
3-6	271808089040098		
3-7*	271808089040085		MST 14
3-8	271808089040086		MST 37, 52, 55, 56
3-9	271808089040099		MST 52, 53, 54, 04
3-10	271808089040095		MST 24
3-11	271808089040083		MST 32

Supplementary information:
* Sample No. 3–7 is laminate for impulse voltate test (MST 14).

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

BOM 4
Module type: GCL-P6/72H345 for sample 4-1 to 4-4
Module type: GCL-P6/72H340 for sample 4-5 to 4-10

Sample No.	Sample S/N	Remarks/constructional characteristics (e.g. cell, backsheet, frame type)	
4-1	271808089040011	Glass: 3.2mm thickness External AR Coating Glass from XINYI Cell: GCL-P156N5BB (dotted 5 busbars, poly cell) from GCL **EVA: S201W (near back sheet)/ S201MP1(near glass) from Shanghai HIUV** **Backsheet: 0.410mm thickness BE-D5 from Crown Advanced material** Frame: 6063-T5, 35mm from JiangYin HAIDA Cell connector / String connector: 0.9*0.25mm / 0.35*6.0mm from Tonyshare (Suzhou) Electronic **Frame & junction box adhesive: HT-8258 from Jiangsu tianchen New materials** Junction box: GCL-S1xy (x=1, y=1) from GCL Potting material: HT-6360 from Jiangsu tianchen New materials Insulation tape: Cynagard 115E from Cybrid Fluxing agent: 8000T8 from Huaihui Shenzhenshi Electronic Material	MQT 06.1
4-2	271808089040001		MST 21, MQT 09
4-3	271808089040005		MST 11, 12,42,51,52 MQT 10, 11, 12
4-4	271808089040006		
4-5	271808089040008		MST 11,12, MQT 13
4-6	271808089040009		
4-7*	271808089040065		MST 14
4-8	271808089040016		MST 37, 52, 55, 56
4-9	271808089040017		MST 52, 53, 54, 04
4-10	271808089040010		MST 24

Supplementary information:
* Sample No. 4–7 is laminate for impulse voltate test (MST 14).

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

BOM 5:
Module type: GCL-P6/72H340 for sample 5-1 to 5-8

Sample No.	Sample S/N	Remarks/constructional characteristics (e.g. cell, backsheet, frame type)	
5-1	271808089040113	Glass: 3.2mm thickness External AR Coating Glass from XINYI Cell: GCL-P156N5BB (dotted 5 busbars, poly cell) from GCL **EVA: F806W (near back sheet)/ F406P(near glass) from Hangzhou First** **Backsheet: 0.300mm thickness BE-D5 from Crown Advanced material** Frame: 6063-T5, 35mm from JiangYin HAIDA Cell connector / String connector: 0.9*0.25mm / 0.35*6.0mm from Tonyshare (Suzhou) Electronic **Frame adhesive: HT-8258 from Jiangsu tianchen New materials** **junction box adhesive: CV709 from CREVO** Junction box: GCL-S1xy (x=1, y=1) from GCL **Potting material: CV315 from CREVO** Insulation tape: Cynagard 115E from Cybrid Fluxing agent: 8000T8 from Huaihui Shenzhenshi Electronic Material	MQT 06.1
5-2	271808089040102		MST 11, 12,42,51,52 MQT 10, 11, 12
5-3	271808089040103		
5-4	271808089040105		MST 11,12, MQT 13
5-5	271808089040109		
5-6*	271808089040108		MST 37, 52, 55, 56
5-7	271808089040110		MST 52, 53, 54
5-8	271808089040118		MST 14

Supplementary information:
* Sample No. 5–6 is laminate for impulse voltate test (MST 14).

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

—	**IEC61215 Part 1: Test requirements**	

	MARKING AND DOCUMENTATION		—
5.1	**Name Plate**		—
	The module includes the following clear and indelible markings:		P
	Name, registered trade name or registered trade mark of manufacturer	Marked on rating label	P
	Type or model number designation	Marked on rating label	P
	Serial number (unless marked on other part of product)	Encapsulated inside module	P
	Date and place of manufacture; alternatively serial number allowing to trace the date and place of manufacture;	Traceable from serial number	P
	Maximum system voltage	Marked on rating label	P
	Class of protection against electrical shock	Marked on rating label	P
	Voltage at open-circuit or V_{oc} including tolerances.	Marked on rating label	P
	Current at short-circuit or I_{sc} including tolerances	Marked on rating label	P
	Module maximum power or P_{max} including tolerances	Marked on rating label	P
	All electrical data is shown as relative to standard test conditions (1 000 W/m², 25 °C, AM 1,5 according to IEC TS 61836).	Marked on rating label	P
	International symbols are used where applicable.	Marked on rating label	P
5.2	**Documentation**		—
5.2.1	Minimum requirements		P
	Modules are supplied with documentation describing the methods of electrical and mechanical installation as well as the electrical ratings of the module	Available in installation manual	P
	The documentation state the class of protection against electrical shock under which the module has been qualified and any specific limitations required for that class.	Available in installation manual	P
	The documentation assure that installers and operators receive appropriate and sufficient documentation for safe installation, use, and maintenance of the PV modules.	Available in installation manual	P
5.2.2	Information to be given in the documentation		P
	All information required under 5.1	Fullfilled in table 5.1	P
	Overcurrent protection device type and rating are e.g. given in IEC 60269-6. Overcurrent protection devices with a 1 h, 1,35 I_n overload rating, where I_n is the rated value of the overcurrent protection device, are recommended	Over current rating is 20A. Marked on rating label.	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	Maximum series/parallel module configurations is recommended	Available in installation manual	P
	Manufacturer's stated tolerance for V_{OC}, I_{SC} and maximum power output under standard test conditions	Marked on rating label	P
	Temperature coefficient for voltage at open-circuit	See table 4.4 of IEC 61215 Part 2 in this report	P
	Temperature coefficient for maximum power	See table 4.4 of IEC 61215 Part 2 in this report	P
	Temperature coefficient for short-circuit current	See table 4.4 of IEC 61215 Part 2 in this report	P
	All electrical data mentioned above is shown as relative to standard test conditions (1 000 W/m², 25 °C, AM 1,5 according to IEC TS 61836).	Marked on rating label	P
	Nominal module operating temperature (NMOT) is specified	N/A	N/A
	Performance at NMOT (MQT 06.2) is specified	N/A	N/A
	Performance at low irradiance (MQT 07) is specified	See table 4.7 of IEC 61215 Part 2 in this report	P
	International symbols are used where applicable	Marked on rating label	P
	Compliance is checked by inspection and MQT 04 through MQT 07.	See table 4.4 And 4.7.	P
	The electrical documentation includes a detailed description of the electrical installation wiring method to be used		P
	The minimum cable diameters for modules intended for field wiring	Available in installation manual	P
	Any limitations on wiring methods and wire management that apply to the wiring compartment or box;	Available in installation manual	P
	The size, type, material and temperature rating of the conductors to be used	The junction box has been certified according to IEC 62790:2014.	P
	Type of terminals for field wiring	The junction box has been certified according to IEC 62790:2014.	P
	Specific PV connector model/types and manufacturer to which the module connectors shall be mated	The junction box has been certified according to IEC 62790:2014.	P
	The bonding method(s) to be used (if applicable); all provided or specified hardware is identified in the documentation	The junction box has been certified according to IEC 62790:2014.	P
	The type and ratings of bypass diode to be used (if applicable)	The junction box has been certified according to IEC 62790:2014.	P
	limitations to the mounting situation (e.g., slope, orientation, mounting means, cooling)	Available in installation manual	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	A statement indicating the fire rating(s) and the applied standard as well as the limitations to that rating (e.g., installation slope, sub structure or other applicable installation information)	Available in installation manual	P
	A statement indicating the design load per each mechanical means for securing the module as evaluated during the static mechanical load test according to MQT 16. At discretion of the manufacturer the test load and/or the safety factor γ_m may be noted, too	Available in installation manual	P
	The installation instructions include relevant parameters specified by manufacturer or the following statement or the equivalent: *"Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of I_{SC} and V_{OC} marked on this module should be multiplied by a factor of 1,25 when determining component voltage ratings, conductor current ratings, and size of controls connected to the PV output."*	Available in installation manual	P
5.2.3	Assembly instructions		P
	These are provided with a product shipped in subassemblies, and are detailed andadequate to the degree required to facilitate complete and safe assembly of the product	N/A	N/A
Supplementary information: N/A			

7	**PASS CRITERIA**		—
7.1	**General**		—
	If two or more modules fail to meet the following test criteria, the design shall be deemed not to have met the qualification requirements	All the modules meet the following test criteria.	P
	Should one module fail any test, two additional modules meeting the requirements of Clause 4 shall be subjected to the entire series of tests of the respective test sequence. If one or both of these modules also fail, the design shall be deemed not to have met the qualification requirements. If, however, both modules pass the test sequence, the design shall be judged to have met the qualification requirements.	All the modules meet the following test criteria.	P
	A module design shall be judged to have passed the qualification tests and therefore to be approved according to this standard, if each test sample meets all of the following criteria.	All the modules meet the following test criteria.	P
7.2	**Power output and electric circuitry**		—
7.2.1	Verification of rated label values (Gate No. 1)	—	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
	After stabilization, each individual module shall meet: $P_{max}\ (Lab) \cdot \left(1 + \frac{\lvert m_1 \rvert [\%]}{100}\right) \geq P_{max}\ (NP) \cdot \left(1 - \frac{\lvert t_1 \rvert [\%]}{100}\right)$ $\overline{P}_{max}(Lab) \cdot \left(1 + \frac{\lvert m_1 \rvert [\%]}{100}\right) \geq P_{max}(NP)$	m_1 = 3.0; t_1 = 3.0 Pmax(Lab) & $\overline{P}$max(Lab): see Table 4.6.3.1(Initial) of IEC 61215 Part 2 in this report. Pmax(NP): 335W for sample No. 1-1 to 1-6. 340W for sample No. 1-7 to 1-8. 345W for sample No. 2-1 and 2-2. 340W for sample No. 2-3 and 2-5. 325W for sample No. 3-1 and 3-6. 345W for sample No. 4-1 and 4-4. 340W for sample No. 4-5 and 4-6. 340W for sample No. 5-1 to 5-5.	P
	After stabilization, each individual module shall meet: $V_{OC}\ (Lab) \cdot \left(1 + \frac{\lvert m_2 \rvert [\%]}{100}\right) \leq V_{OC}\ (NP) \cdot \left(1 + \frac{\lvert t_2 \rvert [\%]}{100}\right)$	m_2 = 0.9; t_2 = 3.0 Voc(Lab): see Table 4.6.3.1 (initial) of IEC 61215 Part 2 in this report. Voc(NP): 46.40V for sample No. 1-1 to 1-6. 46.60V for sample No. 1-7 to 1-8. 47.3V for sample No. 2-1 to 2-2 and No. 4-1 to 4-4. 46.6V for sample No. 2-3 to 2-5, No. 4-5 to 4-6, No.5-1 to 5-5. 46.0V for sample No. 3-1 to 3-6.	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	After stabilization, each individual module shall meet: $I_{SC}\ (Lab) \cdot \left(1 + \frac{\lvert m_3 \rvert [\%]}{100}\right) \leq I_{SC}\ (NP) \cdot \left(1 + \frac{\lvert t_3 \rvert [\%]}{100}\right)$	m_3 = 2.8; t_2 = 4.0 Isc(Lab): see Table 4.6.3.1 (initial) of IEC 61215 Part 2 in this report. Isc(NP): 9.410A for sample No. 1-1 to 1-6. 9.490A for sample No. 1-7 to 1-8, No.2-3 to 2-5, No. 4-5 to 4-6, No. 5-1 to 5-5. 9.240A for sample No.3-1 to 3-6. 9.610A for sample No.4-1 to 4-4, No. 2-1 to 2-2.	P
7.2.2	Maximum power degradation during type approval testing (Gate #2)	—	P
	At the end of each test sequence or for sequence B after bypass diode test, each test sample shall meet: $P_{max}(Lab_Gate\ \#2) \geq 0.95 \times P_{max}(Lab_Gate\ \#1) \cdot \left(1 - \frac{r[\%]}{100}\right)$	r = 0.8 See table 4.6.3.1 (final) of IEC 61215 Part 2 in this report	P
7.2.3	Electrical circuitry	—	P
	Samples are not permitted to exhibit an open-circuit during the tests	No sample exhibit open-circuit during tests.	P
7.3	**Visual defects**	—	P
	There is no visual evidence of a major defect.	No visual major defect.	P
7.4	**Electrical safety**	—	P
	The insulation test (MQT 03) requirements are met after the tests	See table 4.3 (final) of IEC 61215 Part 2 in this report	P
	The wet leakage current test (MQT 15) requirements are met at the beginning and the end of each sequence.	See table 4.15 (final) of IEC 61215 Part 2 in this report	P
	Specific requirements of the individual tests are met.	See relevant tables of of IEC 61215 Part 2 in this report	P
Supplementary information: N/A			

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

—	**IEC61215 Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules**
	Special requirements for testing of crystalline silicon photovoltaic (PV) modules has been illustrated in table 5 of IEC61215-1 : Test requirements and table 4 of IEC61215-2 : Test procedures.
Supplementary information:N/A	

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
4	**IEC 61215 Part 2: Test procedures** **Module type: GCL-P6/72H335 and GCL-P6/72H340** （**BOM 1)**		
4.1	Visual inspection (MQT 01).....:	See table 4.1	P
4.19.5	Initial stabilization (MQT 19.1).....:	See table 4.19.5	P
4.6.3.1	Performance at STC (MQT 06.1)	See table 4.6.3.1	P
4.3	Insulation test (MQT 03).....:	See table 4.3	P
4.15	Wet leakage current test (MQT 15) .....:	See table 4.15	P
4.6.3.2	Performance at NMOT (MQT 06.2) .....:	N/A	—
4.7	Performance at low irradiance (MQT 07).....:	See table 4.7	P
4.4	Measurement of temperature coefficients (MQT 04)	See table 4.4	P
4.5	Measurement of nominal module operating temperature (NMOT, °C) (MQT 05).....:	N/A	—
4.8	Outdoor exposure test (MQT 08).....:	N/A	—
4.18	Bypass diode thermal test (MQT 18.1)	N/A	—
4.18.2	Bypass diode functionality test (MQT 18.2) .....:	See table 4.18.2	P
4.9	Hot spot endurance test (MQT 09) .....:	See table 4.9	P
4.10	UV preconditioning test (MQT 10) .....:	See table 4.10	P
4.11	Thermal cycling test 50 cycles (MQT 11).....:	See table 4.11	P
4.12	Humidity-freeze test (MQT 12) .....:	See table 4.12	P
4.14.2	Retention of junction box on mounting surface (MQT 14.1) .....:	See table 4.14.2	P
4.14.3	Test of cord anchorage (MQT 14.2)	The junction box has been certified according to IEC 62790:2014.	P
4.14.3.2.1	Junction boxes intended to be used with cables specified by the manufacturer……:		P
4.14.3.2.2	Junction boxes intended to be used with generic cables……:		P
4.11	Thermal cycling test 200 cycles (MQT 11).....:	See table 4.11	P
4.13	Damp heat test (MQT 13).....:	See table 4.13	P
4.16	Static mechanical load test (MQT 16).....:	See table 4.16	P
4.17	Hail test (MQT 17) .....:	N/A	—
4.19.2	Final stabilization (MQT 19.2).....:	N/A	—

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
4	**IEC 61215 Part 2: Test procedures** **Module type: GCL-P6/72H345 and GCL-P6/72H340 （BOM 2)**		
4.1	Visual inspection (MQT 01).....:	See table 4.1	P
4.19.5	Initial stabilization (MQT 19.1).....:	See table 4.19.5	P
4.6.3.1	Performance at STC (MQT 06.1)	See table 4.6.3.1	P
4.3	Insulation test (MQT 03).....:	See table 4.3	P
4.15	Wet leakage current test (MQT 15) .....:	See table 4.15	P
4.6.3.2	Performance at NMOT (MQT 06.2) .....:	N/A	—
4.7	Performance at low irradiance (MQT 07).....:	N/A	—
4.4	Measurement of temperature coefficients (MQT 04)	N/A	—
4.5	Measurement of nominal module operating temperature (NMOT, °C) (MQT 05).....:	N/A	—
4.8	Outdoor exposure test (MQT 08).....:	N/A	—
4.18	Bypass diode thermal test (MQT 18.1)	N/A	—
4.18.2	Bypass diode functionality test (MQT 18.2) .....:	See table 4.18.2	P
4.9	Hot spot endurance test (MQT 09) .....:	N/A	—
4.10	UV preconditioning test (MQT 10) .....:	See table 4.10	P
4.11	Thermal cycling test 50 cycles (MQT 11).....:	See table 4.11	P
4.12	Humidity-freeze test (MQT 12) .....:	See table 4.12	P
4.14.2	Retention of junction box on mounting surface (MQT 14.1) .....:	See table 4.14.2	P
4.14.3	Test of cord anchorage (MQT 14.2)	The junction box has been certified according to IEC 62790:2014.	P
4.14.3.2.1	Junction boxes intended to be used with cables specified by the manufacturer……:		P
4.14.3.2.2	Junction boxes intended to be used with generic cables……:		P
4.11	Thermal cycling test 200 cycles (MQT 11).....:	N/A	—
4.13	Damp heat test (MQT 13).....:	See table 4.13	P
4.16	Static mechanical load test (MQT 16).....:	N/A	—
4.17	Hail test (MQT 17) .....:	N/A	—
4.19.2	Final stabilization (MQT 19.2).....:	N/A	—

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
4	**IEC 61215 Part 2: Test procedures** **Module type: GCL-P6/72H325（BOM 3)**		
4.1	Visual inspection (MQT 01).....:	See table 4.1	P
4.19.5	Initial stabilization (MQT 19.1).....:	See table 4.19.5	P
4.6.3.1	Performance at STC (MQT 06.1)	See table 4.6.3.1	P
4.3	Insulation test (MQT 03).....:	See table 4.3	P
4.15	Wet leakage current test (MQT 15) .....:	See table 4.15	P
4.6.3.2	Performance at NMOT (MQT 06.2) .....:	N/A	—
4.7	Performance at low irradiance (MQT 07).....:	N/A	—
4.4	Measurement of temperature coefficients (MQT 04)	N/A	—
4.5	Measurement of nominal module operating temperature (NMOT, °C) (MQT 05).....:	N/A	—
4.8	Outdoor exposure test (MQT 08).....:	N/A	—
4.18	Bypass diode thermal test (MQT 18.1)	N/A	—
4.18.2	Bypass diode functionality test (MQT 18.2) .....:	See table 4.18.2	P
4.9	Hot spot endurance test (MQT 09) .....:	See table 4.9	P
4.10	UV preconditioning test (MQT 10) .....:	See table 4.10	P
4.11	Thermal cycling test 50 cycles (MQT 11).....:	See table 4.11	P
4.12	Humidity-freeze test (MQT 12) .....:	See table 4.12	P
4.14.2	Retention of junction box on mounting surface (MQT 14.1) .....:	See table 4.14.2	P
4.14.3	Test of cord anchorage (MQT 14.2)	The junction box has been certified according to IEC 62790:2014.	P
4.14.3.2.1	Junction boxes intended to be used with cables specified by the manufacturer……:		P
4.14.3.2.2	Junction boxes intended to be used with generic cables……:		P
4.11	Thermal cycling test 200 cycles (MQT 11).....:	N/A	—
4.13	Damp heat test (MQT 13).....:	See table 4.13	P
4.16	Static mechanical load test (MQT 16).....:	N/A	—
4.17	Hail test (MQT 17) .....:	N/A	—
4.19.2	Final stabilization (MQT 19.2).....:	N/A	—

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
4	**IEC 61215 Part 2: Test procedures** **Module type: GCL-P6/72H345 and GCL-P6/72H340 （BOM 4)**		
4.1	Visual inspection (MQT 01).....:	See table 4.1	P
4.19.5	Initial stabilization (MQT 19.1).....:	See table 4.19.5	P
4.6.3.1	Performance at STC (MQT 06.1)	See table 4.6.3.1	P
4.3	Insulation test (MQT 03).....:	See table 4.3	P
4.15	Wet leakage current test (MQT 15) .....:	See table 4.15	P
4.6.3.2	Performance at NMOT (MQT 06.2) .....:	N/A	—
4.7	Performance at low irradiance (MQT 07).....:	N/A	—
4.4	Measurement of temperature coefficients (MQT 04)	N/A	—
4.5	Measurement of nominal module operating temperature (NMOT, °C) (MQT 05).....:	N/A	—
4.8	Outdoor exposure test (MQT 08).....:	N/A	—
4.18	Bypass diode thermal test (MQT 18.1)	N/A	—
4.18.2	Bypass diode functionality test (MQT 18.2) .....:	See table 4.18.2	P
4.9	Hot spot endurance test (MQT 09) .....:	See table 4.9	P
4.10	UV preconditioning test (MQT 10) .....:	See table 4.10	P
4.11	Thermal cycling test 50 cycles (MQT 11).....:	See table 4.11	P
4.12	Humidity-freeze test (MQT 12) .....:	See table 4.12	P
4.14.2	Retention of junction box on mounting surface (MQT 14.1) .....:	See table 4.14.2	P
4.14.3	Test of cord anchorage (MQT 14.2)	The junction box has been certified according to IEC 62790:2014.	P
4.14.3.2.1	Junction boxes intended to be used with cables specified by the manufacturer……:		P
4.14.3.2.2	Junction boxes intended to be used with generic cables……:		P
4.11	Thermal cycling test 200 cycles (MQT 11).....:	N/A	—
4.13	Damp heat test (MQT 13).....:	See table 4.13	P
4.16	Static mechanical load test (MQT 16).....:	N/A	—
4.17	Hail test (MQT 17) .....:	N/A	—
4.19.2	Final stabilization (MQT 19.2).....:	N/A	—

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
4	**IEC 61215 Part 2: Test procedures** **Module type: GCL-P6/72H340（BOM 5)**		
4.1	Visual inspection (MQT 01).....:	See table 4.1	P
4.19.5	Initial stabilization (MQT 19.1).....:	See table 4.19.5	P
4.6.3.1	Performance at STC (MQT 06.1)	See table 4.6.3.1	P
4.3	Insulation test (MQT 03).....:	See table 4.3	P
4.15	Wet leakage current test (MQT 15) .....:	See table 4.15	P
4.6.3.2	Performance at NMOT (MQT 06.2) .....:	N/A	—
4.7	Performance at low irradiance (MQT 07).....:	N/A	—
4.4	Measurement of temperature coefficients (MQT 04)	N/A	—
4.5	Measurement of nominal module operating temperature (NMOT, °C) (MQT 05).....:	N/A	—
4.8	Outdoor exposure test (MQT 08).....:	N/A	—
4.18	Bypass diode thermal test (MQT 18.1)	N/A	—
4.18.2	Bypass diode functionality test (MQT 18.2) .....:	See table 4.18.2	P
4.9	Hot spot endurance test (MQT 09) .....:	N/A	—
4.10	UV preconditioning test (MQT 10) .....:	See table 4.10	P
4.11	Thermal cycling test 50 cycles (MQT 11).....:	See table 4.11	P
4.12	Humidity-freeze test (MQT 12) .....:	See table 4.12	P
4.14.2	Retention of junction box on mounting surface (MQT 14.1) .....:	See table 4.14.2	P
4.14.3	Test of cord anchorage (MQT 14.2)	The junction box has been certified according to IEC 62790:2014.	P
4.14.3.2.1	Junction boxes intended to be used with cables specified by the manufacturer……:		P
4.14.3.2.2	Junction boxes intended to be used with generic cables……:		P
4.11	Thermal cycling test 200 cycles (MQT 11).....:	N/A	—
4.13	Damp heat test (MQT 13).....:	See table 4.13	P
4.16	Static mechanical load test (MQT 16).....:	N/A	—
4.17	Hail test (MQT 17) .....:	N/A	—
4.19.2	Final stabilization (MQT 19.2).....:	N/A	—

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.1	**Visual inspection (Initial)**	
Sample No.	Nature and position of initial findings	—
1-1	No visual defects	P
1-2	No visual defects	P
1-3	No visual defects	P
1-4	No visual defects	P
1-5	No visual defects	P
1-6	No visual defects	P
1-7	No visual defects	P
1-8	No visual defects	P
2-1	No visual defects	P
2-2	No visual defects	P
2-3	No visual defects	P
2-4	No visual defects	P
2-5	No visual defects	P
3-1	No visual defects	P
3-2	No visual defects	P
3-3	No visual defects	P
3-4	No visual defects	P
3-5	No visual defects	P
3-6	No visual defects	P
4-1	No visual defects	P
4-2	No visual defects	P
4-3	No visual defects	P
4-4	No visual defects	P
4-5	No visual defects	P
4-6	No visual defects	P
5-1	No visual defects	P
5-2	No visual defects	P
5-3	No visual defects	P
5-4	No visual defects	P
5-5	No visual defects	P
Supplementary information: N/A		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.19.5	**Initial stabilization (Initial)**					
Sample No. 1-1			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	331.5
1	S	5	1000	50±10	4.4	329.6
2	S	5	1000	50±10	4.4	329.4
(*P*max – *P*min) / *P*average			0.0062	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 1-2			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	340.0
1	S	5	1000	50±10	4.4	338.5
2	S	5	1000	50±10	4.4	337.8
(*P*max – *P*min) / *P*average			0.0064	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 1-3			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	340.9
1	S	5	1000	50±10	4.4	340.3
2	S	5	1000	50±10	4.4	332.1
3	S	5	1000	50±10	4.4	331.6
4	S	5	1000	50±10	4.4	331.1
(*P*max – *P*min) / *P*average			0.0031	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.19.5	**Initial stabilization (Initial)**					
Sample No. 1-4			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m^2)	Irradiance (W/m^2)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	340.1
1	S	5	1000	50±10	4.4	338.7
2	S	5	1000	50±10	4.4	336.4
3	S	5	1000	50±10	4.4	338.2
(*P*max – *P*min) / *P*average			0.0066	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 1-5			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m^2)	Irradiance (W/m^2)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	340.3
1	S	5	1000	50±10	4.4	333.7
2	S	5	1000	50±10	4.4	333.0
3	S	5	1000	50±10	4.4	333.5
(*P*max – *P*min) / *P*average			0.0020	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 1-6			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m^2)	Irradiance (W/m^2)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	337.9
1	S	5	1000	50±10	4.4	336.3
2	S	5	1000	50±10	4.4	337.9
(*P*max – *P*min) / *P*average			0.0047	Stable (Yes/No)		Yes

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.

4.19.5	**Initial stabilization (Initial)**					
Sample No. 1-7			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	340.2
1	S	5	1000	50±10	4.4	338.3
2	S	5	1000	50±10	4.4	337.0
(*P*max – *P*min) / *P*average			0.0094	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 1-8			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	340.5
1	S	5	1000	50±10	4.4	339.2
2	S	5	1000	50±10	4.4	339.3
(*P*max – *P*min) / *P*average			0.0038	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 2-1			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	346.8
1	S	5	1000	50±10	4.4	347.3
2	S	5	1000	50±10	4.4	346.0
(*P*max – *P*min) / *P*average			0.0036	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.19.5	**Initial stabilization (Initial)**					
Sample No. 2-2			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	348.0
1	S	5	1000	50±10	4.4	347.0
2	S	5	1000	50±10	4.4	346.8
(*P*max – *P*min) / *P*average			0.0035	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 2-3			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	346.6
1	S	5	1000	50±10	4.4	345.0
2	S	5	1000	50±10	4.4	342.7
3	S	5	1000	50±10	4.4	341.6
(*P*max – *P*min) / *P*average			0.0100	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 2-4			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	342.5
1	S	5	1000	50±10	4.4	342.2
2	S	5	1000	50±10	4.4	338.5
3	S	5	1000	50±10	4.4	338.5
4	S	5	1000	50±10	4.4	337.78
(*P*max – *P*min) / *P*average			0.0021	Stable (Yes/No)		Yes

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.

4.19.5	**Initial stabilization (Initial)**					
Sample No. 2-5			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	345.1
1	S	5	1000	50±10	4.4	343.9
2	S	5	1000	50±10	4.4	343.7
(*P*max – *P*min) / *P*average			0.0042	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 3-1			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	326.9
1	S	5	1000	50±10	4.4	326.2
2	S	5	1000	50±10	4.4	325.2
(*P*max – *P*min) / *P*average			0.0052	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 3-2			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	328.2
1	S	5	1000	50±10	4.4	328.0
2	S	5	1000	50±10	4.4	325.8
(*P*max – *P*min) / *P*average			0.0074	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.19.5	**Initial stabilization (Initial)**					
Sample No. 3-3			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	328.1
1	S	5	1000	50±10	4.4	327.3
2	S	5	1000	50±10	4.4	325.8
(*P*max – *P*min) / *P*average			0.0070	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 3-4			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	328.6
1	S	5	1000	50±10	4.4	327.9
2	S	5	1000	50±10	4.4	326.2
(*P*max – *P*min) / *P*average			0.0074	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 3-5			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	328.2
1	S	5	1000	50±10	4.4	327.3
2	S	5	1000	50±10	4.4	325.6
(*P*max – *P*min) / *P*average			0.0079	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

Sample No. 3-6			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m^2)	Irradiance (W/m^2)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	326.9
1	S	5	1000	50±10	4.4	326.4
2	S	5	1000	50±10	4.4	324.9
(*P*max – *P*min) / *P*average			0.0063	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 4-1			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m^2)	Irradiance (W/m^2)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	346.1
1	S	5	1000	50±10	4.4	343.7
2	S	5	1000	50±10	4.4	346.0
(*P*max – *P*min) / *P*average			0.0068	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 4-2			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m^2)	Irradiance (W/m^2)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	346.9
1	S	5	1000	50±10	4.4	345.9
2	S	5	1000	50±10	4.4	347.2
(*P*max – *P*min) / *P*average			0.0039	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.19.5	**Initial stabilization (Initial)**					
Sample No. 4-3			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m^2)	Irradiance (W/m^2)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	346.4
1	S	5	1000	50±10	4.4	344.7
2	S	5	1000	50±10	4.4	346.9
(*P*max – *P*min) / *P*average			0.0063	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 4-4			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m^2)	Irradiance (W/m^2)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	344.4
1	S	5	1000	50±10	4.4	344.8
2	S	5	1000	50±10	4.4	346.9
(*P*max – *P*min) / *P*average			0.0071	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 4-5			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m^2)	Irradiance (W/m^2)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	344.0
1	S	5	1000	50±10	4.4	342.7
2	S	5	1000	50±10	4.4	345.4
(*P*max – *P*min) / *P*average			0.0079	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.19.5	**Initial stabilization (Initial)**					
Sample No. 4-6			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	344.7
1	S	5	1000	50±10	4.4	344.4
2	S	5	1000	50±10	4.4	345.6
(*P*max – *P*min) / *P*average			0.0036	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 5-1			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	345.5
1	S	5	1000	50±10	4.4	344.5
2	S	5	1000	50±10	4.4	345.4
(*P*max – *P*min) / *P*average			0.0030	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 5-2			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	348.4
1	S	5	1000	50±10	4.4	345.0
2	S	5	1000	50±10	4.4	346.0
(*P*max – *P*min) / *P*average			0.0097	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.19.5	**Initial stabilization (Initial)**					
Sample No. 5-3			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	347.3
1	S	5	1000	50±10	4.4	343.6
2	S	5	1000	50±10	4.4	345.4
(*P*max – *P*min) / *P*average			0.0106	Stable (Yes/No)		No
3	S	5	1000	50±10	4.4	342.3
(*P*max – *P*min) / *P*average			0.0089	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 5-4			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	346.6
1	S	5	1000	50±10	4.4	344.5
2	S	5	1000	50±10	4.4	345.0
(*P*max – *P*min) / *P*average			0.0059	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

4.19.5	**Initial stabilization (Initial)**					
Sample No. 5-5			☒ Simulator ☐ Natural sunlight ☐ Other stabilization procedures			
Abbreviation: Regarding light source "S" for Solar simulator and "N" for Natural sunlight						
Test cycle	Light source	Integrated irradiation (kWh/m²)	Irradiance (W/m²)	Module temperature (°C)	Resistive load (Ω)	Pmp(W) at the end of cycle
Initial	—	—	—	—	—	344.9
1	S	5	1000	50±10	4.4	343.9
2	S	5	1000	50±10	4.4	345.2
(*P*max – *P*min) / *P*average			0.0038	Stable (Yes/No)		Yes
Supplementary information: The sample has reached its stabilized when (Pmax – Pmin) / Paverage < 0.01.						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.3	**Insulation test (Initial)**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				4000 / 8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-1	5.00	1.94	9.70	-	No	P
1-2	5.00	1.94	9.70	-	No	P
1-3	5.00	1.94	9.70	-	No	P
1-4	5.00	1.94	9.70	-	No	P
1-5	5.00	1.94	9.70	-	No	P
1-6	5.00	1.94	9.70	-	No	P
1-7	5.00	1.94	9.70	-	No	P
1-8	5.00	1.94	9.70	-	No	P
2-1	5.00	1.94	9.70	-	No	P
2-2	5.00	1.94	9.70	-	No	P
2-3	5.00	1.94	9.70	-	No	P
2-4	5.00	1.94	9.70	-	No	P
2-5	5.00	1.94	9.70	-	No	P
3-1	5.00	1.94	9.70	-	No	P
3-2	5.00	1.94	9.70	-	No	P
3-3	5.00	1.94	9.70	-	No	P
3-4	5.00	1.94	9.70	-	No	P
3-5	5.00	1.94	9.70	-	No	P
3-6	5.00	1.94	9.70	-	No	P
4-1	5.00	1.94	9.70	-	No	P
4-2	5.00	1.94	9.70	-	No	P
4-3	5.00	1.94	9.70	-	No	P
4-4	5.00	1.94	9.70	-	No	P
4-5	5.00	1.94	9.70	-	No	P
4-6	5.00	1.94	9.70	-	No	P
5-1	5.00	1.94	9.70	-	No	P
5-2	5.00	1.94	9.70	-	No	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

5-3	5.00	1.94	9.70	-	No	P
5-4	5.00	1.94	9.70	-	No	P
5-5	5.00	1.94	9.70	-	No	P
*Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information: Insulation tester can measure up to 5.00 GΩ.						

4.15	**Wet leakage current test (Initial)**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured [MΩ]	Area [m²]	Result* [MΩ × m²]	—
1-1	5000.0	1.94	9700.0	P
1-2	5000.0	1.94	9700.0	P
1-3	5000.0	1.94	9700.0	P
1-4	5000.0	1.94	9700.0	P
1-5	4690.0	1.94	9099.0	P
1-6	5000.0	1.94	9700.0	P
1-7	5000.0	1.94	9700.0	P
1-8	5000.0	1.94	9700.0	P
2-1	3750.0	1.94	7275.0	P
2-2	3525.0	1.94	6839.0	P
2-3	3481.0	1.94	6753.0	P
2-4	3650.0	1.94	7081.0	P
2-5	3969.0	1.94	7699.0	P
3-1	5000.0	1.94	9700.0	P
3-2	5000.0	1.94	9700.0	P
3-3	5000.0	1.94	9700.0	P
3-4	5000.0	1.94	9700.0	P
3-5	5000.0	1.94	9700.0	P
3-6	5000.0	1.94	9700.0	P
4-1	4413.0	1.94	8561.0	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4-2	4534.0	1.94	8796.0	P
4-3	5000.0	1.94	9700.0	P
4-4	4746.0	1.94	9207.0	P
4-5	4597.0	1.94	8918.0	P
4-6	4386.0	1.94	8509.0	P
5-1	5000.0	1.94	9700.0	P
5-2	5000.0	1.94	9700.0	P
5-3	5000.0	1.94	9700.0	P
5-4	5000.0	1.94	9700.0	P
5-5	5000.0	1.94	9700.0	P

* Minimum requirement acc. To the standard is 40 MΩ × m².

Supplementary information: the tester can measure up to 5000.0 MΩ.

4.4	**Measurement of temperature coefficients**		
Ambient air temperature [°C]		25 ± 2	—
Irradiance [W/m²]		1000 ± 50	
Module temperature [°C] high/low		60 / 25	
Sample No.	Coefficient	Calculated value	
1-1	α [%/°C]	0.06415	
	β [%/°C]	-0.3223	
	γ [%/°C]	-0.42898	

Supplementary information: Temperature coefficients are measured under a pulsed solar simulator.

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.6.3.1	**Performance at STC (Initial)**						
Test method			☒ Simulator ☐ Natural sunlight				—
Ambient temperature [°C]			25 ± 2				
Irradiance [W/m²]			1000				
Module temperature [°C]			25 ± 0.2				
Sample No.	P_{max} [W]	V_{mpp} [V]	I_{mpp} [A]	V_{oc} [V]	I_{sc} [A]	FF [%]	
1-1	332.4	37.70	8.819	46.62	9.433	75.59	—
1-2	339.2	37.92	8.947	47.02	9.507	75.88	—
1-3	334.4	37.55	8.906	46.82	9.383	76.14	—
1-4	339.5	38.03	8.928	47.08	9.488	76.00	—
1-5	334.9	37.52	8.928	46.90	9.434	75.69	—
1-6	338.8	37.46	9.046	47.01	9.464	76.14	—
1-7	339.1	37.53	9.038	47.02	9.53	75.69	—
1-8	341.1	37.78	9.270	47.03	9.532	76.09	—
2-1	344.6	37.94	9.082	47.02	9.622	76.16	—
2-2	344.9	37.80	9.126	47.02	9.653	75.98	—
2-3	340.7	37.75	9.027	46.92	9.523	76.25	—
2-4	336.9	37.50	8.983	46.84	9.505	75.66	—
2-5	342.3	37.97	9.016	47.00	9.590	75.95	—
3-1	323.2	37.16	8.699	45.75	9.143	77.27	—
3-2	324.9	37.40	8.687	45.78	9.156	77.52	—
3-3	324.2	37.37	8.677	45.80	9.187	77.06	—
3-4	324.4	37.32	8.694	45.79	9.167	77.29	—
3-5	324.2	37.21	8.712	45.76	9.164	77.29	—
3-6	322.6	37.35	8.635	45.78	9.134	77.14	—
4-1	342.4	37.47	9.141	47.01	9.633	75.62	—
4-2	344.1	37.86	9.089	46.97	9.656	75.86	—
4-3	344.6	38.02	9.064	46.99	9.649	76.00	—
4-4	343.9	37.93	9.067	47.01	9.616	76.07	—
4-5	341.5	37.64	9.075	46.93	9.577	75.99	—
4-6	343.4	37.83	9.078	47.02	9.591	76.15	—
5-1	344.8	38.12	9.046	47.01	9.581	76.57	—
5-2	346.1	38.31	9.034	47.17	9.564	76.72	—

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

5-3	344.6	38.13	9.034	47.01	9.593	76.40	—
5-4	343.6	38.08	9.023	47.03	9.573	76.31	—
5-5	345.5	38.13	9.060	47.05	9.567	76.76	—
Supplementary information: N/A							

4.7	**Performance at low irradiance**						
Test method			☒ Data corrected to a 25°C cell temperature and 200 W/m² irradiance ☐ Directly measured				—
Ambient temperature [°C]			25 ± 2				
Irradiance [W/m²]			200				
Module temperature [°C]			25 ± 0.2				
Sample No.	P_{max} [W]	V_{mpp} [V]	I_{mpp} [A]	V_{oc} [V]	I_{sc} [A]	FF [%]	
1-1	64.0	36.33	1.760	43.11	1.876	79.09	
Supplementary information: N/A							

4.9	**Hot-spot endurance test**			
Sample No.	1-2			—
Cell interconnection circuit	☒ S	☐ SP	☐ SPS	
Module temperature at thermal equilibrium [°C]	42.8			
Measurement at 1st worst case cell at edge of module				
Maximum measured cell temperature [°C]	118			
Shading rate [%]	11			
Measurement at 1st worst case cell of complete module				
Maximum measured cell temperature [°C]	141			
Shading rate [%]	11			
Measurement at 2nd worst case cell of complete module				
Maximum measured cell temperature [°C]	148			
Shading rate [%]	11			
Measurement at 3rd worst case cell with lowest leakage current				
Maximum measured cell temperature [°C]	137			
Shading rate [%]	8			
Supplementary information: N/A				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.9	**Hot-spot endurance test**			
Sample No.	3-2			—
Cell interconnection circuit	☒ S	☐ SP	☐ SPS	
Module temperature at thermal equilibrium [°C]	42.9			
Measurement at 1st worst case cell at edge of module				
Maximum measured cell temperature [°C]	143			
Shading rate [%]	15			
Measurement at 1st worst case cell of complete module				
Maximum measured cell temperature [°C]	145			
Shading rate [%]	12			
Measurement at 2nd worst case cell of complete module				
Maximum measured cell temperature [°C]	130			
Shading rate [%]	11			
Measurement at 3rd worst case cell with lowest leakage current				
Maximum measured cell temperature [°C]	8			
Shading rate [%]	128			
Supplementary information: N/A				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.9	**Hot-spot endurance test**			
Sample No.	4-2			—
Cell interconnection circuit	☒ S	☐ SP	☐ SPS	
Module temperature at thermal equilibrium [°C]	44.7			
Measurement at 1st worst case cell at edge of module				
Maximum measured cell temperature [°C]	47.66			
Shading rate [%]	14			
Measurement at 1st worst case cell of complete module				
Maximum measured cell temperature [°C]	48.27			
Shading rate [%]	13			
Measurement at 2nd worst case cell of complete module				
Maximum measured cell temperature [°C]	48.52			
Shading rate [%]	12			
Measurement at 3rd worst case cell with lowest leakage current				
Maximum measured cell temperature [°C]	48.43			
Shading rate [%]	8			
Supplementary information: N/A				

4.1	**Visual inspection after Hot-spot endurance test**	
Sample No.	Nature and position of findings	—
1-2	No visual defects	P
3-2	No visual defects	P
4-2	No visual defects	P
Supplementary information: N/A		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.3	**Insulation test after Hot-spot endurance test**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				4000 / 8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-2	24.60	1.94	47.72	-	No	P
3-2	40.50	1.94	78.57	-	No	P
4-2	23.80	1.94	46.17	-	no	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information: N/A						

4.15	**Wet leakage current test after Hot-spot endurance test**			
Maximum system voltage [V]		1500		
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
1-2	4410.0	1.94	8555.4	P
3-2	7890.0	1.94	15306.6	P
4-2	2950.0	1.94	5723.0	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information: N/A				

4.18.2	**Bypass diode functionality test after Hot-spot endurance test**			
☒ Method B				—
Sample No.	Power degradation by shading cell string protected by each diode			—
–	Diode 1	Diode 2	Diode 3	—
1-2	34.8%	35.0%	34.6%	P
3-2	34.5%	34.6%	34.6%	P
4-2	34.7%	34.9%	34.9%	P
Supplementary information: N/A				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.10	**UV preconditioning test**	
Module temperature [°C]	60 ± 5	—
Ratio of UV-B irradiation (280 – 320 nm) [%]	3 - 10	
UV irradiation dose (280 – 400 nm) [kWh/m²]	15	
Sample No.	Open circuits (yes/no)	
1-3	no	—
1-4	no	—
2-2	no	—
2-3	no	—
3-3	no	—
3-4	no	—
4-3	no	—
4-4	no	—
5-2	no	—
5-3	no	—
Supplementary information: Samples were short circuited.		

4.1	**Visual inspection after UV preconditioning test**	
Sample No.	Nature and position of findings	—
1-3	No visual defects	P
1-4	No visual defects	P
2-2	No visual defects	P
2-3	No visual defects	P
3-3	No visual defects	P
3-4	No visual defects	P
4-3	No visual defects	P
4-4	No visual defects	P
5-2	No visual defects	P
5-3	No visual defects	P
Supplementary information: N/A		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.15	**Wet leakage current test after UV preconditioning test**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
1-3	13200.0	1.94	25608.0	P
1-4	4950.0	1.94	9603.0	P
2-2	3610.0	1.94	7003.4	P
2-3	3770.0	1.94	7313.8	P
3-3	8110.0	1.94	15733.4	P
3-4	9290.0	1.94	16082.6	P
4-3	3390.0	1.94	6576.7	P
4-4	3250.0	1.94	6305.0	P
5-2	9610.0	1.94	18643.4	P
5-3	10300.0	1.94	19982.0	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information:N/A				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.11	**Thermal cycling 50 test**	
Total number of cycles	50	—
Sample No.	Open circuits (yes/no)	
1-3	no	—
1-4	no	—
2-2	no	—
2-3	no	—
3-3	no	—
3-4	no	—
4-3	no	—
4-4	no	—
5-2	no	—
5-3	no	—
Supplementary information: N/A		

4.1	**Visual inspection after Thermal cycling 50 test**	
Sample No.	Nature and position of findings	—
1-3	No visual defects	P
1-4	No visual defects	P
2-2	No visual defects	P
2-3	No visual defects	P
3-3	No visual defects	P
3-4	No visual defects	P
4-3	No visual defects	P
4-4	No visual defects	P
5-2	No visual defects	P
5-3	No visual defects	P
Supplementary information: N/A		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.15	**Wet leakage current test after Thermal cycling 50 test**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 3		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
1-3	5900.0	1.94	11446.0	P
1-4	4180.0	1.94	8109.2	P
2-2	4890.0	1.94	9486.6	P
2-3	4530.0	1.94	8788.2	P
3-3	6120.0	1.94	11872.8	P
3-4	5810.0	1.94	11271.4	P
4-3	3200.0	1.94	6280.0	P
4-4	2780.0	1.94	5393.2	P
5-2	7690.0	1.94	14918.6	P
5-3	8060.0	1.94	15636.4	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information:N/A				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.12	**Humidity freeze test**	
Total number of cycles	10	—
Sample No.	Open circuits (yes/no)	
1-3	no	—
1-4	no	—
2-2	no	—
2-3	no	—
3-3	no	—
3-4	no	—
4-3	no	—
4-4	no	—
5-2	no	—
5-3	no	—
Supplementary information: N/A		

4.1	**Visual inspection after Humidity freeze test**	
Sample No.	Nature and position of findings	—
1-3	No visual defects	P
1-4	No visual defects	P
2-2	No visual defects	P
2-3	No visual defects	P
3-3	No visual defects	P
3-4	No visual defects	P
4-3	No visual defects	P
4-4	No visual defects	P
5-2	No visual defects	P
5-3	No visual defects	P
Supplementary information: N/A		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.3	**Insulation test after Humidity freeze test**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				4000 / 8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-3	7.14	1.94	13.85	-	No	P
1-4	4.31	1.94	8.36	-	No	P
2-2	34.6	1.94	67.71	-	No	P
2-3	22.4	1.94	43.46	-	No	P
3-2	8.57	1.94	16.63	-	No	P
3-3	9.32	1.94	18.08	-	No	P
4-3	23.1	1.94	44.81	-	No	P
4-4	25.4	1.94	49.28	-	No	P
5-2	2.42	1.94	4.69	-	No	P
5-3	2.27	1.94	4.40	-	No	P
*Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information:N/A						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.15	**Wet leakage current test after Humidity freeze test**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
1-3	5320.0	1.94	10320.8	P
1-4	3040.0	1.94	5897.6	P
2-2	1440.0	1.94	2793.6	P
2-3	1330.0	1.94	2580.2	P
3-3	2210.0	1.94	4287.4	P
3-4	2190.0	1.94	4248.6	P
4-3	1300.0	1.94	2522.0	P
4-4	1340.0	1.94	2599.6	P
5-2	1810.0	1.94	3511.8	P
5-3	1920.0	1.94	3724.8	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information: N/A				

4.14.2	**Retention of junction box on mounting surface**	
Sample No.	1-3, 2-2, 3-3, 4-3, 5-2	—
Applied force in all directions parallel to the module edges [N]	40	
Applied force in all directions parallel to the mounting surface [N]	40	
Supplementary information: N/A		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.1	**Visual inspection after Retention of junction box on mounting surface**	
Sample No.	Nature and position of findings	—
1-3	No visual defects	P
2-2	No visual defects	P
3-3	No visual defects	P
4-3	No visual defects	P
5-2	No visual defects	P
Supplementary information: N/A		

4.15	**Wet leakage current test after Retention of junction box on mounting surface**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
1-3	5410.0	1.94	10495.4	P
2-2	1570.0	1.94	3045.8	P
3-3	2530.0	1.94	4908.2	P
4-3	1730.0	1.94	3356.2	P
5-2	2530.0	1.94	4908.2	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information: N/A				

4.11	**Thermal cycling 200 test**	
Total number of cycles	200	—
Sample No.	Open circuits (yes/no)	
1-5	no	—
1-6	no	—
Supplementary information: N/A		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.1	**Visual inspection after Thermal cycling 200 test**	
Sample No.	Nature and position of findings	—
1-5	No visual defects	P
1-6	No visual defects	P
Supplementary information: N/A		

4.15	**Wet leakage current test after Thermal cycling 200 test**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
1-5	3800.0	1.94	7372.0	P
1-6	7690.0	1.94	14918.6	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information: N/A				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.13	**Damp heat test**	
Total duration [h]	1000	—
Sample No.	—	
1-7	—	
1-8	—	
2-4	—	
2-5	—	
3-5	—	
3-6	—	
4-5	—	
4-6	—	
5-4	—	
5-5	—	
Supplementary information: N/A		

4.1	**Visual inspection after Damp heat test**	
Sample No.	Nature and position of findings	—
1-7	No visual defects	P
1-8	No visual defects	P
2-4	No visual defects	P
2-5	No visual defects	P
3-5	No visual defects	P
3-6	No visual defects	P
4-5	No visual defects	P
4-6	No visual defects	P
5-4	No visual defects	P
5-5	No visual defects	P
Supplementary information: N/A		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.3	**Insulation test after Damp heat test**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				4000 / 8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-7	2.02	1.94	3.92	-	No	P
1-8	28.30	1.94	54.09	-	No	P
2-4	21.70	1.94	42.10	-	No	P
2-5	16.00	1.94	31.40	-	No	P
3-5	3.18	1.94	6.17	-	No	P
4-5	14.40	1.94	27.94	-	No	P
5-4	2.70	1.94	5.24	-	No	P
5-5	2.09	1.94	4.05	-	No	P
*Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information:N/A						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.15	**Wet leakage current test after Damp heat test**			
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
1-7	3720.0	1.94	7216.0	P
1-8	2070.0	1.94	4015.0	P
2-4	1260.0	1.94	2444.4	P
2-5	1220.0	1.94	2366.8	P
3-5	3830.0	1.94	5412.0	P
3-6	2790.0	1.94	5412.0	P
4-5	1180.0	1.94	2289.2	P
4-6	1220.0	1.94	2366.8	P
5-4	1350.0	1.94	2619.0	P
5-5	1630.0	1.94	3162.2	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information: N/A				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.16	**Static Mechanical load test**		
Sample No.	1-7		—
Design load [Pa]	1600（Upward）/3600 （Downward）		
Safety factors	1.5（upward）/ 1.5（Downward）		
Mounting method	4 clamps and 2 rails 4 clamps are on the position of ¼ length		
Load applied to	front side	back side	
Mechanical load [Pa]	5400	2400	
First cycle time (start/end)..... :	10:00-10:59	11:00-11:59	
Intermittent open-circuit (yes/no)..... :	no	no	
Second cycle time (start/end)..... :	12:00-12:59	13:00-13:59	
Intermittent open-circuit (yes/no)..... :	no	no	
Third cycle time (start/end)..... :	14:00-14:59	15:00-15:59	
Intermittent open-circuit (yes/no)..... :	no	no	
Supplementary information: Refer to appendix 3 of this test report.			

4.1	**Visual inspection after Mechanical load test**	
Sample No.	Nature and position of findings	—
1-7	No visual defects	P
Supplementary information: N/A		

10.15	**Wet leakage current test after Mechanical load test**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
1-7	5270.0	1.94	11097.0	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information: N/A				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.6.3.1	**Performance at STC (Final)**								
Test method			☒ Simulator ☐ Natural sunlight						—
Ambient temperature [°C]			25 ± 2						
Irradiance [W/m²]			1000						
Module temperature [°C]			25 ± 0.2						
Sample No.	P_{max} [W]	V_{mpp} [V]	I_{mpp} [A]	V_{oc} [V]	I_{sc} [A]	FF [%]	Degradation [%]	Gate No.2	
1-2	333.2	37.56	8.870	46.88	9.413	75.5	-1.78	P	
1-3	334.1	37.85	8.826	46.85	9.341	76.34	0.00	P	
1-4	335.1	37.93	8.836	47.02	9.421	75.65	-1.20	P	
1-5	340.3	37.75	9.016	47.2	9.49	75.98	0.38	P	
1-6	341.3	37.98	8.987	47.21	9.47	76.35	0.28	P	
1-7	330.5	37.33	8.853	47.02	9.389	74.85	-1.11	P	
1-8	338.4	37.81	8.950	47.16	9.429	76.10	0.01	P	
2-2	339.5	37.68	9.009	46.80	9.609	75.50	-1.60	P	
2-3	335.1	37.26	8.993	46.83	9.479	75.48	-1.60	P	
2-4	336.6	37.97	8.866	46.78	9.536	75.46	-0.01	P	
2-5	340.6	37.80	9.012	46.82	9.560	76.11	0.50	P	
3-2	327.0	37.59	8.700	45065	9.197	77.90	0.64	P	
3-3	321.0	37.21	8.627	45.75	9.144	76.73	-1.00	P	
3-4	321.3	37.32	8.610	45.86	9.095	77.03	-1.00	P	
3-5	322.8	37.6	8.584	45.75	9.092	77.59	-0.43	P	
3-6	321.8	37.38	8.610	45.70	9.117	77.23	-0.25	P	
4-2	344.9	37.45	9.211	46.89	9.654	76.20	-0.66	P	
4-3	334.6	37.15	9.008	46.92	9.619	74.14	-2.90	P	
4-4	337.9	37.11	9.104	46.83	9.600	75.20	-1.70	P	
4-5	344.5	37.99	9.067	47.02	9.617	76.17	0.80	P	
4-6	343.8	37.95	9.058	47.02	9.626	75.95	0.01	P	
5-2	335.1	38.06	8.804	46.91	9.510	75.11	-3.20	P	
5-3	336.5	37.64	8.942	46.81	9.464	76.00	-2.30	P	
5-4	341.0	37.90	8.995	46.88	9.485	76.68	-0.80	P	
5-5	342.1	38.19	8.961	46.97	9.530	76.44	-0.90	P	
Supplementary information: N/A									

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4.3	**Insulation test (Final)**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				4000 / 8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		—
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-1	57.70	1.94	111.94	-	No	P
1-2	24.60	1.94	47.72	-	No	P
1-3	34.90	1.94	67.71	-	No	P
1-4	4.31	1.94	8.36	-	No	P
1-5	53.60	1.94	103.98	-	No	P
1-6	51.70	1.94	100.30	-	No	P
1-7	7.28	1.94	14.12	-	No	P
1-8	28.30	1.94	54.90	-	No	P
2-1	26.30	1.94	51.02	-	No	P
2-2	34.90	1.94	67.71	-	No	P
2-3	22.40	1.94	43.46	-	No	P
2-4	21.70	1.94	42.10	-	No	P
2-5	16.00	1.94	31.04	-	No	P
3-1	33.30	1.94	64.60	-	No	P
3-2	40.50	1.94	78.57	-	No	P
3-3	9.32	1.94	18.08	-	No	P
3-4	8.57	1.94	16.63	-	No	P
3-5	3.18	1.94	6.17	-	No	P
3-6	17.60	1.94	34.14	-	No	P
4-1	35.70	1.94	69.26	-	No	P
4-2	23.80	1.94	46.17	-	No	P
4-3	43.50	1.94	84.39	-	No	P
4-4	25.40	1.94	49.28	-	No	P
4-5	40.50	1.94	78.57	-	No	P
4-6	39.50	1.94	76.63	-	No	P
5-1	18.30	1.94	35.50	-	No	P
5-2	17.00	1.94	32.98	-	No	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

5-3	2.27	1.94	4.40	-	No	P
5-4	19.00	1.94	36.86	-	No	P
5-5	2.09	1.94	4.05	-	No	P
*Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information: N/A						

4.15	**Wet leakage current test (Final)**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
1-1	4900.0	1.94	9506.0	P
1-2	4320.0	1.94	8380.8	P
1-3	5410.0	1.94	10495.4	P
1-4	3040.0	1.94	5897.6	P
1-5	4030.0	1.94	7818.2	P
1-6	7690.0	1.94	14918.6	P
1-7	5270.0	1.94	11097.0	P
1-8	2070.0	1.94	4015.0	P
2-1	4140.0	1.94	8031.6	P
2-2	2650.0	1.94	5141.0	P
2-3	1440.0	1.94	2793.6	P
2-4	1260.0	1.94	2444.4	P
2-5	1220.0	1.94	2366.8	P
3-1	6730.0	1.94	13056.2	P
3-2	5270.0	1.94	11097.0	P
3-3	2530.0	1.94	4908.2	P
3-4	5810.0	1.94	11271.4	P
3-5	2790.0	1.94	5490.0	P
3-6	2790.0	1.94	5412.0	P
4-1	3120.0	1.94	6052.8	P
4-2	2950.0	1.94	5723.0	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
4-3	1850.0	1.94	3589.0	P
4-4	1340.0	1.94	2599.6	P
4-5	1410.0	1.94	2735.4	P
4-6	1220.0	1.94	2366.8	P
5-1	3580.0	1.94	6945.2	P
5-2	2450.0	1.94	4753.0	P
5-3	1920.0	1.94	3724.8	P
5-4	1840.0	1.94	3569.6	P
5-5	1630.0	1.94	3162.2	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information: N/A				

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
—	**IEC 61730 Part 1 - Requirements for construction**		
4	**Classification, applications and intended use**		
	The PV modules shall be classified according to IEC 61140.	The PV modules are classified as Class II.	P
Supplementary information: N/A			
5	**Requirements for design and construction**		
5.1	**General**		
	Where applicable, materials and components shall comply with the safety requirements specified in the relevant IEC standards.	Compliance is verified by evaluation of materials and components. See subclause 5.2 - 5.6 for details.	P
	All PV modules shall be suitable for operation in outdoor non-weather protected locations, exposed to direct and indirect (albedo) solar radiation, in an environmental temperature range of at least –40 °C to +40 °C and up to 100 % relative humidity as well as rain. PV modules shall be designed to withstand the electrical, mechanical, thermal and environmental (temperature, mechanical load, humidity, UV/weather, pollution, etc.) stresses occurring in their intended use and present no danger to the user or the environment.	Compliance is verified by evaluation of materials, components and PV module construction as well as tests specified in IEC 61730-2.	P
	A PV module can either be completely assembled when shipped from the factory, or be provided in subassemblies. The provided assemblies of the product shall not involve any action that is likely to affect compliance with the requirements of the IEC 61730 series.	PV modules are completely assembled.	P
	Incorporation of a PV module into the final assembly shall not require any alteration of the PV module from its originally evaluated form.	No assembly part is present.	N/A
	All PV module mounting and wiring methods specified in the installation instructions shall be evaluated for compliance with the IEC 61730 series. The construction of a PV module shall be such that equipotential bonding continuity, if applicable, is not interrupted by installation.	Compliance is checked by inspection and by test for MST 34 and MST 13.	P
	Any adjustable or movable structural part shall be provided with a locking device to reduce the likelihood of unintentional movement, if any such movement may result in a risk of fire, electric shock, or injury to persons.	No such parts.	N/A

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	PV modules shall not have accessible burrs, sharp edges or sharp points that can cause injury to users or service persons.	Compliance is checked by test for MST 06.	P
	Parts shall be prevented from loosening or turning if such loosening or turning may result in a risk of fire, electric shock, or injury to persons.	No such parts.	N/A
5.2	**Marking and documentation**		
5.2.1	General		
	Instructions related to safety shall be in an official language of the country where the equipment is to be installed.	Marking and documentation are written in English.	P
5.2.2	Marking		
5.2.2.1	General		
	Each PV module shall include the following clear and indelible markings:	Compliance is checked by test for MST 01 and MST 05.	P
	a) Name, registered trade name or registered trade mark of manufacturer	On label and installation manual.	P
	b) Type or model number designation	On label and installation manual.	P
	c) Serial number	Laminated in module.	P
	d) Date and place of manufacture; alternatively serial number assuring traceability of date and place of manufacture	Traceable from serial number.	P
	e) Polarity of terminals or leads	“+“ and “-“ on terminal.	P
	f) “Maximum system voltage” or ”Vsys”	1500V on label and installation manual.	P
	g) Class of protection against electrical shock	Class II on label and installation manual.	P
	h) “Voltage at open-circuit” or “Voc” including manufacturing tolerances	On label and installation manual.	P
	i) “current at short-circuit;” or “Isc” including manufacturing tolerances	On label and installation manual.	P
	j) “PV module maximum power” or “Pmax” including manufacturing tolerances	On label and installation manual.	P
	k) “Maximum overcurrent protection rating”	On label and installation manual.	P
	All electrical data shall be shown as relative to standard test conditions (STC) (1 000 W/m2, (25 ± 2) °C, AM 1,5 according to IEC 60904-3).	On label and installation manual.	P
	International symbols shall be used where applicable.	CE symbol on label.	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	PV connectors or wiring shall be marked in accordance to IEC 62852 with a symbol "Do not disconnect under load".	Symbol and warning notice are labelled close to connectors.	P
	PV connectors shall be clearly marked indicating the terminal polarity.	“+“ and “-“ on terminal.	P
	For Class II and Class 0 PV modules, the symbol per IEC 60417-6042 shall be applied near the PV module electrical connection means.	Electrical hazard symbol and warning on label.	P
	PV modules shall be marked to indicate the classes.	Class II symbol on label.	P
	PV modules provided with terminals for field wiring rated only for use with copper wire shall be marked, at or adjacent to the terminals, with the statement "Use copper wire only", "Cu only", or the equivalent. PV modules provided with terminals for field wiring rated only for use with a different specific wiring material shall be marked with a similar statement referring to the rated material. PV modules provided with terminals for field wiring rated for use with all types of wiring material do not need to be marked.	“For field connections, use minimum 4mm^2 copper wires insulated for a minimum 90°C.” on label.	P
5.2.2.2	Symbols		
5.2.2.2.1	Equipotential bonding		
	A wiring terminal or bonding location of a PV module intended to accommodate a field installed bonding conductor for equipotential bonding shall be identified with the appropriate symbol per IEC 60417-5021 or IEC 60417-5017.	Symbol per IEC 60417-5021 on frame.	P
5.2.2.2.2	Functional earthing		
	A wiring terminal or bonding location of a PV module intended to accommodate a field installed functional earthing conductor shall be identified with the appropriate symbol per IEC 60417-5018.	PV modules are not functional earthing.	N/A
5.2.3	Documentation		
	PV modules shall be supplied with documentation describing the methods of electrical and mechanical installation as well as the electrical ratings of the PV module.	Installation manual is provided.	P
	The documentation shall state the Class under which the PV module was qualified and any specific limitations required for that Class.	Written in installation manual.	P
	The documentation shall state the environmental conditions to which the module has been qualified, which by default includes a temperature range of –40 °C to +40 °C and wind/snow load including safety factor.	Written in installation manual.	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
	It shall be ensured that appropriate documentation for safe installation, use, and maintenance is available to installers and operators. For identical PV modules it is considered to be sufficient that one set of documentation is supplied with the PV module shipping unit.	Installation manual is provided.	P
	Environmental conditions to which a PV module has been qualified may include IEC 61701 or IEC 62716.	Written in installation manual. PV modules are tested according to IEC 61701, IEC 62716 and 2PfG 2387/04.14.	P
	The documentation shall contain the following information:		
	All information required by 5.2.2.1 with exception of c), d) and e).	Written in installation manual.	P
	Recommended maximum series/parallel PV module configurations.	Written in installation manual.	P
	The current rating of overcurrent protection, as determined in MST 26.	Written in installation manual.	P
	Manufacturer's stated tolerance for Voc, Isc and maximum power output Pmax under standard test conditions.	Written in installation manual.	P
	Temperature coefficient for voltage at open-circuit.	Written in installation manual.	P
	Temperature coefficient for maximum power.	Written in installation manual.	P
	Temperature coefficient for short-circuit current.	Written in installation manual.	P
	All electrical data shall be shown as relative to standard test conditions (1 000 W/m2, (25 ± 2) °C, AM 1,5 according to IEC 60904-3).	Written in installation manual.	P
	International symbols shall be used where applicable.	Written in installation manual.	P
	The electrical documentation shall include a detailed description of the electrical installation wiring method to be used. This description shall include:		
	The minimum cable diameters for PV modules intended for field wiring.	Written in installation manual.	P
	Any limitations on wiring methods and wire management that apply to the junction box for the PV module	Written in installation manual.	P
	The size, type, material, and temperature rating of the conductors to be used.	Written in installation manual.	P
	Type of terminals for field wiring.	Written in installation manual.	P
	Specific PV connector model/types and manufacturer to which the PV module connectors can be mated.	Written in installation manual.	P
	The bonding method(s) to be used (if applicable) shall be specified. All provided or specified hardware shall be identified in the documentation	Written in installation manual.	P
	The type and ratings of bypass diode to be used (if applicable).	Written in installation manual.	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	Limitations to the mounting situation (e.g. slope, mounting means, cooling).	Written in installation manual.	P
	A statement indicating the fire rating(s) and the applied standard, or a statement that resistance to external fire sources was not evaluated, as well as the limitations to that rating (e.g. installation slope, sub structure or other applicable installation information).	Written in installation manual.	P
	A statement indicating the minimum mechanical means for securing the PV module (as evaluated during the mechanical load test (MST 34)).	Written in installation manual.	P
	A statement indicating the maximum altitude the PV module is designed for. De-ratings can be applied.	Written in installation manual.	P
	The documentation for roof mounting shall include:		
	A statement indicating the minimum mechanical means for securing the PV module to the roof (as evaluated during the mechanical load test according (MST 34)	Written in installation manual.	P
	Details of the specific parameter(s) when the fire rating is dependent on a specific mounting structure, specific spacing, or specific means of attachment to the roof or structure.	Written in installation manual.	P
	The documentation shall include a statement advising that external or otherwise artificially concentrated sunlight shall not be directed onto the front or back face of the PV module (if not qualified for).	Written in installation manual.	P
	Assembly instructions shall be provided with a product shipped in subassemblies, and shall be detailed and adequate to the degree required to facilitate complete and safe assembly of the product to specifications set forth in the IEC 61730 standard series.	Written in installation manual.	P
	To facilitate proper system sizing the manufacturer shall include relevant parameters in the installation instructions that allow system layout based not only on STC values given in the documentation.	Written in installation manual.	P
	The following or equivalent statement shall be included:		
	"Under normal conditions, a photovoltaic module is likely to experience conditions that produce higher current and/or voltage than reported at standard test conditions. Accordingly, the values of Isc and Voc. marked on this PV module should be multiplied by a factor of 1,25 when determining component voltage ratings, conductor current ratings, and size of controls (e.g. inverter) connected to the PV output."	Written in installation manual.	P
5.3	**Electrical components and insulation**		
5.3.1	General		
	PV modules may consist of the following electrical components and insulation:		
	The internal wiring, e.g. solar cell and cell interconnects	See subclause 5.3.2.	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	External wiring and output cables	See subclause 5.3.3.	P
	Connectors	See subclause 5.3.4.	P
	Junction boxes for PV modules	See subclause 5.3.5.	P
	Frontsheet and backsheet	See subclause 5.3.6.	P
	Insulation barriers	See subclause 5.3.7.	P
	Electrical connections	See subclause 5.3.8.	P
	Encapsulant	See subclause 5.3.9.	P
	Bypass diodes	See subclause 5.3.10.	P
5.3.2	Internal wiring		
	Internal wiring shall have sufficient current carrying capacity for the relevant application.	Compliance is checked by inspection and by reverse current overload test (MST 26).	P
5.3.3	External wiring and cables		
	External wires and cables shall fulfill the requirements of EN 50618.	Cables fulfill the requirements of EN 50618:2014.	P
5.3.4	Connectors		
	External DC connectors shall fulfill the requirements of IEC 62852.	Connectors fulfill the requirements of IEC 62852:2014.	P
5.3.5	Junction boxes for PV modules		
	Junction boxes for PV modules shall fulfill the requirements of IEC 62790.	Junction boxes fulfill the requirements of IEC 62790:2014.	P
5.3.6	Frontsheets and backsheets		
	Layers of frontsheets and backsheets which are relied upon for insulation shall withstand all relevant mechanical, electrical, thermal, and environmental stresses, with compliance demonstrated at the material or component level.	Compliance is checked by passing the tests in IEC 61730-2. Backsheets fulfill the requirements of 2 PfG 1793/04.2014. Certificate No.: R 50303475 for BE-D5, R 50302136 for ZTT-KPO350，R 50296517 for Cynagard 225A（R）	P
	Layers which may represent a part of a tracking path (creepage) shall be classified into a material group.	See subclause 5.6.3.3.	P
	In general polymeric frontsheets and backsheets shall meet the relevant requirements of section 5.5.2.	See subclause 5.5.2. Compliance is checked by passing the tests in IEC 61730-2.	P
	If these sheets are used as relied upon insulation they shall at a minimum fulfill the requirements of 5.6.4.3 for insulation in thin layers.	See subclause 5.6.4.3.	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	Polymeric front- and backsheets used as relied upon insulation shall meet the requirements of 5.5.2.3.	See subclause 5.5.2.3.	P
	Adhesion of the front- and backsheet, e.g. to the encapsulant or glass, shall be appropriate.	Compliance is checked by passing the IEC 61730-2 test sequence.	P
5.3.7	Insulation barriers		
	An insulation barrier shall withstand all relevant mechanical, electrical, thermal, and environmental stresses.	Compliance is checked by passing the IEC 61730-2 test sequence.	P
	In general a polymeric insulation barrier shall meet the relevant requirements of 5.5.2. It shall be held in place and shall not be adversely affected to the extent that its required electrical and mechanical properties fall below the minimum acceptable values for the application.	See subclause 5.5.2. Compliance is checked by passing the IEC 61730-2 test sequence.	P
	The removal of the insulation barrier shall only be possible by using a tool.	Tool is needed for removal of the insulation barrier.	P
5.3.8	Electrical connections		
5.3.8.1	General		
	Electrical connections shall be so designed that contact pressure is not transmitted through insulating material other than ceramic, pure mica or other material with suitable characteristics, unless there is sufficient resiliency in the metallic parts to compensate for any shrinkage or yielding of the insulating material. Prevention shall be taken that connections do not become loose.	Compliance is checked by MST 01 and MST 13.	P
	Precautions shall be taken that under operation clamping units or other terminations are prevented from thermal and mechanical stress which might impair electrical conductivity.	Compliance is checked by passing the IEC 61730-2 test sequence.	P
5.3.8.2	Terminals for external cables and PV connector ribbons		
	Terminals for electrical connections shall be suitable for the type and range of conductor cross-sectional areas according to specification of the manufacturer.	Junction boxes fulfill the requirements of IEC 62790:2014.	P
	Insulated terminals shall be designed in a manner where a possible displacement that may result in a reduction of clearances and creepage distances is prevented.	Connections are mechanically secure.	P
5.3.8.3	Splices and connections inside a PV module		

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	Splices and connections inside a PV module other than those for terminals of external cables and PV connector ribbons shall be mechanically secured and shall provide electrical continuity. Electrical connections shall be soldered, welded, conductively adhered, crimped, or otherwise securely connected. A soldered or conductively adhered joint shall be additionally mechanically secured.	No splice.	P
5.3.9	Encapsulants		
	The technical properties of encapsulant shall be suitable for the intended application. In particular: a) the rated operating temperature range shall include the temperature range of the intended application; b) the material group, the insulation resistance and the dielectric strength shall be suitable for the intended application.	Compliance is checked by passing the IEC 61730-2 test sequence.	P
5.3.10	Bypass diodes		
	Bypass diodes shall be rated to withstand the current and voltage for their intended use.	Compliance is checked by MST 01, MST 07, MST 22 and MST 25.	P
5.4	**Mechanical and electromechanical connections**		
5.4.1	General		
	Mechanical connections shall be able to durably withstand the thermal, mechanical, and environmental stresses occurring in the application without decreasing the integrity of the connection below safe levels.	Compliance is checked by inspection and tested by MST 13, MST 32, MST 34 and MST 37.	P
	Parts intended to be removed shall only be detachable with the aid of tools.	Tool is needed for removal.	P
5.4.2	Screw connections		
	Screws and mechanical connections, the failure of which might cause the PV module to become unsafe, shall withstand the mechanical stresses occurring in normal use.	No screw is used.	N/A
	Screws shall not be made of a material which is soft or liable to creep.	No screw is used.	N/A
	Screws which are operated for maintenance purposes shall not be of insulating material if their replacement by a metal screw could impair supplementary or reinforced insulation.	No screw is used.	N/A
	At least one screw per electrical mechanical connection shall ensure the electrically connection between the metallic component.	No screw is used.	N/A

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	Screws used for mechanical and electrical connections with a nominal diameter of less than 3 mm shall screw into metal. For screws used for mechanical and electrical connections two full threads shall engage into the metal.	No screw is used.	N/A
	Screwed and other fixed connections between different parts of the PV module shall be made in such a way that they do not come loose through torsion, bending stresses, vibration, etc., as may occur in normal use.	No screw is used.	N/A
5.4.3	Rivets		
	Rivets which serve as electrical as well as mechanical connections shall be locked against loosening. A noncircular shank or an appropriate notch may be sufficient.	No rivets is used.	N/A
5.4.4	Thread-cutting screws		
	Thread-cutting screws and self-tapping screws shall not be used for the interconnection of current-carrying parts made of metal which is soft or liable to creep, such as zinc or aluminium.	No thread-cutting screw is used.	N/A
	Thread-forming screws (sheet metal screws) shall not be used for the connection of current-carrying parts, unless they clamp these parts directly in contact with each other, and are provided with suitable locking means.	No thread-cutting screw is used.	N/A
	Thread-cutting (self-tapping) screws shall not be used for the connection of current-carrying parts unless they generate a full form standard machine screw thread. However, screws of the latter type shall not be used if they are likely to be operated by the user or installer.	No thread-cutting screw is used.	N/A
	Thread-cutting and thread-forming screws, used to provide continuity for equipotential bonding, shall be such that it is not necessary to disturb the connection in normal use.	No thread-cutting screw is used.	N/A
5.4.5	Form/press/tight fit		
	Form/press/tight fits of metallic components not separately equipotentially bonded need to be electrically connected.	Compliance is checked by inspection and tested by MST 32, MST 34 and MST 13 pre and post the MST 32 and MST 34 tests.	P
5.4.6	Connections by adhesives		
	Adhesion of a polymer relied upon for insulation to another insulating layer shall be appropriate for the application.	Compliance is checked with MST 34, MST 13, MST 32 for mounting means adhesives and MST 42, MST 17 for junction box adhesives.	P
5.4.7	Other connections		

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	Materials and processes for creating the connections shall be appropriate for the intended use.	Compliance is checked with MST 01 and MST 13.	P
5.5	**Materials**		
5.5.1	General	General compliance is checked with tests in accordance to IEC 61730-2.	P
5.5.2	Polymeric materials		
5.5.2.1	General		
	Polymeric materials shall be able to durably and safely withstand the electrical, mechanical, thermal, environmental, and corrosive stresses occurring in the application, and shall be resistant to electrical and mechanical property degradation.	Compliance is checked by passing the IEC 61730-2 test sequence.	P
	Polymeric parts which ensure either the electrical or mechanical safety of the PV module, or both, shall be resistant to electrical and mechanical property degradation and shall comply with the requirements of the materials creep test (MST 37) depending on their constructive function in the PV module.	Compliance is checked with materials creep test (MST 37).	P
5.5.2.2.	Endurance to weathering stress		
	Polymeric materials shall be durable to weathering stress occurring in the application.	Components are evaluated to the relevant requirement in the applicable component standard.	P
5.5.2.3	Polymeric materials used as electrical insulation		
5.5.2.3.1	General		
	An insulation material that serves more than one function shall comply with all applicable requirements. In case of multiple similar requirements (e.g. thickness or test duration) the most stringent requirements applies. It shall be evaluated in the thinnest significant thickness used for the specific application.	Components are evaluated to the relevant requirement in the applicable component standard.	P
	Variations in polymer additives such as anti-oxidants, UV stabilizers, colorants, and change of chemical formulation of polymeric component shall be evaluated to determine if the material property changes with respect to electrical, mechanical, thermal, and physical properties. Compliance is checked by inspection and by the relevant PV module and material tests.	Components are evaluated to the relevant requirement in the applicable component standard.	P
	The temperature limits of materials used as insulation shall not be less than the maximum measured operating temperature of the specific material in application, as measured during the temperature test (MST 21).	Compliance is checked with temperature test (MST 21).	P
5.5.2.3.2	Endurance to electrical stress		
	Materials used as electrical insulation shall withstand electrical stresses which occur in the application both in the unconditioned and preconditioned cases.	Compliance is checked with MST 16 and MST 14.	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	Insulating materials between conductive parts of different polarity or between conductive parts and accessible surfaces shall be assessed according to their material group designation based on their CTI rating, if those materials are a part of a creepage distance.	Compliance is checked by passing the IEC 61730-2 test sequence including B1 test sequence.	P
5.5.2.3.3	Endurance to thermal stress – RTE (RTI) or TI (mechanical/electrical)		
	Materials used as relied upon insulation shall have a minimum relative thermal endurance, relative thermal index or temperature index (RTE/RTI or TI) in accordance with IEC 60216-5 or IEC 60216-1 equal to or greater than the maximum normalized operating temperature of the material as measured in the particular mounting situation (e.g. roof mounted) during the temperature test (MST 21), or 90 °C, whichever is higher.	Compliance is checked with temperature test (MST 21).	P
	To ensure that the electrical and mechanical properties are provided through the expected lifetime the TI and RTE (RTI) values have to be evaluated as mechanical and electrical ones according to IEC 60216-2. Relevant RTI values evaluated in accordance to UL 746B are accepted as an alternative to RTE.	For Cynagard 225A backsheet, TI mechanical @ 20,000h is 120°C, TI electrical @ 20,000h is 120°C. For BE-D5 backsheet, TI mechanical @ 20,000h is 113°C, TI electrical @ 20,000h is 113°C. For ZTT-KPO350 backsheet, TI mechanical @ 20,000h is 126°C, TI electrical @ 20,000h is 126°C.	P
5.5.2.3.4	Polymeric insulating materials used as external parts		
	Any accessible part (edge seal, front- and backsheet) that is used as insulation shall meet the criteria of this subclause.	Compliance is checked with MST 24.	P
5.5.2.3.5	Polymeric insulating parts supporting live parts		
	External parts of non-metallic material, parts of insulating material supporting live parts including connections, and parts of polymeric material providing supplementary insulation or reinforced insulation, shall be sufficiently resistant to heat if their deterioration could cause the PV module to fail to comply with this standard.	Compliance is checked with MST 24 and MST 37. Junction boxes fulfill the requirements of IEC 62790:2014.	P
5.5.2.4	Polymeric materials used for mechanical functions		

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	Materials used for mechanical functions shall have a minimum mechanical relative thermal endurance, relative thermal index or temperature index (RTE/RTI or TI) in accordance with IEC 60216-5 or IEC 60216-1 equal to or greater than the maximum normalized operating temperature of the material as measured in the particular mounting situation (e.g. roof mounted) during the temperature test (MST 21), or 90 °C, whichever is higher.	Compliance is checked with temperature test (MST 21).	P
5.5.3	Metallic materials		
5.5.3.1	General		
	Iron or mild steel as a part of the product shall be plated, painted, or enamelled for protection against corrosion.	Compliance is checked by inspection.	P
5.5.3.2	Current carrying parts		
	Under normal operation current-carrying parts shall have a sufficient mechanical strength and electrical conductivity.	Current carrying parts are protected.	P
5.5.4	Adhesives		
	Adhesives shall be appropriate for the application.	Compliance is checked by relevant tests of IEC 61730-2, including MST 42, MST 34, MST 01, MST 11 and MST 17.	P
5.6	**Protection against electric shock**		
5.6.1	General		
	PV modules shall be provided with adequate protection against contact with hazardous live parts and shall pose no risk of electric shock.	See subclause 5.6.2 - 5.6.4.	P
5.6.2	Protection against accessibility to hazardous live parts		
5.6.2.1	General		
	PV modules shall be constructed to provide adequate protection against accessibility to hazardous live parts (> 35 V DC).	Compliance is checked by MST 01 and MST 11.	P
5.6.2.2	Protection by means of enclosures and insulation barriers		
	Enclosures or insulation barriers shall be so designed that, after mounting, the live parts are not accessible. This requirement shall be fulfilled even if there is any deformation of the housing and/or cover as a result of mechanical and thermal stress, which can occur during normal use. Furthermore, the degree of protection of the housing may not be impaired by this possible deformation.	EVA, glass, backsheet, junction box, cable and connectors are acceptably insulated.	P
	Parts of enclosures and insulation barriers that provide protection in accordance with these requirements shall not be removable without the use of a tool.	Tool is needed for removal.	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	An insulation barrier shall be held in place and shall not be adversely affected by influences expected during normal operation to the extent that its necessary electrical and mechanical properties fall below the minimum acceptable values for the application.	Compliance is checked by passing the IEC 61730-2 test sequence.	P
	Parts shall be prevented from loosening or turning if such loosening or turning may result in a risk of fire, electric shock, or injury to persons.	No such parts.	N/A
5.6.2.3	Protection by means of insulation of live parts		
	An insulation material providing the sole insulation between a live part and an accessible metal part, or between uninsulated live parts not of the same potential, shall be of adequate thickness and of a material appropriate for the application.	Compliance is verified by evaluation of materials and components.	P
5.6.3	Insulation coordination		
5.6.3.1	General		
	Voltages which can occur in the system (overvoltages)	Overvoltage category III is applicable for PV modules.	P
	Voltages which are generated by the devices in the system (system voltage)	Rated system voltage 1500V. Values for the rated impulse voltage for reinforced insulation is 16,000V.	P
	Protection for individuals and objects (classes according to IEC 61140)	Class II.	P
	Environmental conditions (pollution degree)	Pollution degree 1.	P
	Insulation properties (material groups)	Material group I.	P
5.6.3.2	Pollution degree	Pollution degree 1. Compliance is checked by passing the IEC 61730-2 test sequence including B1 test sequence.	P
5.6.3.3	Material groups	Material group I. Sequence B1 was passed.	P
5.6.3.4	Clearances (cl) and creepage distances (cr)		
	Minimum measured creepage and clearance distances between field wiring terminals (mm)	The junction box has been certified according to IEC 62790:2014.	P
	Minimum measured creepage and clearance distances between internal current carrying parts and accessible points (mm)	Min-creepage distance is 14.5mm.	P
5.6.4	Distance through insulation (dti)		
5.6.4.1	General		

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	Solid insulation in the sense of this standard can be comprised of single or multiple layers, and typically appear as thin layers (5.6.4.3) and cemented joints (5.6.4.2)	Frontsheet is glass comprised of single layer. Backsheet Cynagard 215A comprised of multiple layers. Backsheet BE-D5 backsheet comprised of multiple layers. Backsheet ZTT-KPO350 backsheet comprised of multiple layers.	—
	Distances through insulation (dti) (mm):	See table MST 04	—
	Polymeric materials for cemented insulation parts and insulation in thin layers shall withstand environmental, thermal, electrical and mechanical stresses as far as they occur. The insulation shall fulfill the material classification as given in IEC 60216-1, IEC 60216-2 and IEC 60216-5 (RTI/RTE/TI)	Comply with requirements according to subclause 5.5.2.	P
5.6.4.2	Cemented joints		
	Distances through cemented joints (mm):	Not cemented joint construction.	N/A
	a) Joint between rigid part and rigid part	Not cemented joint construction.	N/A
	b) Joint between rigid part and flexible part, also between flexible part and flexible part	Not cemented joint construction.	N/A
5.6.4.3	Insulation in thin layers		
	a) Single-layer sheet		
	Minimum thickness (mm)	Not single-layer sheet.	N/A
	RTI / RTE / TI (°C)	Not single-layer sheet.	N/A
	Dielectric strength for reinforced insulation (VDC)	Not single-layer sheet.	N/A
	b) Multi-layer sheets		
	The sum of thickness of all layers providing relied upon insulation (mm)	Compliance is checked by MST 04.	P
	RTI / RTE / TI (°C)	For Cynagard 225A backsheet, TI mechanical @ 20,000h is 120°C, TI electrical @ 20,000h is 120°C. For BE-D5 backsheet, TI mechanical @ 20,000h is 113°C, TI electrical @ 20,000h is 113°C. For ZTT-KPO350 backsheet, TI mechanical @ 20,000h is 126°C, TI electrical @ 20,000h is 126°C.	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
	Dielectric strength for reinforced insulation (VDC)	8000VDC test voltage applied.	P
Supplementary information: N/A			

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
—	**IEC 61730 Part 2 - Requirements for testing** **Module type: GCL-P6/72H335 and GCL-P6/72H340** （**BOM 1)**		
MST 01	MST 01 - Visual inspection	See table MST 01	P
MST 02	MST 02 - Performance at STC	See table MST 02	P
MST 03	MST 03 - Maximum power determination	See table MST 03	P
MST 04	MST 04 - Insulation thickness test	See table MST 04	P
MST 05	MST 05 - Durability of markings	See table MST 05	P
MST 06	MST 06 - Sharp edge test	See table MST 06	P
MST 07	MST 07 - Bypass diode functionality test	See table MST 07	P
MST 11	MST 11 - Accessibility test	See table MST 11	P
MST 12	MST 12 - Cut susceptibility test	See table MST 12	P
MST 13	MST 13 - Continuity test for equipotential bonding	See table MST 13	P
MST 14	MST 14 - Impulse voltage test	See table MST 14	P
MST 16	MST 16 - Insulation test	See table MST 16	P
MST 17	MST 17 - Wet leakage current test	See table MST 17	P
MST 21	MST 21 - Temperature test	See table MST 21	P
MST 22	MST 22 - Hot-spot endurance test	See table 4.9 of of IEC 61215 Part 2 in this report	P
MST 23	MST 23 - Fire test	N/A	—
MST 24	MST 24 - Ignitability test	See table MST 24	P
MST 25	MST 25 - Bypass diode thermal test	N/A	—
MST 26	MST 26 - Reverse current overload test	See table MST 26	P
MST 32	MST 32 - Module breakage test	See table MST 32	P
MST 33	MST 33 - Screw connections test	N/A	—
MST 34	MST 34 - Static mechanical load test	See table 4.16 of IEC 61215 Part 2 in this report	P
MST 35	MST 35 - Peel test	N/A	—
MST 36	MST 36 - Lap shear strength test	N/A	—
MST 37	MST 37 - Materials creep test	Combined in Sequence B1	P
MST 42	MST 42 - Robustness of terminations test	See table 4.14 of IEC 61215 Part 2 in this report	P
MST 51	MST 51a - Thermal cycling (TC50)	See table 4.11 of IEC 61215 Part 2 in this report	P
	MST 51b - Thermal cycling test (TC200)	See table 4.11 of IEC 61215 Part 2 in this report	P
MST 52	MST 52a - Humidity freeze test	See table 4.12 of IEC 61215 Part 2 in this report	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
	MST 52b - Humidity freeze test	See table MST 52 in this report	P
MST 53	MST 53a - Damp heat test (1000h)	See table 4.13 of IEC 61215 Part 2 in this report	P
	MST 53b - Damp heat test (200h)	See table MST 52 in this report	P
MST 54	MST 54a – UV test (15kWh/m^2)	See table 4.10 of IEC 61215 Part 2 in this report	P
	MST 54b - UV test (60kWh/m^2)	See table MST 54 in this report	P
MST 55	MST 55 - Cold conditioning	See table MST 55	P
MST 56	MST 56 - Dry heat conditioning	See table MST 56	P
Supplementary information: N/A			

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
—	**IEC 61730 Part 2 - Requirements for testing** **Module type: GCL-P6/72H345 and GCL-P6/72H340 (BOM 2)**		
MST 01	MST 01 - Visual inspection	See table MST 01	P
MST 02	MST 02 - Performance at STC	See table MST 02	P
MST 03	MST 03 - Maximum power determination	See table MST 03	P
MST 04	MST 04 - Insulation thickness test	N/A	—
MST 05	MST 05 - Durability of markings	See table MST 05	P
MST 06	MST 06 - Sharp edge test	See table MST 06	P
MST 07	MST 07 - Bypass diode functionality test	See table MST 07	P
MST 11	MST 11 - Accessibility test	See table MST 11	P
MST 12	MST 12 - Cut susceptibility test	See table MST 12	P
MST 13	MST 13 - Continuity test for equipotential bonding	See table MST 13	P
MST 14	MST 14 - Impulse voltage test	See table MST 14	P
MST 16	MST 16 - Insulation test	See table MST 16	P
MST 17	MST 17 - Wet leakage current test	See table MST 17	P
MST 21	MST 21 - Temperature test	N/A	—
MST 22	MST 22 - Hot-spot endurance test	N/A	—
MST 23	MST 23 - Fire test	N/A	—
MST 24	MST 24 - Ignitability test	N/A	—
MST 25	MST 25 - Bypass diode thermal test	N/A	—
MST 26	MST 26 - Reverse current overload test	See table MST 26	P
MST 32	MST 32 - Module breakage test	N/A	—
MST 33	MST 33 - Screw connections test	N/A	—
MST 34	MST 34 - Static mechanical load test	N/A	—
MST 35	MST 35 - Peel test	N/A	—
MST 36	MST 36 - Lap shear strength test	N/A	—
MST 37	MST 37 - Materials creep test	Combined in Sequence B1	P
MST 42	MST 42 - Robustness of terminations test	See table 4.14 of IEC 61215 Part 2 in this report	P
MST 51	MST 51a - Thermal cycling (TC50)	See table 4.11 of IEC 61215 Part 2 in this report	P
	MST 51b - Thermal cycling test (TC200)	See table 4.11 of IEC 61215 Part 2 in this report	P
MST 52	MST 52a - Humidity freeze test	See table 4.12 of IEC 61215 Part 2 in this report	P
	MST 52b - Humidity freeze test	See table MST 52 in this report	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
MST 53	MST 53a - Damp heat test (1000h)	See table 4.13 of IEC 61215 Part 2 in this report	P
	MST 53b - Damp heat test (200h)	See table MST 52 in this report	P
MST 54	MST 54a – UV test (15kWh/m^2)	See table 4.10 of IEC 61215 Part 2 in this report	P
	MST 54b - UV test (60kWh/m^2)	See table MST 54 in this report	P
MST 55	MST 55 - Cold conditioning	See table MST 55	P
MST 56	MST 56 - Dry heat conditioning	See table MST 56	P
Supplementary information: N/A			

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
—	**IEC 61730 Part 2 - Requirements for testing** **Module type GCL-P6/72H325 (BOM 3)**		
MST 01	MST 01 - Visual inspection	See table MST 01	P
MST 02	MST 02 - Performance at STC	See table MST 02	P
MST 03	MST 03 - Maximum power determination	See table MST 03	P
MST 04	MST 04 - Insulation thickness test	See table MST 04	P
MST 05	MST 05 - Durability of markings	See table MST 05	P
MST 06	MST 06 - Sharp edge test	See table MST 06	P
MST 07	MST 07 - Bypass diode functionality test	See table MST 07	P
MST 11	MST 11 - Accessibility test	See table MST 11	P
MST 12	MST 12 - Cut susceptibility test	See table MST 12	P
MST 13	MST 13 - Continuity test for equipotential bonding	See table MST 13	P
MST 14	MST 14 - Impulse voltage test	See table MST 14	P
MST 16	MST 16 - Insulation test	See table MST 16	P
MST 17	MST 17 - Wet leakage current test	See table MST 17	P
MST 21	MST 21 - Temperature test	See table MST 21	P
MST 22	MST 22 - Hot-spot endurance test	See table 4.9 of of IEC 61215 Part 2 in this report	P
MST 23	MST 23 - Fire test	N/A	—
MST 24	MST 24 - Ignitability test	See table MST 24	P
MST 25	MST 25 - Bypass diode thermal test	N/A	—
MST 26	MST 26 - Reverse current overload test	See table MST 26	P
MST 32	MST 32 - Module breakage test	See table MST 32	P
MST 33	MST 33 - Screw connections test	N/A	—
MST 34	MST 34 - Static mechanical load test	N/A	—
MST 35	MST 35 - Peel test	N/A	—
MST 36	MST 36 - Lap shear strength test	N/A	—
MST 37	MST 37 - Materials creep test	Combined in Sequence B1	P
MST 42	MST 42 - Robustness of terminations test	See table 4.14 of IEC 61215 Part 2 in this report	P
MST 51	MST 51a - Thermal cycling (TC50)	See table 4.11 of IEC 61215 Part 2 in this report	P
	MST 51b - Thermal cycling test (TC200)	See table 4.11 of IEC 61215 Part 2 in this report	P
MST 52	MST 52a - Humidity freeze test	See table 4.12 of IEC 61215 Part 2 in this report	P
	MST 52b - Humidity freeze test	See table MST 52 in this report	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
MST 53	MST 53a - Damp heat test (1000h)	See table 4.13 of IEC 61215 Part 2 in this report	P
	MST 53b - Damp heat test (200h)	See table MST 52 in this report	P
MST 54	MST 54a – UV test (15kWh/m^2)	See table 4.10 of IEC 61215 Part 2 in this report	P
	MST 54b - UV test (60kWh/m^2)	See table MST 54 in this report	P
MST 55	MST 55 - Cold conditioning	See table MST 55	P
MST 56	MST 56 - Dry heat conditioning	See table MST 56	P
Supplementary information: N/A			

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
—	**IEC 61730 Part 2 - Requirements for testing** **Module type: GCL-P6/72H345 and GCL-P6/72H340 (BOM 4)**		
MST 01	MST 01 - Visual inspection	See table MST 01	P
MST 02	MST 02 - Performance at STC	See table MST 02	P
MST 03	MST 03 - Maximum power determination	See table MST 03	P
MST 04	MST 04 - Insulation thickness test	See table MST 04	P
MST 05	MST 05 - Durability of markings	See table MST 05	P
MST 06	MST 06 - Sharp edge test	See table MST 06	P
MST 07	MST 07 - Bypass diode functionality test	See table MST 07	P
MST 11	MST 11 - Accessibility test	See table MST 11	P
MST 12	MST 12 - Cut susceptibility test	See table MST 12	P
MST 13	MST 13 - Continuity test for equipotential bonding	See table MST 13	P
MST 14	MST 14 - Impulse voltage test	See table MST 14	P
MST 16	MST 16 - Insulation test	See table MST 16	P
MST 17	MST 17 - Wet leakage current test	See table MST 17	P
MST 21	MST 21 - Temperature test	See table MST 21	P
MST 22	MST 22 - Hot-spot endurance test	See table 4.9 of of IEC 61215 Part 2 in this report	P
MST 23	MST 23 - Fire test	N/A	—
MST 24	MST 24 - Ignitability test	See table MST 24	P
MST 25	MST 25 - Bypass diode thermal test	N/A	—
MST 26	MST 26 - Reverse current overload test	See table MST 26	P
MST 32	MST 32 - Module breakage test	See table MST 32	P
MST 33	MST 33 - Screw connections test	N/A	—
MST 34	MST 34 - Static mechanical load test	N/A	—
MST 35	MST 35 - Peel test	N/A	—
MST 36	MST 36 - Lap shear strength test	N/A	—
MST 37	MST 37 - Materials creep test	Combined in Sequence B1	P
MST 42	MST 42 - Robustness of terminations test	See table 4.14 of IEC 61215 Part 2 in this report	P
MST 51	MST 51a - Thermal cycling (TC50)	See table 4.11 of IEC 61215 Part 2 in this report	P
	MST 51b - Thermal cycling test (TC200)	See table 4.11 of IEC 61215 Part 2 in this report	P
MST 52	MST 52a - Humidity freeze test	See table 4.12 of IEC 61215 Part 2 in this report	P
	MST 52b - Humidity freeze test	See table MST 52 in this report	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
MST 53	MST 53a - Damp heat test (1000h)	See table 4.13 of IEC 61215 Part 2 in this report	P
	MST 53b - Damp heat test (200h)	See table MST 52 in this report	P
MST 54	MST 54a – UV test (15kWh/m^2)	See table 4.10 of IEC 61215 Part 2 in this report	P
	MST 54b - UV test (60kWh/m^2)	See table MST 54 in this report	P
MST 55	MST 55 - Cold conditioning	See table MST 55	P
MST 56	MST 56 - Dry heat conditioning	See table MST 56	P
Supplementary information: N/A			

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
—	**IEC 61730 Part 2 - Requirements for testing** **Module type GCL-P6/72H340 (BOM 5)**		
MST 01	MST 01 - Visual inspection	See table MST 01	P
MST 02	MST 02 - Performance at STC	See table MST 02	P
MST 03	MST 03 - Maximum power determination	See table MST 03	P
MST 04	MST 04 - Insulation thickness test	N/A	—
MST 05	MST 05 - Durability of markings	See table MST 05	P
MST 06	MST 06 - Sharp edge test	See table MST 06	P
MST 07	MST 07 - Bypass diode functionality test	See table MST 07	P
MST 11	MST 11 - Accessibility test	See table MST 11	P
MST 12	MST 12 - Cut susceptibility test	See table MST 12	P
MST 13	MST 13 - Continuity test for equipotential bonding	See table MST 13	P
MST 14	MST 14 - Impulse voltage test	See table MST 14	P
MST 16	MST 16 - Insulation test	See table MST 16	P
MST 17	MST 17 - Wet leakage current test	See table MST 17	P
MST 21	MST 21 - Temperature test	N/A	—
MST 22	MST 22 - Hot-spot endurance test	N/A	—
MST 23	MST 23 - Fire test	N/A	—
MST 24	MST 24 - Ignitability test	N/A	—
MST 25	MST 25 - Bypass diode thermal test	N/A	—
MST 26	MST 26 - Reverse current overload test	See table MST 26	P
MST 32	MST 32 - Module breakage test	N/A	—
MST 33	MST 33 - Screw connections test	N/A	—
MST 34	MST 34 - Static mechanical load test	See table 4.16 of IEC 61215 Part 2 in this report	P
MST 35	MST 35 - Peel test	N/A	—
MST 36	MST 36 - Lap shear strength test	N/A	—
MST 37	MST 37 - Materials creep test	Combined in Sequence B1	P
MST 42	MST 42 - Robustness of terminations test	See table 4.14 of IEC 61215 Part 2 in this report	P
MST 51	MST 51a - Thermal cycling (TC50)	See table 4.11 of IEC 61215 Part 2 in this report	P
	MST 51b - Thermal cycling test (TC200)	See table 4.11 of IEC 61215 Part 2 in this report	P
MST 52	MST 52a - Humidity freeze test	See table 4.12 of IEC 61215 Part 2 in this report	P
	MST 52b - Humidity freeze test	See table MST 52 in this report	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
MST 53	MST 53a - Damp heat test (1000h)	See table 4.13 of IEC 61215 Part 2 in this report	P
	MST 53b - Damp heat test (200h)	See table MST 52 in this report	P
MST 54	MST 54a – UV test (15kWh/m^2)	See table 4.10 of IEC 61215 Part 2 in this report	P
	MST 54b - UV test (60kWh/m^2)	See table MST 54 in this report	P
MST 55	MST 55 - Cold conditioning	See table MST 55	P
MST 56	MST 56 - Dry heat conditioning	See table MST 56	P
Supplementary information: N/A			

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 01	**Visual inspection (Initial) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-1	No visual defects	P
1-2	No visual defects	P
1-3	No visual defects	P
1-5	No visual defects	P
1-7	No visual defects	P
1-9	No visual defects	P
1-10	No visual defects	P
1-11	No visual defects	P
1-12	No visual defects	P
1-13	No visual defects	P
2-1	No visual defects	P
2-2	No visual defects	P
2-4	No visual defects	P
2-6	No visual defects	P
2-7	No visual defects	P
2-8	No visual defects	P
3-1	No visual defects	P
3-2	No visual defects	P
3-3	No visual defects	P
3-5	No visual defects	P
3-7	No visual defects	P
3-8	No visual defects	P
3-9	No visual defects	P
3-10	No visual defects	P
3-11	No visual defects	P
4-1	No visual defects	P
4-2	No visual defects	P
4-3	No visual defects	P
4-5	No visual defects	P
4-7	No visual defects	P
4-8	No visual defects	P
4-9	No visual defects	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4-10	No visual defects	P
5-1	No visual defects	P
5-2	No visual defects	P
5-4	No visual defects	P
5-6	No visual defects	P
5-7	No visual defects	P
5-8	No visual defects	P
Supplementary information: N/A		

MST 02	**Performance at STC - MST 02**						
Irradiance (W/m^2)	1000 ± 100						—
Module temperature (°C)	25 ± 2						—
Test method	☒ Simulator ☐ Natural sunlight						—
Isc with tolerence	9.000 A ± 4%						—
Voc with tolerence	45.60 V ± 3%						—
Sample No.	Pmpp [W]	Vmpp [V]	Impp [A]	Voc [V]	Isc [A]	FF [%]	—
1-1	332.4	37.70	8.819	46.62	9.433	75.59	—
2-1	344.6	37.94	9.082	47.02	9.622	76.16	—
3-1	323.2	37.16	8.699	45.75	9.143	77.27	—
4-1	342.4	37.47	9.141	47.01	9.633	75.62	—
5-1	344.8	38.12	9.046	47.01	9.581	76.57	—
Supplementary information: The STC measurement was performed with a pulsed solar simulator of Class AAA according to IEC60904-9:2007.							

MST 03	**Maximum power determination (Initial) - MST 03**	
Irradiance (W/m^2)	700 - 1000	—
Module temperature (°C)	Corrected to 25	—
Test method	☒ Simulator ☐ Natural sunlight	—
Sample No.	I-V curve recorded (yes/no)	—
1-2	yes	—
1-3	yes	—
1-5	yes	—
1-7	yes	—

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
1-11	yes		—
1-12	yes		—
1-13	yes		—
2-2	yes		—
2-4	yes		—
2-6	yes		—
2-7	yes		—
2-8	yes		—
3-2	yes		—
3-3	yes		—
3-5	yes		—
3-7	yes		—
3-8	yes		—
3-9	yes		—
4-2	yes		—
4-3	yes		—
4-5	yes		—
4-7	yes		—
4-8	yes		—
4-9	yes		—
5-2	yes		—
5-4	yes		—
5-6	yes		—
5-7	yes		—
5-8	yes		—
Supplementary information: N/A			

MST 16	**Insulation test (Initial) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	

Absatz	**Photovoltaic (PV) modules**			Messergebnisse - Bemerkungen		Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*			*Measuring results - Remarks*		*Evaluation*
1-2	5.00	1.94	9.70	-	No	P
1-3	5.00	1.94	9.70	-	No	P
1-5	5.00	1.94	9.70	-	No	P
1-7	5.00	1.94	9.70	-	No	P
1-11	5.00	1.94	9.70	-	No	P
1-12	5.00	1.94	9.70	-	No	P
1-13	5.00	1.94	9.70	-	No	P
2-2	5.00	1.94	9.70	-	No	P
2-4	5.00	1.94	9.70	-	No	P
2-5	5.00	1.94	9.70	-	No	P
2-6	5.00	1.94	9.70	-	No	P
2-7	5.00	1.94	9.70	-	No	P
2-8	5.00	1.94	9.70	-	No	P
3-2	5.00	1.94	9.70	-	No	P
3-3	5.00	1.94	9.70	-	No	P
3-5	5.00	1.94	9.70	-	No	P
3-7	5.00	1.94	9.70	-	No	P
3-8	5.00	1.94	9.70	-	No	P
3-9	5.00	1.94	9.70	-	No	P
4-2	5.00	1.94	9.70	-	No	P
4-3	5.00	1.94	9.70	-	No	P
4-5	5.00	1.94	9.70	-	No	P
4-7	5.00	1.94	9.70	-	No	P
4-8	5.00	1.94	9.70	-	No	P
4-9	5.00	1.94	9.70	-	No	P
5-2	5.00	1.94	9.70	-	No	P
5-3	5.00	1.94	9.70	-	No	P
5-4	5.00	1.94	9.70	-	No	P
5-6	5.00	1.94	9.70	-	No	P
5-7	5.00	1.94	9.70	-	No	P
5-8	5.00	1.94	9.70	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information: insulation tester can measure up to 5.00 GΩ.						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 17	**Wet leakage current test (Initial) - MST 17**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
1-2	5000.0	1.94	9700.0	P
1-3	5000.0	1.94	9700.0	P
1-5	4690.0	1.94	9099.0	P
1-7	5000.0	1.94	9700.0	P
1-12	5000.0	1.94	9700.0	P
1-13	5000.0	1.94	9700.0	P
2-2	3525.0	1.94	6839.0	P
2-4	3650.0	1.94	7081.0	P
2-7	5764.0	1.94	7267.0	P
2-8	3206.0	1.94	6220.0	P
3-2	5000.0	1.94	9700.0	P
3-3	5000.0	1.94	9700.0	P
3-5	5000.0	1.94	9700.0	P
3-8	5000.0	1.94	9700.0	P
3-9	5000.0	1.94	9700.0	P
4-2	4534.0	1.94	8796.0	P
4-3	5000.0	1.94	9700.0	P
4-5	4597.0	1.94	8918.0	P
4-8	4116.0	1.94	7985.0	P
4-9	4016.0	1.94	7791.0	P
5-2	5000.0	1.94	9700.0	P
5-4	5000.0	1.94	9700.0	P
5-6	5000.0	1.94	9700.0	P
5-7	5000.0	1.94	9700.0	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information: the tester can measure up to 5000.0 MΩ.				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 11	**Accessibility test (Initial) - MST 11**	
Applied force [N]	10	—
Sample No.	Result [MΩ]	—
1-3	60.0	P
1-5	60.0	P
1-7	60.0	P
1-12	60.0	P
1-13	60.0	P
2-2	60.0	P
2-4	60.0	P
2-7	60.0	P
2-8	60.0	P
3-3	60.0	P
3-5	60.0	P
3-8	60.0	P
3-9	60.0	P
4-3	60.0	P
4-5	60.0	P
4-8	60.0	P
4-9	60.0	P
5-2	60.0	P
5-4	60.0	P
5-6	60.0	P
5-7	60.0	P
Supplementary information: the ohmmerter can measure up to 60.0 MΩ.		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 13	**Continuity test of equipotential bonding (Initial) - MST 13**		
Maximum overcurrent protection rating [A]		15	—
Current applied [A]		37.5	
Duration of applied current [min]		2	
Location of designated grounding point		At the side of longer side.	
Location of second contacting point		Adjacent side with greatest distance from the grounding point; At the center of another longer side; At the center of another shorter side.	
Sample No.	Voltage [mV]	Resistance [mΩ]	—
1-7	37.6 40.5 36.7	1.00 1.08 0.98	P
1-9	33.1 37.1 30.8	0.88 0.99 0.82	P
1-12	34.1 36.1 33.6	0.91 0.96 0.90	P
1-13	35.4 36.9 34.5	0.94 0.98 0.92	P
2-7	35.1 36.4 31.0	0.94 0.97 0.83	P
2-8	36.2 37.0 34.8	0.97 0.99 0.93	P
3-8	36.0 36.8 31.2	0.960 0.981 0.832	P
3-9	35.6 37.1 30.8	0.949 0.989 0.821	P
3-11	31.0 31.6 30.8	0.827 0.843 0.821	P

Absatz *Clause*	**Photovoltaic (PV) modules** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
4-8	31.3 33.4 31.6	0.835 0.891 0.843	P
4-9	31.2 32.1 29.6	0.832 0.856 0.789	P
5-6	39.2 44.0 39.6	1.045 1.173 1.056	P
5-7	40.9 42.6 39.8	1.091 1.136 1.061	P
Supplementary information: N/A			

MST 12	**Cut susceptibility test – MST 12**		
Applied force [N]		8.9 ± 0.5	—
Sample No.	Test results		
1-3	☒ No exposure of active circuitry of the module		P
1-5	☒ No exposure of active circuitry of the module		P
1-7	☒ No exposure of active circuitry of the module		P
1-12	☒ No exposure of active circuitry of the module		P
1-13	☒ No exposure of active circuitry of the module		P
2-2	☒ No exposure of active circuitry of the module		P
2-4	☒ No exposure of active circuitry of the module		P
2-7	☒ No exposure of active circuitry of the module		P
2-8	☒ No exposure of active circuitry of the module		P
3-3	☒ No exposure of active circuitry of the module		P
3-5	☒ No exposure of active circuitry of the module		P
3-8	☒ No exposure of active circuitry of the module		P
3-9	☒ No exposure of active circuitry of the module		P
4-3	☒ No exposure of active circuitry of the module		P
4-5	☒ No exposure of active circuitry of the module		P
4-8	☒ No exposure of active circuitry of the module		P
4-9	☒ No exposure of active circuitry of the module		P
5-2	☒ No exposure of active circuitry of the module		P
5-4	☒ No exposure of active circuitry of the module		P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

5-6	☒	No exposure of active circuitry of the module	P
5-7	☒	No exposure of active circuitry of the module	P
Supplementary information: N/A			

MST 01	**Visual inspection (after Cut susceptibility test) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-3	No exposure of active circuitry of the module	P
1-5	No exposure of active circuitry of the module	P
1-7	No exposure of active circuitry of the module	P
1-12	No exposure of active circuitry of the module	P
1-13	No exposure of active circuitry of the module	P
2-2	No exposure of active circuitry of the module	P
2-4	No exposure of active circuitry of the module	P
2-7	No exposure of active circuitry of the module	P
2-8	No exposure of active circuitry of the module	P
3-3	No exposure of active circuitry of the module	P
3-5	No exposure of active circuitry of the module	P
3-8	No exposure of active circuitry of the module	P
3-9	No exposure of active circuitry of the module	P
4-3	No exposure of active circuitry of the module	P
4-5	No exposure of active circuitry of the module	P
4-8	No exposure of active circuitry of the module	P
4-9	No exposure of active circuitry of the module	P
5-2	No exposure of active circuitry of the module	P
5-4	No exposure of active circuitry of the module	P
5-6	No exposure of active circuitry of the module	P
5-7	No exposure of active circuitry of the module	P
Supplementary information: N/A		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 16	**Insulation test (after Cut susceptibility test) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-3	34.90	1.94	67.71	-	No	P
1-5	57.70	1.94	111.94	-	No	P
1-7	6.20	1.94	12.03	-	No	P
1-12	13.60	1.94	26.38	-	No	P
1-13	6.46	1.94	12.53	-	No	P
2-2	34.90	1.94	67.71	-	No	P
2-4	30.60	1.94	59.36	-	No	P
2-7	37.50	1.94	72.75	-	No	P
2-8	5.53	1.94	10.73	-	No	P
3-3	38.50	1.94	74.69	-	No	P
3-5	21.70	1.94	42.1	-	No	P
3-8	14.60	1.94	28.32	-	No	P
3-9	12.40	1.94	24.06	-	No	P
4-3	43.5	1.94	84.39	-	No	P
4-5	40.5	1.94	78.57	-	No	P
4-8	42.9	1.94	83.23	-	No	P
4-9	30.6	1.94	59.36	-	No	P
5-2	17.0	1.94	32.98	-	No	P
5-4	19.0	1.94	36.86	-	No	P
5-6	17.0	1.94	32.98	-	No	P
5-7	3.56	1.94	6.91	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information: N/A						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 17	**Wet leakage current test (after Cut susceptibility test) - MST 17**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured [MΩ]	Area [m²]	Result* [MΩ × m²]	—
1-3	6000.0	1.94	11640.0	P
1-5	030.0	1.94	7818.2	P
1-7	5300.0	1.94	10282.0	P
1-12	3140.0	1.94	6091.6	P
1-13	3030.0	1.94	5878.2	P
2-2	2650.0	1.94	5141.0	P
2-4	1540.0	1.94	2988.0	P
2-7	1640.0	1.94	3181.6	P
2-8	1770.0	1.94	3433.8	P
3-3	3500.0	1.94	6790.0	P
3-5	2320.0	1.94	4500.8	P
3-8	2220.0	1.94	4306.8	P
3-9	2400.0	1.94	4656.0	P
4-3	1850.0	1.94	3589.0	P
4-5	1410.0	1.94	2735.4	P
4-8	1730.0	1.94	3356.1	P
4-9	1750.0	1.94	3395.0	P
5-2	2450.0	1.94	4753.0	P
5-4	1840.0	1.94	3569.6	P
5-6	2320.0	1.94	4500.8	P
5-7	2570.0	1.94	4985.8	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information:N/A				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 11	**Accessibility test (after Cut susceptibility test) - MST 11**	
Applied force [N]	10	—
Sample No.	Result [MΩ]	—
1-3	50.0	P
1-5	50.0	P
1-7	60.0	P
1-12	50.0	P
1-13	50.0	P
2-2	50.0	P
2-4	50.0	P
2-7	50.0	P
2-8	50.0	P
3-3	50.0	P
3-5	50.0	P
3-8	50.0	P
3-9	50.0	P
4-3	60.0	P
4-5	50.0	P
4-8	50.0	P
4-9	50.0	P
5-2	60.0	P
5-4	50.0	P
5-6	50.0	P
5-7	50.0	P
Supplementary information: N/A		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 13	**Continuity test of equipotential bonding (after Cut susceptibility test) - MST 13**		
Maximum overcurrent protection rating [A]		15	—
Current applied [A]		37.5	
Duration of applied current [s]		2	
Location of designated grounding point		At the side of longer side.	
Location of second contacting point		Adjacent side with greatest distance from the grounding point; At the center of another longer side; At the center of another shorter side.	
Sample No.	Voltage [mV]	Resistance [mΩ]	—
1-3	369.4 380.7 366.5	9.85 10.15 9.77	P
1-5	367.8 374.2 390.1	9.81 9.98 10.4	P
1-7	356.8 423.6 376.2	9.52 11.30 10.03	P
1-12	37.8 38.8 40.5	1.01 1.03 1.08	P
1-13	155.6 186.3 232.1	4.15 4.97 6.19	P
2-7	140.9 148.4 143.6	3.76 3.96 3.83	P
2-8	202.4 219.0 466.7	5.40 5.84 12.45	P
3-3	394.7 401.7 411.3	10.53 10.71 10.97	P
3-8	197.5 192.2 183.6	5.27 5.13 4.89	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
3-9	130.9 130.3 125.2	3.49 3.47 3.34	P
4-8	220.9 251.5 247.3	5.89 6.71 6.59	P
4-9	166.2 191.0 182.4	4.43 5.09 4.86	P
5-6	183.8 182.7 171.7	4.90 4.87 4.58	P
5-7	191.1 255.2 239.3	5.10 6.81 6.38	P
Supplementary information: N/A			

MST 14	**Impulse voltage test - MST 14**	
Maximum system voltage [V]	1500	—
Impulse voltage [V]	16000	
Sample No.	Test results	
1-11	☒ No evidence of dielectric breakdown or surface tracking observed	P
2-6	☒ No evidence of dielectric breakdown or surface tracking observed	P
3-7	☒ No evidence of dielectric breakdown or surface tracking observed	P
4-7	☒ No evidence of dielectric breakdown or surface tracking observed	P
5-8	☒ No evidence of dielectric breakdown or surface tracking observed	P
Supplementary information: N/A		

MST 01	**Visual inspection (after Impulse voltage test) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-11	No visual defects	P
2-6	No visual defects	P
3-7	No visual defects	P
4-7	No visual defects	P
5-8	No visual defects	P
Supplementary information: N/A		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 16	**Insulation test (after Impulse voltage test) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-11	3.78	1.94	7.33	-	No	P
2-6	0.88	1.94	1.71	-	No	P
3-7	1.93	1.94	3.74	-	No	P
4-7	1.99	1.94	3.86	-	No	P
5-8	1.92	1.94	3.72	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information: Insulation tester can measure up to 5.00 GΩ.						

MST 21	**Temperature test - MST 21**			
Sample No.	1-2			—
Test Method	☒ Solar simulator method			—
Irradiance [W/m²]	1000			
Air temperature [°C]	23.9			
Wind-speeds [m/s]	0			
Measuring location	Component temperature T_{OBS} [°C]	Normalised temperature T_{CON} [°C]	Component temperature limit [°C]	—
Module frontsheet above the centre cell	47.8	64.7	—	P
Module backsheet below the centre cell	68.7	85.7	120	P
Terminal enclosure interior surface	53.8	70.8	85	P
Field wiring terminals	N/A	N/A	N/A	N/A*
Insulation of the field wiring leads	36.2	53.2	85	P
External connector bodies	36.1	53.0	85	P
Bypass diode bodies	N/A	N/A	N/A	N/A*
Supplementary information: * The field wiring terminals and bypass diode bodies can not be accessible because the junction box was potted. $T_{CON} = T_{OBS} + (40°C – T_{AIR})$. Thermal material requirements are given in 5.5 of IEC 61730-1:2016.				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 21	**Temperature test - MST 21**			
Sample No.	3-2			—
Test Method	☒ Solar simulator method			—
Irradiance [W/m²]	1000			
Air temperature [°C]	23.9			
Wind-speeds [m/s]	0			
Measuring location	Component temperature T_{OBS} [°C]	Normalised temperature T_{CON} [°C]	Component temperature limit [°C]	—
Module frontsheet above the centre cell	54.1	71.7	—	P
Module backsheet below the centre cell	83.9	101.6	126	P
Terminal enclosure interior surface	59.7	77.4	85	P
Field wiring terminals	N/A	N/A	N/A	N/A*
Insulation of the field wiring leads	38.1	55.8	85	P
External connector bodies	35.5	53.2	85	P
Bypass diode bodies	N/A	N/A	N/A	N/A*

Supplementary information:
* The field wiring terminals and bypass diode bodies can not be accessible because the junction box was potted.
$T_{CON} = T_{OBS} + (40°C – T_{AIR})$. Thermal material requirements are given in 5.5 of IEC 61730-1:2016.

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 21	**Temperature test - MST 21**			
Sample No.	4-2			—
Test Method	☒ Solar simulator method			—
Irradiance [W/m²]	1000			
Air temperature [°C]	23.9			
Wind-speeds [m/s]	0			
Measuring location	Component temperature T_{OBS} [°C]	Normalised temperature T_{CON} [°C]	Component temperature limit [°C]	—
Module frontsheet above the centre cell	49.0	57.2	—	P
Module backsheet below the centre cell	82.3	90.5	113	P
Terminal enclosure interior surface	36.0	44.1	85	P
Field wiring terminals	N/A	N/A	N/A	N/A*
Insulation of the field wiring leads	54.4	62.6	85	P
External connector bodies	35.2	43.4	85	P
Bypass diode bodies	N/A	N/A	N/A	N/A*
Supplementary information: * The field wiring terminals and bypass diode bodies can not be accessible because the junction box was potted. $T_{CON} = T_{OBS} + (40°C – T_{AIR})$. Thermal material requirements are given in 5.5 of IEC 61730-1:2016.				

MST 01	**Visual inspection (after Temperature test) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-2	No visual defects	P
3-2	No visual defects	P
4-2	No visual defects	P
Supplementary information: N/A		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 16	**Insulation test (after Temperature test) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-2	21.7	1.94	42.10	-	No	P
3-2	20.0	1.94	38.80	-	No	P
4-2	21.4	1.94	41.52	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information: N/A						

MST 17	**Wet leakage current test (after Temperature test) - MST 17**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		—
Solution temperature [°C]		22 ± 2		—
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
1-2	4060.0	1.94	7876.4	P
3-2	7500.0	1.94	14550.0	P
4-2	3770.0	1.94	7313.8	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information: N/A				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 24	**Ignitability test - MST 24**	
Sample No.	1-10, 3-10, 4-10	—
Surface exposure		—
☐ Ignition occurs.		P
☐ The flame tip reaches a height of 150 mm above the flame application point at < 20 s		P
Edge exposure		—
☐ Ignition occurs.		P
☐ The flame tip reaches a height of 150 mm above the flame application point at < 20 s		P
Supplementary information: N/A		

MST 26	**Reverse current overload test - MST 26**	
Module over-current protection rating [A]	15	—
Test current [A]	20.25	
Range of applied voltage [V]	48.9-54.3	
Test duration [h]	2	
Sample No.	Test results	—
1-2	☒ No flaming of the PV module	P
	☒ No flaming or charring of the tissue paper	P
Supplementary information: N/A		

MST 01	**Visual inspection (after Reverse current overload test) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-2	No visual defects	P
Supplementary information: N/A		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 16	**Insulation test (after Reverse current overload test) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-2	24.20	1.94	46.95	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information: N/A						

MST 17	**Wet leakage current test (after Reverse current overload test) - MST 17**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
1-2	4320.0	1.94	8380.8	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information: N/A				

MST 32	**Module breakage test - MST 32**	
Weight of impactor [kg]	45.5 ± 0.5	—
Drop height [mm]	300	
Mounting technique used	4 clamps & 2 rails on the position of ¼ length	
Sample No.	Test results	—
1-9	☒ No Breakage occurred	P
	☐ PV module separated from the mounting structure or from the framing.	N/A
	☐ Breakage occurred, but no shear or opening large enough for a 76 mm diameter sphere to pass freely has developed and no particles larger than 6.5 cm² have been ejected from the sample.	N/A
Supplementary information: N/A		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 32	**Module breakage test - MST 32**		
Weight of impactor [kg]		45.5 ± 0.5	—
Drop height [mm]		300	
Mounting technique used		4 clamps & 2 rails on the position of ¼ length	
Sample No.	Test results		—
3-11	☒ No Breakage occurred		P
	☐ PV module separated from the mounting structure or from the framing.		N/A
	☐ Breakage occurred, but no shear or opening large enough for a 76 mm diameter sphere to pass freely has developed and no particles larger than 6.5 cm² have been ejected from the sample.		N/A
Supplementary information: N/A			

MST 13	**Continuity test of equipotential bonding (after Module breakage test) - MST 13**		
Maximum overcurrent protection rating [A]		15	—
Current applied [A]		37.5	
Duration of applied current [s]		2	
Location of designated grounding point		At the side of longer side.	
Location of second contacting point		Adjacent side with greatest distance from the grounding point; At the center of another longer side; At the center of another shorter side.	
Sample No.	Voltage [mV]	Resistance [mΩ]	—
1-9	69.2 64.7 71.1	1.85 1.73 1.90	P
3-11	74.0 75.0 75.7	1.97 2.00 2.01	P
Supplementary information: N/A			

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 37	**Materials Creep test - MST 37**	
Temperature [°C]	105 ± 5	—
Duration [h]	200	—
Sample No.	Open circuits (yes/no)	—
1-12	no	—
2-7	no	—
3-8	no	—
4-8	no	—
5-6	no	—
Supplementary information: N/A		

MST 01	**Visual inspection (after Materials Creep test) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-12	No exposure of active circuitry of the module	P
2-7	No exposure of active circuitry of the module	P
3-8	No exposure of active circuitry of the module	P
4-8	No exposure of active circuitry of the module	P
5-6	No exposure of active circuitry of the module	P
Supplementary information: N/A		

MST 16	**Insulation test (after Materials Creep test) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-12	60.0	1.94	116.4	-	No	P
2-7	57.70	1.94	111.94	-	No	P
3-8	42.9	1.94	83.2	-	No	P
4-8	51.7	1.94	100.3	-	No	P
5-6	48.4	1.94	93.90	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information: N/A						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 17	**Wet leakage current test (after Materials Creep test) - MST 17**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
1-12	4260.0	1.94	8264.4	P
2-7	3650.0	1.94	7081.0	P
3-8	5810.0	1.94	11271.4	P
4-8	3760.0	1.94	7294.4	P
5-6	4970.0	1.94	9641.8	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information: N/A				

MST 11	**Accessibility test (after Materials Creep test) - MST 11**	
Applied force [N]	10	—
Sample No.	Result [MΩ]	—
1-12	50.0	P
2-7	50.0	P
3-8	50.0	P
4-8	50.0	P
5-6	50.0	P
Supplementary information: The ohmmerter can measure up to 50.0 MΩ.		

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 13	**Continuity test of equipotential bonding (after Materials Creep test) - MST 13**		
Maximum overcurrent protection rating [A]		15	—
Current applied [A]		37.5	
Duration of applied current [s]		2	
Location of designated grounding point		At the side of longer side.	
Location of second contacting point		Adjacent side with greatest distance from the grounding point; At the center of another longer side; At the center of another shorter side.	
Sample No.	Voltage [mV]	Resistance [mΩ]	—
1-12	178.3 196.5 189.9	4.75 5.24 5.06	P
2-7	163.3 185.9 191.5	4.35 4.96 5.11	P
3-8	159.3 180.6 166.7	4.25 4.82 4.45	P
4-8	314.5 320.6 330.8	8.39 8.55 8.82	P
5-6	322.8 352.3 351.9	8.61 9.39 9.38	P
Supplementary information: N/A			

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 55	**Damp heat test - MST 53**	
Total duration [h]	200	—
Sample No.	—	
1-13	—	
2-8	—	
3-9	—	
4-9	—	
5-7	—	
Supplementary information: N/A		

MST 01	**Visual inspection (after Damp heat test (200h)) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-13	No visual defects	P
2-8	No visual defects	P
3-9	No visual defects	P
4-9	No visual defects	P
5-7	No visual defects	P
Supplementary information: N/A		

MST 16	**Insulation test (after Damp heat test (200h)) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-13	5.21	1.94	10.11	-	No	P
2-8	2.20	1.94	4.27	-	No	P
3-9	2.45	1.94	4.75	-	No	P
4-9	28.8	1.94	55.87	-	No	P
5-7	2.75	1.94	5.34	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information: N/A						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 54	**UV test (Cycle 1) – MST 54**	
Module temperature [°C]	60 ± 5	—
Ratio of UV-B irradiation (280 – 320 nm) [%]	3 - 10	
UV irradiation dose (280 – 400 nm) [kWh/m²]	60	
Sample No.	Open circuits (yes/no)	
1-13	no	—
2-8	no	—
3-9	no	—
4-9	no	—
5-7	no	—
Supplementary information: Sample was short circuited and the front side was irradiated.		

MST 01	**Visual inspection (after UV test (Cycle 1)) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-13	No visual defects	P
2-8	No visual defects	P
3-9	No visual defects	P
4-9	No visual defects	P
5-7	No visual defects	P
Supplementary information: N/A		

MST 16	**Insulation test (after UV test (Cycle 1)) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-13	23.8	1.94	46.17	-	No	P
2-8	24.56	1.94	47.72	-	No	P
3-9	17.60	1.94	34.14	-	No	P
4-9	27.8	1.94	53.93	-	No	P
5-7	23.8	1.94	46.17	-	No	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

* Minimum requirement acc. to the standard is 0.04 GΩ × m².
Supplementary information: N/A

MST 52	**Humidity freeze test (Cycle 1) - MST 52**	
Total number of cycles	10	—
Sample No.	Open circuits (yes/no)	
1-13	no	—
2-8	no	—
3-9	no	—
4-9	no	—
5-7	no	—
Supplementary information: N/A		

MST 01	**Visual inspection (after Humidity freeze test (Cycle 1)) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-13	No visual defects	P
2-8	No visual defects	P
3-9	No visual defects	P
4-9	No visual defects	P
5-7	No visual defects	P
Supplementary information: N/A		

MST 16	**Insulation test (after Humidity freeze test (Cycle 1)) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-13	3.39	1.94	6.58	-	No	P
2-8	1.98	1.94	3.84	-	No	P
3-9	4.59	1.94	8.90	-	No	P
4-9	13.8	1.94	26.77	-	No	P
5-7	1.64	1.94	3.18	-	No	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

* Minimum requirement acc. to the standard is 0.04 GΩ × m².
Supplementary information: N/A

MST 54	**UV test (Cycle 2) – MST 54**	
Module temperature [°C]	60 ± 5	—
Ratio of UV-B irradiation (280 – 320 nm) [%]	3 - 10	
UV irradiation dose (280 – 400 nm) [kWh/m²]	60	
Sample No.	Open circuits (yes/no)	
1-13	no	—
2-8	no	—
3-9	no	—
4-9	no	—
5-7	no	—
Supplementary information: Sample was short circuited and the back side was irradiated.		

MST 01	**Visual inspection (after UV test (Cycle 2)) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-13	No visual defects	P
2-8	No visual defects	P
3-9	No visual defects	P
4-9	No visual defects	P
5-7	No visual defects	P
Supplementary information: N/A		

MST 16	**Insulation test (after UV test (Cycle 2)) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-13	3.69	1.94	7.16	-	No	P
2-8	1.62	1.94	3.14	-	No	P
3-9	3.23	1.94	6.27	-	No	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4-9	26.80	1.94	51.99	-	No	P
5-7	1.84	1.94	3.57	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information: NA						

MST 52	**Humidity freeze test (Cycle 2) - MST 52**	
Total number of cycles	10	—
Sample No.	Open circuits (yes/no)	
1-13	no	—
2-8	no	—
3-9	no	—
4-9	no	—
5-7	no	—
Supplementary information: N/A		

MST 01	**Visual inspection (after Humidity freeze test (Cycle 2)) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-13	No visual defects	P
2-8	No visual defects	P
3-9	No visual defects	P
4-9	No visual defects	P
5-7	No visual defects	P
Supplementary information: N/A		

MST 16	**Insulation test (after Humidity freeze test (Cycle 2)) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-13	2.50	1.94	4.85	-	No	P
2-8	1.90	1.94	3.69	-	No	P
3-9	1.64	1.94	3.18	-	No	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

4-9	12.60	1.94	24.44	-	No	P
5-7	1.96	1.94	3.80	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information: N/A						

MST 17	**Wet leakage current test (after Humidity freeze test (Cycle 2)) - MST 17**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured [MΩ]	Area [m²]	Result* [MΩ × m²]	—
1-13	2190.0	1.94	4249.0	P
2-8	1440.0	1.94	2794.0	P
3-9	1820.0	1.94	3531.0	P
4-9	1380.0	1.94	2677.0	P
5-7	1590.0	1.94	3085.0	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information: N/A				

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 55	**Cold conditioning test (Cycle 1)- MST 55**	
Temperature [°C]	–40 ± 3	—
Duration [h]	48	—
Sample No.	Open circuits (yes/no)	—
1-12	no	—
2-7	no	—
3-8	no	—
4-8	no	—
5-6	no	—
Supplementary information: N/A		

MST 01	**Visual inspection (after Cold conditioning test (Cycle 1)) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-12	No visual defects	P
2-7	No visual defects	P
3-8	No visual defects	P
4-8	No visual defects	P
5-6	No visual defects	P
Supplementary information: N/A		

MST 16	**Insulation test (after Cold conditioning test (Cycle 1)) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-12	39.50	1.94	76.63	-	No	P
2-7	36.60	1.94	71.00	-	No	P
3-8	28.80	1.94	55.87	-	No	P
4-8	44.1	1.94	85.55	-	No	P
5-6	31.2	1.94	60.53	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m².						
Supplementary information: N/A						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 56	**Dry heat conditioning test - MST 56**	
Temperature [°C]	105 ± 5	—
Relative humidity [%]	< 50	
Duration [h]	200	—
Sample No.	Open circuits (yes/no)	—
1-12	no	—
2-7	no	—
3-8	no	—
4-8	no	—
5-6	no	—
Supplementary information: N/A		

MST 01	**Visual inspection (after Dry heat conditioning test) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-12	No visual defects	P
2-7	No visual defects	P
3-8	No visual defects	P
4-8	No visual defects	P
5-6	No visual defects	P
Supplementary information: N/A		

MST 16	**Insulation test (after Dry heat conditioning test) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-12	60.00	1.94	116.40	-	No	P
2-7	57.70	1.94	111.94	-	No	P
3-8	42.90	1.94	83.20	-	No	P
4-8	51.7	1.94	100.3	-	No	P
5-6	48.4	1.94	93.90	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m².						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

Supplementary information: N/A

MST 52	**Humidity freeze test (Cycle 1) - MST 52**	
Total number of cycles	10	—
Sample No.	Open circuits (yes/no)	
1-12	no	—
2-7	no	—
3-8	no	—
4-8	no	—
5-6	no	—

Supplementary information: N/A

MST 01	**Visual inspection (after Humidity freeze test (Cycle 1)) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-12	No visual defects	P
2-7	No visual defects	P
3-8	No visual defects	P
4-8	No visual defects	P
5-6	No visual defects	P

Supplementary information: N/A

MST 16	**Insulation test (after Humidity freeze test (Cycle 1)) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-12	9..03	1.94	17.52	-	No	P
2-7	28.80	1.94	55.87	-	No	P
3-8	7.46	1.94	14.47	-	No	P
4-8	25.4	1.94	49.28	-	No	P
5-6	6.85	1.94	13.29	-	No	P

* Minimum requirement acc. to the standard is 0.04 GΩ × m².

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

Supplementary information: N/A

MST 55	**Cold conditioning test (Cycle 2)- MST 55**	
Temperature [°C]	–40 ± 3	—
Duration [h]	48	—
Sample No.	Open circuits (yes/no)	—
1-12	no	—
2-7	no	—
3-8	no	—
4-8	no	—
5-6	no	—
Supplementary information: N/A		

MST 01	**Visual inspection (after Cold conditioning test (Cycle 2)) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-12	No visual defects	P
2-7	No visual defects	P
3-8	No visual defects	P
4-8	No visual defects	P
5-6	No visual defects	P
Supplementary information: N/A		

MST 16	**Insulation test (after Cold conditioning test (Cycle 2)) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-12	9.43	1.94	18.29	-	No	P
2-7	39.50	1.94	76.63	-	No	P
3-8	5.51	1.94	10.69	-	No	P
4-8	51.7	1.94	100.30	-	No	P
5-6	4.70	1.94	9.12	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m².						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

Supplementary information: N/A

MST 52	**Humidity freeze test (Cycle 2) - MST 52**	
Total number of cycles	10	—
Sample No.	Open circuits (yes/no)	
1-12	no	—
2-7	no	—
3-8	no	—
4-8	no	—
5-6	no	—
Supplementary information: N/A		

MST 01	**Visual inspection (after Humidity freeze test (Cycle 2)) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-12	No visual defects	P
2-7	No visual defects	P
3-8	No visual defects	P
4-8	No visual defects	P
5-6	No visual defects	P
Supplementary information: N/A		

MST 16	**Insulation test (after Humidity freeze test (Cycle 2)) - MST 16**					
Maximum system voltage [V]				1500		—
High voltage applied [V]				8000		
Insulation resistance measured at [V]				1500		
Sample No.	Measured	Area	Result*	Dielectric breakdown		
	[GΩ]	[m²]	[GΩ × m²]	Yes (description)	No	
1-12	2.75	1.94	5.34	-	No	P
2-7	12.40	1.94	24.06	-	No	P
3-8	2.75	1.94	5.34	-	No	P
4-8	17.5	1.94	33.95	-	No	P
5-6	2.83	1.94	5.49	-	No	P
* Minimum requirement acc. to the standard is 0.04 GΩ × m².						

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

Supplementary information: N/A

MST 17	**Wet leakage current test (after Humidity freeze test (Cycle 2)) - MST 17**			
Maximum system voltage [V]		1500		—
Insulation resistance measured at [V]		1500		—
Solution resistivity [Ω cm]		< 3,500		P
Solution temperature [°C]		22 ± 2		P
Sample No.	Measured	Area	Result*	—
	[MΩ]	[m²]	[MΩ × m²]	
1-12	2590.0	1.94	5025.0	P
2-7	1580.0	1.94	3065.0	P
3-8	2000.0	1.94	3880.0	P
4-8	1500.0	1.94	2910.0	P
5-6	1930.0	1.94	3744.0	P
* Minimum requirement acc. to the standard is 40 MΩ × m².				
Supplementary information: N/A				

MST 04	**Insulation thickness test - MST 04**		
Measurement uncertainty [µm]		- 0.5	
Locations		Three locations per side on the PV module: Location 1 – 3 & 7 – 8 are at the edge of the longer side. Location 4 – 6 & 10 – 12 are on the soldering connections of the short side.	
Sample No.	Location	Measured value [µm]	—
1-13	1	335.6	P
	2	320.7	
	3	331.7	
	4	322.8	
	5	319.9	
	6	313.2	
	7	311.7	
	8	315.4	
	9	316.6	
	10	317.9	

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

	11	319.5	
	12	320.2	
Supplementary information: N/A			

MST 04	**Insulation thickness test - MST 04**		
Measurement uncertainty [µm]		- 0.5	
Locations		Three locations per side on the PV module: Location 1 – 3 & 7 – 8 are at the edge of the longer side. Location 4 – 6 & 10 – 12 are on the soldering connections of the short side.	
Sample No.	Location	Measured value [µm]	—
3-9	1	340.4	P
	2	340.4	
	3	348.1	
	4	339.5	
	5	343.0	
	6	343.0	
	7	334.1	
	8	340.0	
	9	343.1	
	10	344.2	
	11	341.3	
	12	343.0	
Supplementary information: N/A			

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 04	**Insulation thickness test - MST 04**		
Measurement uncertainty [µm]		- 0.5	
Locations		Three locations per side on the PV module: Location 1 – 3 & 7 – 8 are at the edge of the longer side. Location 4 – 6 & 10 – 12 are on the soldering connections of the short side.	
Sample No.	Location	Measured value [µm]	—
4-9	1	312.5	P
	2	314.9	
	3	312.4	
	4	312.7	
	5	314.2	
	6	315.6	
	7	312.5	
	8	317.1	
	9	315.4	
	10	308.6	
	11	307.6	
	12	310.1	
Supplementary information: N/A			

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 03	**Maximum power determination (Final) - MST 03**		
Irradiance (W/m^2)		700 - 1000	—
Module temperature (°C)		Corrected to 25	—
Test method		☒ Simulator ☐ Natural sunlight	—
Sample No.		Compared to the initial IV curve	—
1-1	☒	No additional kinks or other unusual characteristics	P
1-2	☒	No additional kinks or other unusual characteristics	P
1-12	☒	No additional kinks or other unusual characteristics	P
1-13	☒	No additional kinks or other unusual characteristics	P
2-7	☒	No additional kinks or other unusual characteristics	P
2-8	☒	No additional kinks or other unusual characteristics	P
3-2	☒	No additional kinks or other unusual characteristics	P
3-8	☒	No additional kinks or other unusual characteristics	P
3-9	☒	No additional kinks or other unusual characteristics	P
4-1	☒	No additional kinks or other unusual characteristics	P
4-2	☒	No additional kinks or other unusual characteristics	P
4-3	☒	No additional kinks or other unusual characteristics	P
4-5	☒	No additional kinks or other unusual characteristics	P
4-8	☒	No additional kinks or other unusual characteristics	P
4-9	☒	No additional kinks or other unusual characteristics	P
5-2	☒	No additional kinks or other unusual characteristics	P
5-3	☒	No additional kinks or other unusual characteristics	P
5-4	☒	No additional kinks or other unusual characteristics	P
5-6	☒	No additional kinks or other unusual characteristics	P
5-7	☒	No additional kinks or other unusual characteristics	P
Supplementary information: See appendix 3 for the measurement report.			

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

MST 01	**Visual inspection (Final) - MST 01**	
Sample No.	Nature and position of initial findings – comments or attach photos	—
1-1	No visual defects	P
1-2	No visual defects	P
1-3	No visual defects	P
1-5	No visual defects	P
1-7	No visual defects	P
1-11	No visual defects	P
1-12	No visual defects	P
1-13	No visual defects	P
2-1	No visual defects	P
2-2	No visual defects	P
2-4	No visual defects	P
2-5	No visual defects	P
2-6	No visual defects	P
2-7	No visual defects	P
2-8	No visual defects	P
3-1	No visual defects	P
3-2	No visual defects	P
3-3	No visual defects	P
3-5	No visual defects	P
3-7	No visual defects	P
3-8	No visual defects	P
3-9	No visual defects	P
4-1	No visual defects	P
4-2	No visual defects	P
4-3	No visual defects	P
4-5	No visual defects	P
4-8	No visual defects	P
4-9	No visual defects	P
5-1	No visual defects	P
5-2	No visual defects	P
5-4	No visual defects	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

5-6	No visual defects	P
5-7	No visual defects	P
Supplementary information: N/A		

MST 05	**Durability of markings- MST 05**	
Duration of rubbing with water [s]	15	—
Duration of rubbing with petroleum spirits [s]	15	—
Sample No.	Comments	—
1-1	The marking is legible; The marking plate is unremovable and no curling.	P
1-2	The marking is legible; The marking plate is unremovable and no curling.	P
1-3	The marking is legible; The marking plate is unremovable and no curling.	P
1-5	The marking is legible; The marking plate is unremovable and no curling.	P
1-7	The marking is legible; The marking plate is unremovable and no curling.	P
1-12	The marking is legible; The marking plate is unremovable and no curling.	P
1-13	The marking is legible; The marking plate is unremovable and no curling.	P
2-1	The marking is legible; The marking plate is unremovable and no curling.	P
2-2	The marking is legible; The marking plate is unremovable and no curling.	P
2-4	The marking is legible; The marking plate is unremovable and no curling.	P
2-7	The marking is legible; The marking plate is unremovable and no curling.	P
2-8	The marking is legible; The marking plate is unremovable and no curling.	P
3-1	The marking is legible; The marking plate is unremovable and no curling.	P
3-2	The marking is legible; The marking plate is unremovable and no curling.	P
3-3	The marking is legible; The marking plate is unremovable and no curling.	P
3-5	The marking is legible; The marking plate is unremovable and no curling.	P
3-8	The marking is legible; The marking plate is unremovable and no curling.	P
3-9	The marking is legible; The marking plate is unremovable and no curling.	P
4-1	The marking is legible; The marking plate is unremovable and no curling.	P
4-2	The marking is legible; The marking plate is unremovable and no curling.	P
4-3	The marking is legible; The marking plate is unremovable and no curling.	P
4-5	The marking is legible; The marking plate is unremovable and no curling.	P
4-8	The marking is legible; The marking plate is unremovable and no curling.	P
4-9	The marking is legible; The marking plate is unremovable and no curling.	P
5-1	The marking is legible; The marking plate is unremovable and no curling.	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

5-4	The marking is legible; The marking plate is unremovable and no curling.	P
5-2	The marking is legible; The marking plate is unremovable and no curling.	P
5-6	The marking is legible; The marking plate is unremovable and no curling.	P
5-7	The marking is legible; The marking plate is unremovable and no curling.	P
Supplementary information: N/A		

MST 06	**Sharp edge test - MST 06**	
Sample No.	Comments	—
1-1	The accessible PV module surfaces are smooth and free from sharp edges.	P
1-2	The accessible PV module surfaces are smooth and free from sharp edges.	P
1-3	The accessible PV module surfaces are smooth and free from sharp edges.	P
1-5	The accessible PV module surfaces are smooth and free from sharp edges.	P
1-7	The accessible PV module surfaces are smooth and free from sharp edges.	P
1-12	The accessible PV module surfaces are smooth and free from sharp edges.	P
1-13	The accessible PV module surfaces are smooth and free from sharp edges.	P
2-1	The accessible PV module surfaces are smooth and free from sharp edges.	P
2-4	The accessible PV module surfaces are smooth and free from sharp edges.	P
2-2	The accessible PV module surfaces are smooth and free from sharp edges.	P
2-7	The accessible PV module surfaces are smooth and free from sharp edges.	P
2-8	The accessible PV module surfaces are smooth and free from sharp edges.	P
3-1	The accessible PV module surfaces are smooth and free from sharp edges.	P
3-2	The accessible PV module surfaces are smooth and free from sharp edges.	P
3-3	The accessible PV module surfaces are smooth and free from sharp edges.	P
3-5	The accessible PV module surfaces are smooth and free from sharp edges.	P
3-8	The accessible PV module surfaces are smooth and free from sharp edges.	P
3-9	The accessible PV module surfaces are smooth and free from sharp edges.	P
4-1	The accessible PV module surfaces are smooth and free from sharp edges.	P
4-2	The accessible PV module surfaces are smooth and free from sharp edges.	P
4-3	The accessible PV module surfaces are smooth and free from sharp edges.	P
4-5	The accessible PV module surfaces are smooth and free from sharp edges.	P
4-8	The accessible PV module surfaces are smooth and free from sharp edges.	P
4-9	The accessible PV module surfaces are smooth and free from sharp edges.	P
5-1	The accessible PV module surfaces are smooth and free from sharp edges.	P
5-2	The accessible PV module surfaces are smooth and free from sharp edges.	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*
5-4	The accessible PV module surfaces are smooth and free from sharp edges.		P
5-6	The accessible PV module surfaces are smooth and free from sharp edges.		P
5-7	The accessible PV module surfaces are smooth and free from sharp edges.		P
Supplementary information: N/A			

MST 07	**Bypass diode functionality test - MST 07**			
☒ Method B				—
Sample No.	Power degradation by shading cell string protected by each diode			—
	Diode 1	Diode 2	Diode 3	—
1-1	34.3%	34.4%	34.3%	P
1-2	34.8%	35.0%	34.6%	P
1-3	34.8%	34.6%	34.6%	P
1-5	34.4%	34.8%	34.7%	P
1-7	34.2%	34.2%	35.0%	P
1-12	34.6%	34.8%	34.7%	P
1-13	34.5%	34.8%	34.5%	P
2-1	34.4%	34.4%	34.5%	P
2-4	34.4%	35.1%	34.9%	P
2-2	34.5%	34.7%	34.7%	P
2-7	34.4%	35.1%	34.9%	P
2-8	34.5%	35.1%	34.7%	P
3-1	34.5%	34.7%	34.6%	P
3-2	34.5%	34.6%	34.6%	P
3-3	34.6%	34.6%	34.6%	P
3-5	34.6%	34.7%	34.5%	P
3-8	34.6%	34.5%	34.6%	P
3-9	34.5%	34.6%	34.7%	P
4-1	34.6%	34.6%	34.6%	P
4-2	34.7%	34.9%	34.9%	P
4-3	34.6%	34.0%	34.7%	P
4-5	34.6%	34.8%	34.8%	P
4-8	34.4%	35.0%	34.9%	P
4-9	34.4%	35.0%	34.8%	P

Absatz	**Photovoltaic (PV) modules**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

5-1	34.4%	34.4%	34.5%	P
5-2	34.3%	34.7%	34.6%	P
5-4	34.3%	34.8%	34.6%	P
5-6	34.6%	34.7%	34.7%	P
5-7	34.5%	34.6%	34.6%	P
Supplementary information: N/A				